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COMPUTERISED DATA ON NATIONAL ZOOLOGICAL COLLECTION

The National Zoological Collections comprising nearly 15,000 types are housed in the Zoological Survey of India, Calcutta and are properly maintained. All these specimens have Registration numbers and are readily available for study as and when required. Data pertaining to locality, date of collection, name of collector, sex, up to date valid species name, name of the host (for parasite) etc., of each *type of collection* have already been computerised. The computerised data are stored in the computer centre of Zoological Survey of India. Scientists/Naturalists interested for any information on type species present in Zoological Survey of India may contact the *Director, Zoological Survey of India, 'M' Block, New Alipore, Kolkata-700 053.*

Dr. RAMAKRISHNA
Director-in-charge
Zoological Survey of India

AN APPEAL

In order to enrich the *"National Zoological Collection"* (NZC) and to up date information on the occurrence and distribution of animal species in India Scientists/Naturalists and researchers working on animal taxonomy/systematics are requested to deposit their identified specimens to the Zoological Survey of India at the following address :

Officer in Charge, Identification and Advisory Section,
Zoological Survey of India, M-Block, New Alipore,
Kolkata-700 053.

These specimens will be registered and their data will be computerised. *They are further requested to deposit their type collection positively of ZSI and use the Registration number in their publication of the new taxon.*

Dr. RAMAKRISHNA
Director-in-charge
Zoological Survey of India

Rec. zool. Surv. India **109**(Part–1) 1-12, 2009

A POPULATION SURVEY OF RHESUS MACAQUES AND HANUMAN LANGURS IN DHENKANAL DISTRICT, ORISSA

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

INTRODUCTION

The religious and philosophical beliefs and tolerance towards the monkeys by the people for their sacred status lead to their protection for centuries in India. At present, the breaking down of these taboos, and due to rapid cultural changes and urbanization are the factors that majority people do not consider the monkeys as sacred rather consider the monkeys as pest and destructive agents to the crops and household properties. Hopefully, the sacred status is still enjoyed by the monkeys in Orissa. Field studies on the non-human primates of Orissa carried out by Tiwari and Mukherjee (1992). Behura *et al.* (1969) reported the wild life fauna of Orissa; Tiwari *et al.* (1997) published the sightings of monkeys at Chandaka Wild life Sanctuary, Khurda district. A comprehensive faunal account of Simlipal Biosphere Reserve was recorded by Ramakrishna *el al.* (2006). Chaudhuri *et al* (2007) published the non-human primates of Nayagarh district; Ramakrishna *et al* (2008) reported the Hanuman langur population of Baleswar district, Orissa. The two common species of monkeys that are found in Orissa are rhesus macaque *(Macaca mulatto)* and Hanuman langur *(Semnopithecus entellus).* These two monkeys are found in many parts of India and occupy diverse habitats, ranging from dense forests to open lands, montane region and near human settlements.

The early history of Dhenkanal is locally derived from an aboriginal name "Dhenka" to the "Dhenkanal Raj" a group of Princely States in the middle of 17th century. This district came into existence on 1st January 1948 after the merger of two ex-states of Dhenkanal and Hindol, with the province of Orissa. This report deals with the information regarding distribution, abundance and social composition of Rhesus macaques and Hanuman langurs of Dhenkanal district.

STUDY AREAS

Dhenkanal district is located at central Orissa. It lies between 20°29'–21°11' N and 85°10'–86°2' E with an area of 4330 Km^2 The human population of this district is 10,65,983 (2001) and

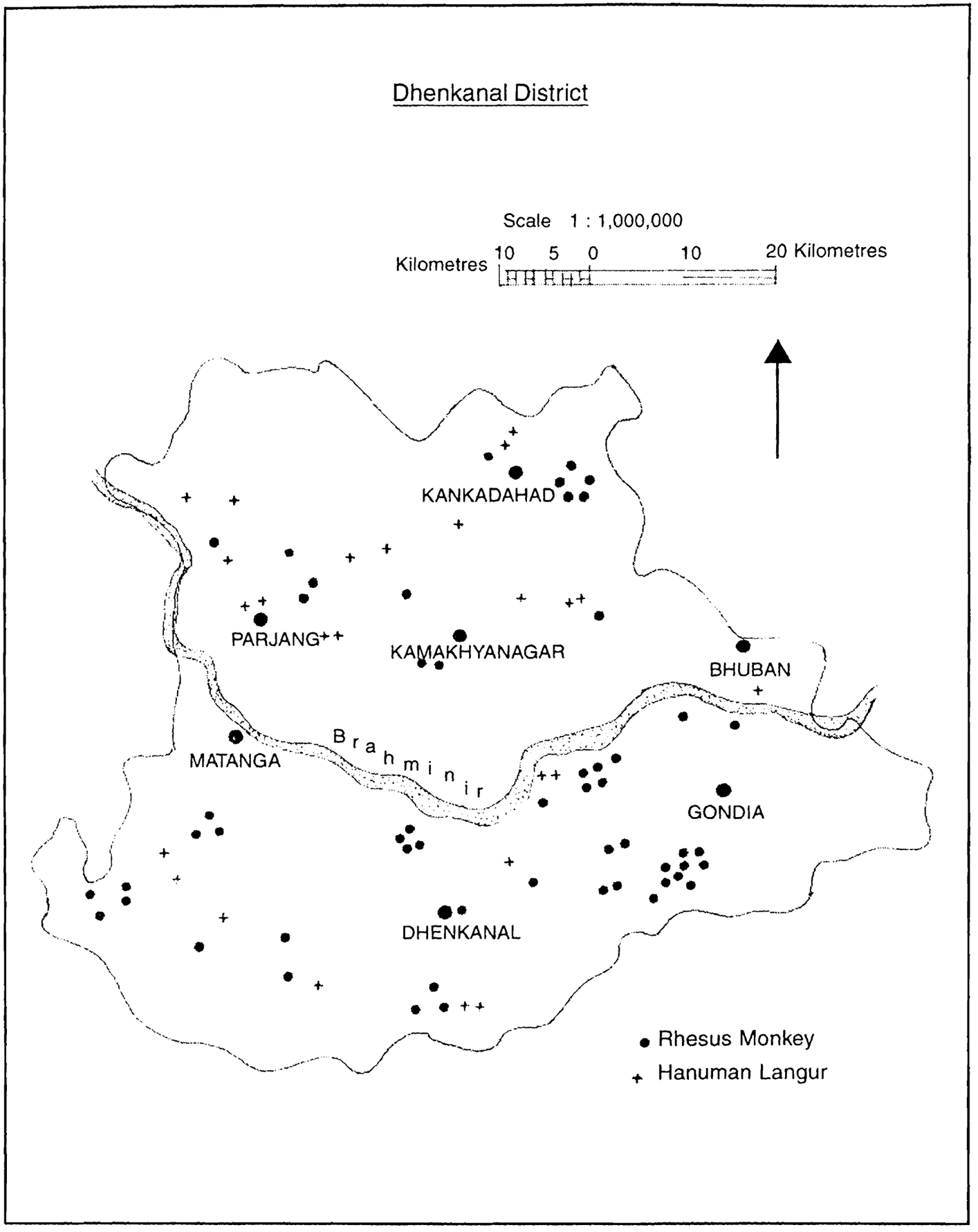

Fig. 1 : Distribution of Rhesus monkey and Hanuman Langur.

during 1991 census it was 947,670 persons. The demographic pattern of this district has increased over a period of two years from 218.8 persons/km^2 to 246.1 persons/km^2 The district has sub-division as Dhenkanal (Headquarter), Bhuban and Kamakhanagar. The district is connected by road with adjoining Cuttack and Angul districts of Orissa and very few train services on Talcher-Cuttack sector provide rail connection. The lack of sufficient communication is the main problem in the development of the district.

GEOMORPHOLOGY

Geomorphologically the district forms 3 sub-division *viz* northern and southern hill ranges and intervening Brahmini river basin. Northern hill ranges are situated to the north of Brahamini river with a strech of 32 km. Southern hill ranges running in a direction of west northeast to east southwest in western part and to south SE to east NE in eastern region. Central Brahmini river valley has a moderately plain land to undulating topography with few scattered hillocks. The soil groups consisted of laterite, alluvial red loamy and black clay. Geological formation is composed of Gondowana sand stones, semi-consolidated tertiary laterite and unconsolidated alluvium river basin. The minerals that are available are good quality coal, graphite of high grade, chromite, kyanite, chinaclay, variants of granite. Semi-precious stones like garnet, moonstone, pink sapphire, pink corundum, rock crystals are also available in this district.

Climate of the district is warm and humid and it enjoys a sub-tropical monsoon climate, with 3 seasons- winters, summer and monsoon. May is the hottest month with a mean daily temperature of 41°C and January is the coldest having a mean daily temperature of 13°C. Mean annual temperature is 24.4°C and average annual rainfall is about 1420 mm. The rainfall is declining from 2000 AD, during 2000 it was 898 mm and in 2002 it was 797 mm annually, which was 56% of the normal. Now it is about around 1200–1300 mm annually. Brahmini is the main river that divides the district into almost two equal halves in a semicircular manner. The river Brahmini and few of its tributaries are major perennial water source in this district. Relative humidity in the Dhenkanal district is fairly high throughout the year, in contrast to the neighbouring district Angul. Maximum relative humidity is in the month of October and minimum in May. Humidity is high in the eastern and southeastern parts of the district.

FOREST TYPE

Four major types of forest are found in Dhenkananl district, *viz* Orissa Tropical semi evergreen forest; Laterite semi-evergreen forests; North Indian Tropical moist mixed deciduous forests and North Indian tropical moist peninsular sal forests. There are number of hills and hill ranges covered

with good forest throughout the district and the highest peak is Kanaka (751 m). Total reserve forest of the district is 1107 Km^2 The other types of forested areas comprised of village forest, Debottar forests, unclassed forests, and the total forested areas of the district including reserves is calculated around 1341 Km^2 This provides forested areas of the District are around 31%, which is fairly good.

Major trees of the district Acacia *auricnliformin, Aacia niotica, Acacia niotica, Acacia catechu, Acacia leucophloca, Albizia procera, Albizia lebhecck, Anthocephahts cadamba, Artocarpus integrifolia, Azadiraehta indica, Butea monosperma, Rombax ciba, Bauhinia variegate, Cassia fistula, Dalbergia sissoo, Dalbergia lalifolia, Diospyrus sylvatica, Kncalyptrss* spp. *Fiats bengalensis, Ficus religiosa, Fines hispida, Emhlica officinalis, Grewia tiliifolia, Gmelina arborea, Kydia calycona, Michelia champaca, Mahnca indica, Mangifera indica, Mesua fenea, Pongamia pinnata, Pterocarpus mansupium, Polyalthia simiamm, Saraca asoca, Schleichere naxvomica, Schleichera oleosa, Shorea robusta, Syzyginm chmini, Terminalia arjuna, Terminalia tomentosa, Terminalia bellerica, terminalia chebula, Termanalia indica etc.* There are number of bamboo species and other shrubs, herbs are on the forests floors.

METHODOLOGY

The survey was conducted on roadsides and in forests. The roadside survey methods applied in Dhenkanal district were the same that was adopted in Nayagarh district survey in Orissa (Chaudhuri *et al.*, 2007). The roadside survey was made from a slow moving vehicle, while the forest roads and trails were surveyed both on foot and vehicle. Transect and point methods were applied to locate the monkeys in forests and hills. Transect method in the forest path was accomplished by slow walking and waiting for 5–6 minutes in every 200 m for visual and auditory signals for presence of monkeys and other animals (Southwick *et al* 1961). Point method was adopted in the hills where elevation exceeds 200m and above. Total count and sweep sampling techniques were used to estimate the primate population.

Two surveys were conducted in this district, one during summer (June 2007) and other in winter (January 2008). Result of the survey discussed in this report based on January 2008 survey, when the entire district was resurveyed. The fieldwork conducted mainly in the forenoon (0700–1100 hr) and afternoon (1500–1800 hr) in summer and whole day during the winter. A total of 140 hours were spent in the census work. About 1650 km^2 areas was surveyed. Groups when located, their social structure, habitat, inter-intra group interaction were recorded. Individuals of a group were broadly classified for both the monkey species as adult males, adult females, juveniles and infants. The juveniles were those more than one year or less than three years old and infants were those carried by mothers, pre-weaned and less than one year old.

RESULT

In this district about 1650 km^2 was surveyed which comprised 38% of the total geographical area. 55 groups of rhesus macaques and 26 groups of Hanuman langurs were recorded. Out of 26 groups of Hanuman langur, 25 were bisexual groups and 1 was all male band. Both the species inhabited in the forests and villages.

Rhesus macaque : In Dhenkanal district 55 groups of rhesus monkeys were recorded of which 35 were forest groups and 20 were village groups. The 55 groups contained 2132 monkeys in the surveyed area of the district. Almost all the monkey habitable areas were surveyed and only the inaccessible hills with forest areas were left out. This provides a population estimate of 0.03 groups/ km^2 and 1.29 individuals/km^2 The areas and the distribution of monkeys are shown in Fig 1. Out of these 55 groups, social composition of 3 forests groups containing 114 monkeys could not be ascertained, hence these groups were not taken into as social groups and not figured in the table for calculation. The 52 social groups contained 2018 monkeys and the composition consisted of 263 adult males; 975 adult females; 288 juveniles and 492 infants (Table 1, Fig. 2). The mean group size was 38.8 ± 2.67 individuals per group. The mean density of rhesus monkeys of Dhenkanal district is shown in Fig. 3. The group size varied from 6 to 78 monkeys. Out of 52 groups, 15 groups contained more than 50 monkeys each; 18 groups having 30–48 monkeys; 11 groups consisted of 20–29 monkeys and remaining 8 groups contained less than 20 monkeys in each

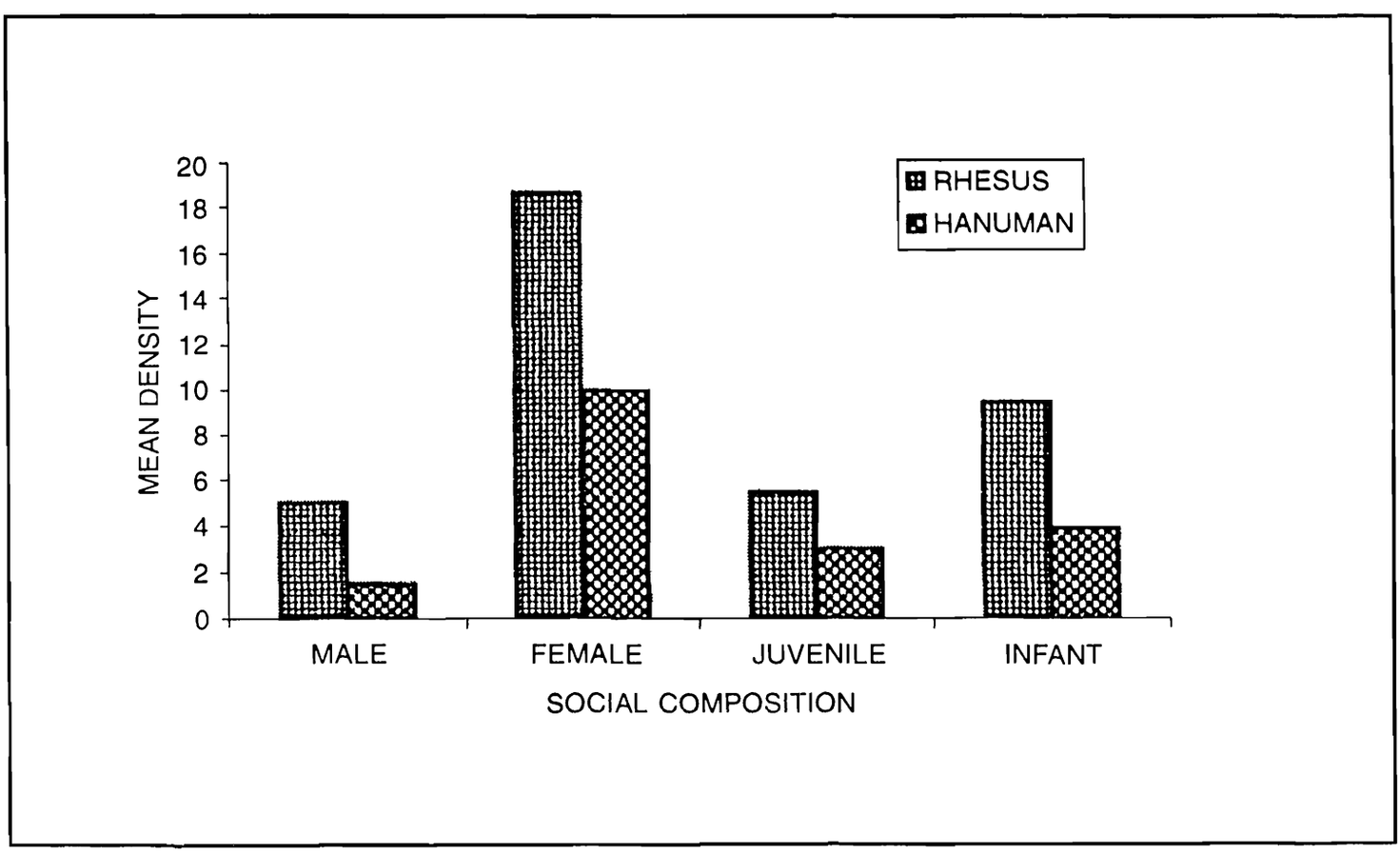

Fig. 2 : Rhesus macaque and Hanuman langur population of Dhenkanal.

group. The adult male to adult female ratio was 1 : 3.7 and adult female to sub-adults ratio was 1:0.8. About 50% females were carrying infants. The entire rhesus population of this district is distributed in two habitat categories- forests and villages.

Forest : The 32 forest group contained 1204 monkeys. The social composition consisted of 153 adult males, 588 adult females, 167 juveniles and 296 infants with a mean group size of 37.66 ± 3.51 individuals per group (fig. 3). The percentage composition in the population consisted of 12.7% adult males; 48.8% adult females; 13.8% juveniles and 24.7% were infants. Adult males to adult females ratio was 1 : 3.8 and adult females to sub-adults ratio was 1 : 0.78.

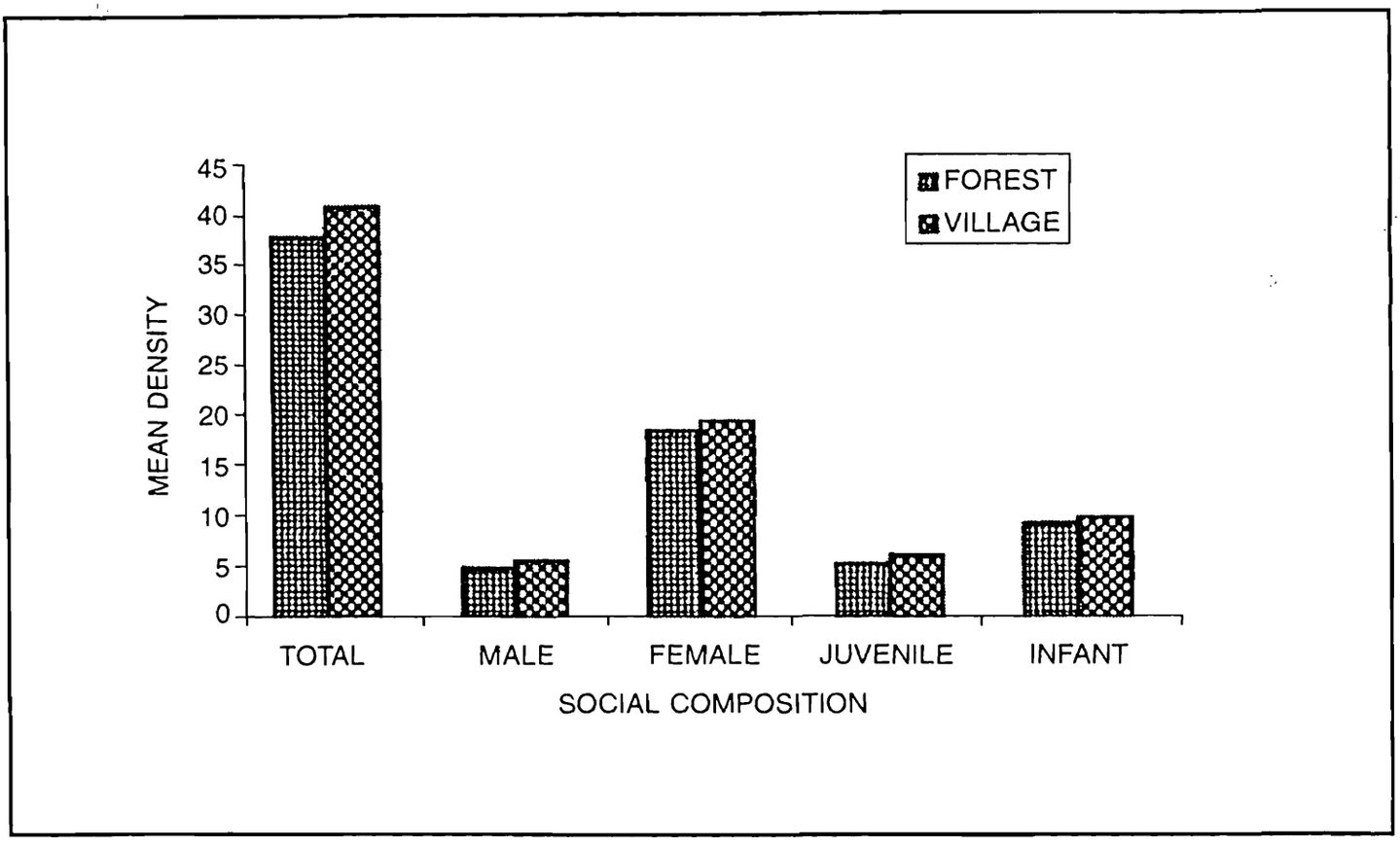

Fig. 3 : Mean density of Rhesus macaque of Dhenkanal.

The rhesus groups that were recorded at Kapilas R.F. and Khalpal R.F. consisted of 114 monkeys. Two groups were seen at Kapilas. The social composition of these three groups could not be ascertained as these monkeys disappeared quickly in the undergrowth of the forests. The 2 Kapilas groups contained 103 monkeys and the Khalpal group with 11 monkeys, apart from these groups a large group of monkeys inhabiting near the Kapilas temple which was not been recorded as those monkeys scattered over a large areas, hill tops, staircase and in trees. Though it was harbouring in forest but became semi-provisioned as pilgrims came to visit the temple and offer food items to these monkeys.

Village : The villages contained 814 monkeys of which 110 were adult males; 387 were adult females; 121 were juveniles and 196 infants with a mean group size of 40.70 ± 4.17 individuals per group (Fig. 3). Adult males to adult females ratio was 1:3.5 and adult females to infants and juveniles ratio were 1 : 0.5 and 1 : 0.3 respectively. The percentage composition consisted of 13.5% adult males, 47.5% adult females, 14.9% juvenile and 24.1% infants. Village groups normally inhabited the villages but in many villages occasionally they moved to hills situated in village areas nearby.

Hanuman langur : 26 groups of Hanuman langurs were sighted in this district, out of which 25 were bisexual groups and 1 was all male band. The 26 groups contained 669 langurs. One all male group with 5 langurs inhabiting at Khalpal village, not being shown in population density and distribution table. The 25 bisexual groups contained 464 langur and consisted of 38 adult males; 250 adult females; 77 juveniles and 99 infants. The distribution of Hanuman langur is shown in Table 2, Fig. 2. This provides a population estimate of 0.015 groups/km^2 and 0.28 individuals/km^2 The group size varied from 9 to 45. The mean group size was 18.5 ± 1.6. The adult males to adult females ratio were 1 : 6.5 and adult females to infants and juvenile's ratio was 1 : 0.4 and 1 : 0.7 respectively. The langurs were distributed in two habitat categories- forests and villages.

Forest : The 14 forest groups having 271 langurs with a mean group size of 19.36 ± 2.6 individuals. The social composition consisted of 23 adult males, 140 adult females, 47 juveniles and 61 infants (fig 4). Percentage composition in the population was 8.5% adult male; 51.7% adult

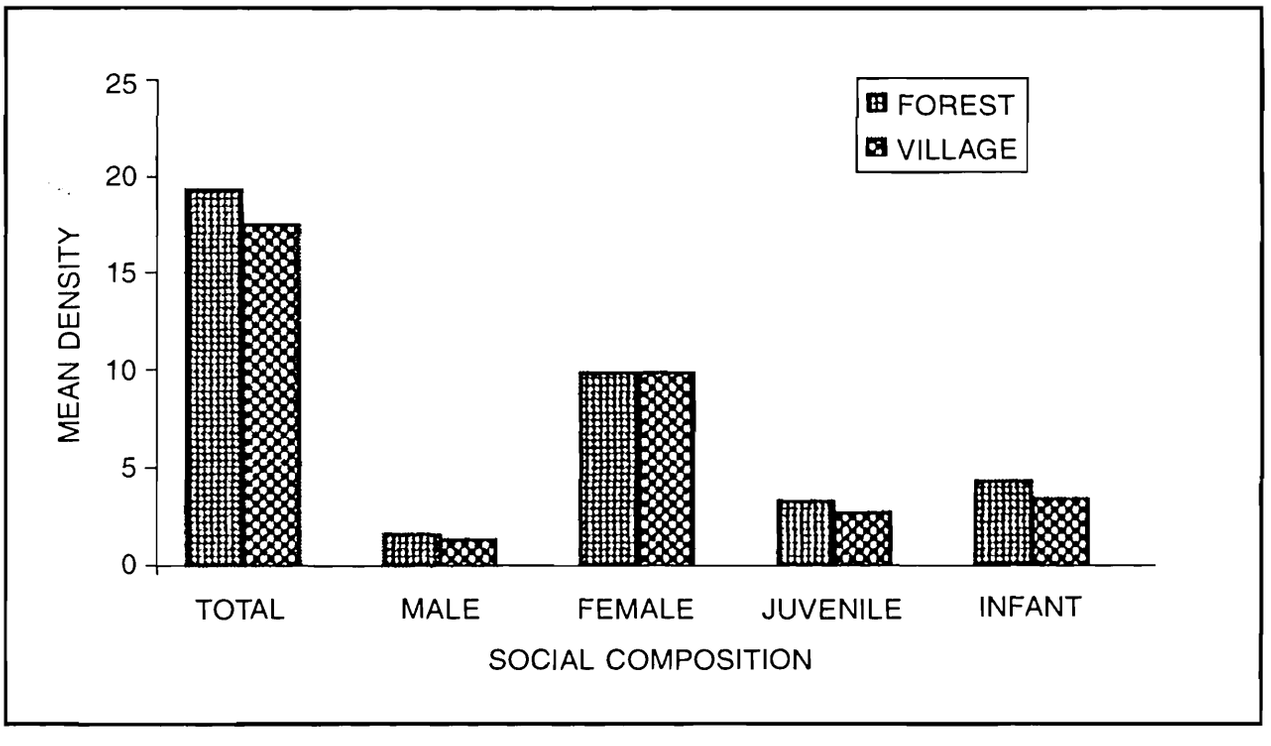

Fig. 4 : Mean density of Hanuman Langur of Dhenkanal.

females; 17.3 juveniles and 22.5% infants. About 43.5% adult females were recorded carrying infants, adult females to infants ratio was 1 : 0.4.

Village : The 11 village groups contained 193 langurs with a mean group size of 17.55 ± 1.64 individuals. The social composition was 15 adult males; 110 adult females; 30 juveniles and 38 infants (fig 4). The percentage of different class consists of 7.8% adult males, 57% adult females, 15.55% juveniles and 19.7% infants. Only 27% adult females were having infants, the ratio of adult females to infants was 1 : 0.3.

DISCUSSION

The present survey revealed that the rhesus monkey population was more than the Hanuman langur in Dhenkanal district. Both the simians were reported more in the forested areas of the district than in villages. In this district, apart from reserved forests there were also village forest, Debottar forest and unclassed forest. Total forested area is about 31% of the total geographical area of Dhenkanal. Villages provide food and shelter to the monkeys throughout the year. Small and medium hills and hill ranges scattered over the entire district with good vegetation support the monkey populations to great extent.

The Hanuman langurs at Dhenkanal, mostly harbour hill forests. The survey party encountered only 26 groups and it appeared that more groups were left out in the inaccessible hill areas. Local enquire, however, revealed that in any case the rhesus population in this district is fairly higher than the langurs. Rhesus monkey populations were, one of the most common and widely distributed monkey species, is fast depleting at many parts of India. The result of the present survey indicates that the rhesus population is quite encouraging in Dhenkanal with 50% adult females having infants, whereas in case of Hanuman langur it is about 35.3%. In reserved forest like Saptasajya, Kopilas and Ranjagarh a good number of monkeys were sighted, 3 groups at Saptaasajya, 7 groups at Kapilas and 5 groups at Ranjagarh. Karmal and Barda villages recorded a number of rhesus groups (Table 1). At Kopilas forest there is a very old Shiva temple on a hilltop amidst good forest. A motorable ghat road of 5 km leads to the temple. On the other side of hill a staircase of 1365 steps leads to the temple. The rhesus monkeys inhabited both in ghat roads and the steps leading to the temple. The rhesus inhabiting on ghat road were true forests groups and retreat into the forests on seeing the people. The monkeys found on the steps and near the temple were thin, and unhealthy, suffering from malnutrition. The adult females looked like the size of juveniles but almost all females were carrying infants or gravid. These monkey groups mostly depended on provision food items from pilgrims and non-viable population.

The other district surveyed in Orissa was Nayagarh (Chaudhuri *et al.* 207) where 40% of the total area was surveyed and 10 groups of rhesus monkeys with 292 individuals were recorded. The

Table-1. Group size and distribution of Rhesus macaque of Dhenkanal

Sl. No.	Locality	Habitat	Total	Ad. Male	Ad. Fem.	Juvenile	Infant
1	Sapttasaja	DLF	52	8	22	10	12
2.	Saptasajya	DLF	64	7	29	12	16
3.	Saptasajya	DLF	67	11	30	8	18
4.	Bhagbanpur	DLF	41	6	20	5	10
5.	Karala	DLF	78	11	36	11	20
6.	Berikunti	DLF	13	1	7	2	3
7.	Berikunti	DLF	35	4	16	8	7
8.	Karmal	DLF	38	6	21	3	8
9.	Kopilas	DLF	53	5	24	8	16
10.	Kopilas	DLF	41	3	20	8	10
11.	Kopilas	DLF	75	8	35	12	20
12.	Kopilas	DLF	54	6	25	6	17
13.	Kopilas	DLF	24	3	13	2	6
14.	Kopilas	DLF	10	1	6	0	3
15.	Kopilas	DLF	34	4	16	6	8
16.	Kopilas	DLF	25	3	13	3	6
17.	Siblapasi	DLF	30	4	16	3	7
18.	Bariapur	DLF	7	1	4	0	2
19.	Bariapur	DLF	35	4	16	6	9
20.	Khalpal	DLF	21	4	13	0	4
21	Rajnagarh	DLF	73	9	39	9	16
22.	Rajnagarh	DLF	39	3	20	6	10
23.	Rajnagarh	DLF	43	6	22	6	9
24.	Rajnagarh	DLF	29	4	10	7	8
25.	Rajnagarh	DLF	60	11	24	7	18
26.	Bangura	DLF	6	1	4	0	1
27.	Kai	DLF	36	4	19	4	9
28.	Kai	DLF	26	3	13	5	5

Sl. No.	Locality	Habitat	Total	Ad. Male	Ad. Fem.	Juvenile	Infant
29.	Sapua	DLF	25	3	15	3	4
30.	Ramai	DLF	31	4	18	3	6
31.	Ramai	DLF	18	2	10	2	4
32.	Aswakhola	DLF	21	3	12	2	4
33.	Kuttum	DLV	69	8	32	14	15
34.	Ranjagore	DLV	28	5	14	3	6
35.	Tarkabera	DLV	44	4	24	6	10
36.	Tarkabera	DLV	29	3	14	4	8
37.	Jangkhira	DLV	55	8	23	12	12
38.	Joranda	DLV	35	6	18	3	8
39.	Karmal	DLV	62	8	28	10	16
40.	Karmal	DLV	17	2	10	1	4
41	Kamal	DLV	63	9	27	9	18
42.	Ganeshkhole	DLV	25	3	12	4	6
43.	Barda	DLV	32	3	16	5	8
44.	Barda	DLV	45	5	20	8	12
45.	Barda	DLV	48	9	22	7	10
46.	Barda	DLV	65	12	30	8	15
47.	Kaulo	DLV	21	3	12	2	4
48.	Bangura	DLV	65	6	32	10	17
49.	Bangura	DLV	45	7	21	6	11
50.	Kadaripu	DLV	10	1	5	2	2
51.	Bundabanpur	DLV	44	6	21	6	11
52.	Dhenkanol	DLV	12	2	6	1	3
	Total		2018	263	975	288	492
	Mean		38.8	5.06	18.75	5.54	9.46

Table-2. Group size and distribution of Hanuman Langur of Dhenkanal

Sl. No.	Locality	Habitat	Total	Ad. Male	Ad. Fem.	Juvenile	Infant
1.	Saptasajya	DLF	14	1	8	2	3
2.	Saptasajya	DLF	23	2	11	4	6
3.	Bhagbanpur	DLF	25	2	15	3	5
4.	Karanda	DLF	13	1	7	2	3
5.	Karala	DLF	14	2	7	2	3
6.	Punakote	DLF	45	4	22	9	10
7.	Jangkhira	DLF	15	1	8	2	4
8.	Parjang	DLF	22	2	10	6	4
9.	Parjang	DLF	14	1	8	2	3
10.	Khalpal	DLF	9	1	5	1	2
11.	Kusumdia	DLF	11	1	6	2	2
12.	Kusumdia	DLF	11	1	5	2	3
13.	Jamunakote	DLF	24	2	12	4	6
14.	Jamunakote	DLF	31	2	16	6	7
15.	Sukhiabanti	DLV	9	1	5	2	1
16.	Kamagara	DLV	20	1	14	2	3
17.	Kamagara	DLV	21	1	13	3	4
18.	Khuntibati	DLV	11	1	7	2	1
19.	Siblapasi	DLV	20	1	11	3	5
20.	Shiarimaria	DLV	24	2	13	4	5
21	Bariapur	DLV	15	1	8	2	4
22.	Bariapur	DLV	14	1	7	3	3
23.	Kualo	DLV	21	2	12	3	4
24.	Naupal	DLV	13	2	7	2	2
25.	Nilakantapur	DLV	25	2	13	4	6
	Total		464	38	250	77	99
	Mean		18.56	1.52	10	3.08	3.96

topography of Nayagarh closely resembled that of Dhenkanal. It has undulating, precipitous rocky peaks, and a number of hills in the villages, and good forests. In Dhenkanal, 38% of the total area was surveyed and 55 groups consisting of 2132 (2018 + 114 unclassed monkeys) monkeys were recorded. In contrast to rhesus, Nayagarh district contained 30 groups of langur with 748 individuals.

The langurs and the rhesus monkeys were reported to invade orchards and mohua trees of the villages seasonally, and also during paddy harvest. At Karmal and Barda, the two big villages, we heard from the villagers that the rhesus monkeys were causing damage to the household foodstuff and considerable loss to the standing crops. These monkeys even scared the boys and kids. However, no biting and scratching to the people by the monkeys in this district were reported. Man-monkeys conflict in the district is negligible. Good mixed forest both reserved and village forest support sustainable primate population. Like Nayagarh in this district of Orissa too,the primates did not face any threat from the people.

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Rec. zool. Surv. India : **109**(Part–1) : 13-30, 2009

CHECKLIST OF THE BLIND SNAKES (TYPHLOPIDAE), PYTHONS AND BOAS (BOIDAE) OF INDIA

GOURI DASGUPTA, R. K. BISWAS AND SUJOY RAHA

Zoological Survey of India, F.P.S. Building, Kolkata-700 016

INTRODUCTION

Reptiles are ectothermic vertebrates which include the Crocodiles, Turtles, Lizards & Snakes. In India reptilian assemblage is represented by the orders Crocodylia, Testudines and Sqamata. The snake fauna comprises of ten families, of these family Typhlopidae and Boidae are listed in the paper. Each species is supplemented with an exhaustive synonymy along with remarks pertaining to the rarity and status.

The studies on Indian Reptiles have been enriched with notable contributions by several workers both during the pre and post independent India. We will be failing in our duty if we do not cite the works notably by Das (1991, 1995, 2003), Murthy (1986, 1990, 1992) Sharama (1971 1976, 1977, 2003), Biswas (1965, 1977), and Sanyal (1991, 1993, 2006) to mention only a few in the unending list of the galaxy of workers in the recent times. However we owe our deep debt of gratitude to the pioneering herpetologists of British India who laid the foundation of Indian Herpetology, notably Boulenger (1890, 1893) Nelson Annandale (1876-1924) Wall (1909-1923) and M. A. Smith. (1875-1958). The contribution of Wallach (1999, 2003) Nassbaum (1980) and the book "Snake species of the world" dealing with extensive reference work compiled by Mc Diarmid, Campbell and T A. Toure (1999) contributed to our knowledge on Typhlopidae and Boidae. However the checklist presented herein will be a source of valuable information and help to the growing number of herpetological workers in India.

Phylum CHORDATA

Class REPTILIA

Order SQAMATA

Sub order SERPENTES

1 Family TYPHLOPIDAE

1 Genus ***Grypotyphlops*** Peters, 1881

1843. *Rhinotyphlops* Fitzinger, Syst, Rept p. 24.

1844. *Onychocephalus* A.M.C Dumeril & Bibron, *Erp. Gen.* **6** : 272.

1845. *Onychocephalus* Gray, 1845, Cat. Spec. Lizards collect Brit. Mus., p. 132.

1868. *Letheobia*, Cope, *Proc. Acad, Nat, Sci Philadelphia,* **20** : 322.

1881. *Grypotyphlops* Peters, Sizungsber Ges. Naturforsch. Freunde Berlin; 69-71.

Type species : *Onychocephalus acutus* Dum & Bib. 1844–*Rhinotyphlops acutus* Dum & Bib (1844) by original designation.

1. ***Grypotyphlops acutus*** (Dumeril & Bibron, 1844)

1844. *Onychocephalus acutus*, Dumeril & Bibron, *Erp. Gen.*, **6** : 609 pp. (333).

1845. *Typhlops russelli,* Gray, Cat, Spec. Lizards collect. *Brit. Mus.*, 289. pp. (132).

1862. *Onychocephalus westermanni,* Liitken, Vidensk. Medd. Dansk, Naturhist. foren. **14** : 292-311 (306, pl. 1 fig 5).

1864. *Onychocephalus acutus,* Gunther, Rept. Brit. India, 452 pp. (177, pl. 16 fig A).

1865. *Typhlops excipens,* Jan in Jan & Sordelli, Icon Gen. Ophid 1, levr index to pl. 1 (fig. 5).

1875. *Onychocephalus malabaricus,* Beddome inGunther, *Proc. Zool. Soc.*, London, 227.

1881 *Grypotyphlops acutus*, Peters, [Schr. Ges. Naturforsch Freunde Berlin 70.

1885. *Typhlops acutus*, Muller, Verh Naturforsch,. Basel, **7**(3) : 674.

1893. *Typhlops acutus*, Boulenger, Cat Snakes. *Brit. Mus.*, **1** : 56.

1893. *Gryptotyphlops acutus,* Boulenger, 1893, Cat Snakes. *Brit. Mus.*, **1** : 56.

1903. *Typhlops psittacus,* Werner, *Zool. Anz.*, **26** : 246-253.

1949. *Typhlops acuta,* Constable, *Bull. Mus. Comp. Zool.*, **103** : 59-100.

1967. *Typhlops actis,* Rajendran, Snakes our land, (**2**) : p. 2.

1978. *Typhlina acutus,* Whitaker, Common Indian Snakes, pp. 108.

1983. *Typhlops acuts,* Murthy, *Indian J. Zootomy,* **24** : 77.

1994. *Rhinotyphlops acutus,* Wallach, *Bull. Inst, R. Sci. Nat Belgique,* **64** : 219.

2003. *Grypotyphlops acutus,* Wallach, *Hamadryad,* **27**(2) : 226.

2004. *Grypotyphlops acutus,* Whitaker & Captain Ashok. Snakes of India, The field guide pp. 490.

Common Name : Beaked Blind Snake.

Type(s) : Holotype MNHN lost as stated by Hahn (1980 : 49) Wallach (1994 : 214) designated UF 19902 as the Neotype.

Type locality : Unknown, Kanheri caves–West central India, elevation CA 180 m 19°14' N, 72°5' E based on the neotype designation by Wallach (1994 214).

Distribution : INDIA : Found south of Ganges basin & South of Rajasthan. Range extends west of Baroda & east to Kolkata.

Remarks : It is the largest Asian worm snake found only in India. W Peters established the genus *Grypotyphlops* with *Onycocephalus*. Dumeril & Bibron designated as the type species. Since the name is available, *Onycocephalus acutus* is returned to *Grypotyphlops* Peters. The species currently known as *Rhinotyphlops acutus* should now be reffered as *Grypotyphlops acutus* (Dumeril & Bibron)–Welch (2003).

2. Genus ***Ramphotyphlops*** Fitzinger, 1843

1830. *Typhlina* Wagler, *Nat. Syst. Amph.*, **354** : 196.

1843. *Ramphotyphlops* Fitzinger, *Syst. Rept.*, **106** : 24.

1843. *Pseudotyphlops* Fitzinger, *Syst. Rept.*, **106** : 24. Type species : *Typhlops polygrammicus* Schlegel *(Ramphotyphlops polygrammicus* (Schlegel, 1839).

1844. *Pilidion* A.M.C Dumeril & Bibron, *Erp. Gen.*, **6** : 247.

1845. *Typhlinalis* Gray Cat. Spec. Lizards collect, *Brit. Mus.*, p. 134.

1861. *Typhlira* Jan. *Arch Naturgesch,* **27** : 6.

Type Species : *Typhlops multilineatus* Schlegel, 1839 by original designation.

Remarks : The International Commission of Zoological Nomenclature suppressed the name *Typhlina* Wagler, 1830 for the purposes of the law of priority and placed the generic name *Ramphotyphlops* Fitzinger, 1843, on the official list of Generic Name in the Zoology.

The genus represents a single species in India.

2. ***Ramphotyphlops bramiuns*** (Daudin, 1803)

1803. *Eryx braminus* Daudin, *Hist. Nat. Gen. Part. Rept.*, **7** : 279.

1820. *Tortrix russelii,* Merrem, *Tent. Syst. Amph.*, **191** : 84.

1829. *Typhlops braminus,* Cuvier, *Regne Animal*, 2d. ed. **2** : 73.

1839. *Typhlops russeli,* Schlegel, (1837, 1844) Abblid. Amph p. 39.

1845. *Argyrophis truncates,* Gray, *Cat. Spec. Lizard collect. Brit. Mus.*, p. 138.

1845. *Argyrophis bramicus,* Gray, *Cat. Spec. Lizards collect. Brit. Mus.*, p. 138.

1845. *Eryx bramicus,* Gray, *Cat. Spec Lizards collect. Brit. Mus.*, p. 138.

1845. *Tortrix bramicus,* Gray, *Cat. Spec. Lizards collect, Brit. Mus.*, p. 279.

1846. *Onychocephalus capensis., A. Smith illustr. Zool. S. African,* Rept., **3**(24) : pl. 51 (fig. 3) pl. 54 (figs. 9-16) one unnumbered page.

1861. *Ophthalmidium tenue,* Hallo well, *Proc. Acad. Nat. Sci. Philadelphia* : 480-510.

1863. *Typhlops incons picuus,* Jan, *Elenco Sist. Of idi*, p. 11.

1863. *Typhlops accedens,* Jan, *Elenco sist ofidi*, p. 12.

1864. *Typhlops accedens,* Jan & Sordelli, Icon. Gen, Ophid, Liver. 3 (Index to pl. 4 fig. 15) pl. 5 (fig. 15).
1882. *Typhlops euproctus,* Boettger *Zool. Anz* **5** : 479.
1887. *Typhlops bramineus*, Meyer, *Abh. Ber. K. Zool. Anthro, Ethno. Mus. Dresden* : 8.
1893. *Tortrix russelli*, Boulenger, *Cat Snakes, Brit. Mus.*, **1** : 16.
1893. *Typhlops russelli*, Boulenger, *Cat snakes, Brit. Mus.*, **1** : 16.
1893. *Typhlops bramiuns*, Boulenger, *Cat. Snakes, Brit. Mus.*, **1** : 76.
1896. *Cat. Snakes Brit. Mus.*, **3** : 584.
1893. *Typhlops accedens*, Boulenger, 1 : *Cat. Snakes, Brit. Mus.*, **1** : 17.
1906. *Typhlops limbrickii,* Annandale, *Mem. Asiatic Soc. Bengal,* **1** : 183-202 (193, pl. 9, figs. 3, 3a).
1906. *Typhlops braminus* var. *arnicola,* Annandale *Mem. Asiatic. Soc. Bengal*, **1** : 192.
1909. *Typhlops braminus* var. *pallidus,* Wall *J. Bombay nat. Hist. Soc.*, **19** : 609.
1909. *Typhlops microcephalus,* Werner, *Jahr. Vereins Vater. Naturkd Wiirttemberg* **65** : 55-63 (60).
1910. *Glauconia braueri,* Sternfeld, Mitt. *Zool. Mus. Berlin,* **5** : 69.
1910. *Typhlops braueri,* Boulenger, Zool. Rec. Batr., 29.
1911. *Typhlopidae bramenis,* Roux, *Zool Jahrd. Abt. Syst.,* **30** : 498.
1919. *Typhlops fletcheri,* Wall, *J. Bombay nat. Hist. Soc.*, **26** : 556, pl, 1.
1930. *Typhlops braminus bramiuns,* Mertens, *Abh. Senckeb Naturforsch. Ges.* **42** : 149, 278.
1938. *Typhlops braminus,* Nakamura, *Zool. Mag,* Tokyo, **50** : 192.
1969. *Typhlops pseudosaurus,* Dryden & Taylor, 1969 *Univ. Kansassci Bull.,* **48** : 279.
1974. *Typhlina bramina,* Mc Dowell, *J Herpetol.*, **8** : 22.
1980. *Ramphotyphlops bramiuns,* Nussbaum, *Herpetologica,* **36** : 215.

Common name : Brahminy worm snake.

Type : Based on pl. 43 (Rondoo tabloo Pam) in Russell, 1796, *Acct. Indian serp.* 1 : 90 pp (48).

Type locality : Vizagapatnam.

Distribution : INDIA : Throughout India; introduced to many parts of the World.

3. Genus ***Typhlops*** Oppel, 1811

1810. (1811) *Typhlops* M. Oppel, *Ann. Mus, Hist. Nat. Paris,* **16** : 380.
1811. *Typhlops* Oppel, Ordn,. *Fam. Gan, Rept.*, **87** : 55.
1815. *Typhlops* Rafinesque, Analysc, Nat. (Herpetol sector) p. 78.
1820. *Typhlops*–Hem prich, Grundr *Natargesch,* p. 119.
1831. *Typhlops*–Bonaparte, *Saggio Distrib Metod Anem, Vert.*, **49** : 73.
1843. *Aspidorhynchus* Fitzinger, Syst. Rept p. 24.
1844. *Ophthalmidion* Dumeril & Bibron.
1844. *Cathetorhinus* Dumeril & Bibron, *Erp. Gen.*, **6** : 268.
1845. *Anilios* Gray, Cat. Spec. Lizards Collect. Brit. Mus. p. 135.
1845. *Argyrophis* Gray, Cat. Spec. Lizards collect. Brit. Mus, p. 36.

1845. *Meditoria* Gray, Cat. Spec. Lizards collect Brit Mus 39.

1846. *Typhlops*–Gistel. *Naturgesh. Thierreichs* 1-ix + 216 pp (xi).

1860. *Diaphoro typhlops* Jan in Jan & Sordelli Icon. Gen. OPhidl. livr. 1 : (Index to pl. 5 figs. 6-7).

1893. *Typhlops*–Boulenger, *Cat. Snakes Brit. Mus.*, **1** : 7.

1922. *Typhlops* M. A. Smith, *J. Fed Malay Staes Mus.*, **10** : 265.

1957. *Opthalmidium*–Loveridge. *KMus., Bull Comp. Zool.*, **117** : 240.

Type species : *Anguis lumbricalis* Linnaeus 1758 (Typhlops *lumbricalis*) (Linnaeus) 1758 [= *Typhlops lumbricalis* (Linnaeus)].

Remarks : Oppel (1811) credited the name *Typhlops* to J. G. Schnieder (1801, *Hist. Amph.* Jena, 2 : 339) Who used the word *Typhlopes* to designate a subdivision of the genus *Anguis*. This was accepted by some authors as an indication that Schneider was the author of the name. Macdamid, et al (1999) compared Schneider's (1801) text to that of Oppel (1811) and found no similarity that would lead them to infer that Schneider wrote the section or that Oppel used Schneider text. At last they came to a conclusion that even though Oppel referred the name to Schneider infact Oppel is the author of *Typhlops*.

This genus *Typhlops* comprises of 16 Indian species.

3. ***Typhlops andamanensis*** Stoliczka, 1871

1871. *Typhlops andamanensis* Stolizka, *J. Asiat. Soc. Bengal.*, **40** : 421-445 pl. 25 (figs. 9-12).

1893. *Typhlops andamaneasis,* Boulenger, *Cat. Snakes Brit. Mus.*, **1** : 448.

Common name : Andaman worm snake.

Type (s) : Holotype NMW 15427.

Type locality : Andaman Islands.

Distribution : INDIA : Andaman.

Remarks : This is the only Indian species known based on Stolizka's text & drawing.

4. ***Typhlops beddomii*** Boulenger, 1890

1890. *Typhlops beddomii,* Boulenger, Fauna Brit. India, Rept. Bater., 237.

1893. *Typhlops beddomii,* Boulenger, *Cat. Snakes. Brit. Mus.*, **3** : 585.

1923. *Typhlops beddomei,* Wall, *J. Bombay nat, Hist. Soc.*, **29** : 348.

1943. *Typhlops beddomei,* M. A. Smith, Fauna Brit. India, Rept. Amph, **3** : 585.

2003. *Typhlops beddomei,* Sharma, Hand Book of Indian Snakes. Pp. 20.

Common name : Beddom's worm snake.

Type Syntypes (13) & Localites : BMNI 1946, 1 10.69-72–from Anaimalai 2000-5000 ft. BMNH 1946, 1 11. 27-30 from kimedy Hills, Vizagapatnam district (formerly BMNH 1884, 5.

8 39-42) BMNH 1946, 1 : 11.93-95 & BMNH 1946, 1 10. 48 (formerly BMNH 1874. 4. 29. 247) from Travancore Hills 2500-3000 ft & MCZ R 22372 from Travancore Hills, 4000ft.

Type locality : Kimedy Hills (Vizagapatnam), Anaimalai and Travancore Hills.

Distribution : INDIA : Hilly areas of Kerala, Anamalai, Tinnevelly, Vizagapatnam.

5. ***Typhlops bothriorhynchus*** Gunther, 1864

1864. *Typhlops bothriorhynchus* Gunther, Rept. Brit. Cat. India, 174 p. pl. 16fig. D.

1893. *Typhlops bothriorhynchus*, Boulenger, *Cat. Snakes Brit. Mus.*, **1** : 448.

1923. *Typhlops bothriorhynchus*, Wall, *J. Bombay nat. Hist. Soc.*, **29** : 350.

1943. *Typhlops bothriorhynchus*, Smith, Fauna Brit. India, **3** : 53.

1996. *Typhlops bothriorhynchus,* Das, Biogeogr. Rept. South. Asia, p. 50.

2003. *Typhlops bothriorhynchus,* Sharma, Handbook of Snakes of India pp. 19-20.

Common name : Assam worm snake.

Type : Holotype BMNH.

Type locality : "Pinang" given as Pinang Malaya in BMNH catalogue Wall1923, *J. Bombay nat. Hist. Soc.* 29 : 345-346].

Distribution : INDIA : Assam; U.P.

Remarks : The specimen recorded from Hardwar is not traceable.

6. ***Typhlops diiardii*** Schlegel, 1839

1839. *Typhlops diardi,* Schlegel, *Abbild. Amph.*, p. 39.

1839. *Typhlops mulleri,* Schlegel, *Abbild. Amph.*, pp. 39, pl. 32, figs. 25-28.

1844. *Typhlops nigroalbus,* Dumeril & Bibron, *Erp. Gen.*, **6** : 609.

1845. *Argyrophis horsfieldi,* Gray, *Cat. Spec. Lizards Collect Brit. Mus.*, p. 136.

1861. *Typhlops striolatus,* Peters, Monatsber Preuss Acad. Wiss. Berlin pp. 922-925.

1863. *Typhlops nigroalbus*, Jan, *Elenco Sist. Ofidi*, p. 12.

1863. *Typhlops schneideri*, Jan, *Elenco Sist. Ofidi*, p. 12.

1863. *Typhlops diardi*, Jan, *Elenco Sist. Ophidi*, p. 12.

1863. *Typhlops mulleri*, Jan, *Elenco Sist. Ophidi*, p. 12.

1864. *Typhlops diardi,* Jan & Sordelli, *Icon. Gen. Ophid*, 1, livr. 4.

1864. *Typhlops mulleri,* Jan & Sordelli, *Icon. Gen. Ophid*, 1, livr. 4.

1864. *Typhlops horsfieldi,* Gunther, *Rept. Brit. India,* p. 173, pl. 16.

1865. *Typhlops schneideri*, Jan & Sordelli, *Icon. Gen. Ophid*, 11livr. 9.

1867. *Typhlops diardii,* Schneider, Reise Oster Fregatte Novara, p. 55.

1872. *Typhlops barmanus,* Stoliczka, *Proc. Asiatic Soc. Bengal* 143-147.

1893. *Typhlops diardi*, Boulenger, *Cat. Snakes Brit. Mus.*, **1** : 448.
1893. *Typhlops muelleri*, Boulenger, *Cat. Snakes Brit. Mus.*, **1** : 448.
1893. *Typhlops nigroalbus*, Boulenger, *Cat. Snakes Brit. Mus.*, **1** : 448.
1893. *Typhlops schneideri*, Boulenger, *Cat. Snakes Brit. Mus.*, **1** : 448.
1906. *Typhlops kapaladua*, Annandale *J. Proc. Soc. Bengal*, **1** : 208-214.
1908. *Typhlops tephrosoma*, Wall *J. Bombay nat. Hist. Soc.*, **18** : 312-337.
1909. *Typhlops diardi* var. *cinereus*, Wall, *J. Bombay nat. Hist Soc.*, **19** : 608-623.
1918. *Typhlops labialis*, Waite, *Rec. S. Australian Mus.*, **1** : 1-34.
1923. *Typhlops diardi diardi*, M. A. Smith, *J. nat. Soc. Siam*, **6** : 47-53.
1923. *Typhlops diardi nigroalbus*, M. A. Smith, *J. nat. Hist. Soc.*, **6** : 47-53.
1934. *Typhlops fusconotus*, Brongersoma, *Zool. Meded., Leiden*, **17** : 161-251.
1934. *Typhlops diardi mulleri*, Brongersoma, *Zool. Meded. Leiden*, **17** : 161-251.
1936. *Typhlops diardi*, Bourret, *Serp. Indochine*, **2** : 12.
1936. *Typhlops diardi tephrosoma*, Bourret, *Serp. Indochine*, **2** : 13.
1980. *Typhlops diardi diardi*, Hahn, *Das Tierreich*, **101** : 1-93.
1980. *Typhlops diardi muelleri*, Hahn, *Das Tierreich*, **101** : 1-93.
1995. *Typhlops diardii*, Das, *Hamadryad*, **22** : 18.

Common name : Diard's worm snake.

Type : Holotype. MNHN.

Type locality : Cochin China.

Distribution : INDIA : Assam; Meghalaya; Nagaland; WestBengal; Sikkim.

Elsewhere : Myanmar; Thailand; Laos; Cambodia; Vietnam; Sumatra; Bankok; Borneo.

7. ***Typhlops exiguas*** Jan, 1864

1864. *Typhlops exiguas* Jan in Jan & Sordelli, *Icon. Gen. Ophid*, 1, livr. 3.
1893. *Typhlops exiguas*, Boulenger, *Cat. Snakes Brit. Mus.*, **1** : 31.
1921. *Typhlops exiguas*, Werner, *Arch. Naturgesh.*, **87** : 332.

Common name : Jan's worm snake.

Type : Holotype : SMNH.

Type locality : Indes orientales [East India].

Distribution : INDIA : Belgaum (Karnataka).

8. ***Typhlops jerdoni*** Boulenger, 1890

1890. *Typhlops jerdoni* Boulenger, *Fauna Brit. India, Rept. Batr.*, 541 p. 238 pl. 34.
1893. *Typhlops jerdoni*, Boulenger, *Cat. Snakes Brit. Mus.*, **1** : 448.

1912. *Typhlops diverciceps,* Annandale, *Rec. Ind. Mus.*, **8** : 37-39.

1936. *Typhlops jerdonii*, Bourret, *Serp. Indocehene*, **2** : 505.

1980. *Typhlops jerdonii*, Hahn, *Das Tierriech,* **101** : 1-60.

Common name : Jerdon's worm snake.

Type : Syntypes (3) : BMNH.

Type locality : Khasi Hills (Meghalaya) ; Seven sisters (Assam).

Distribution : Eastern Himalayas (Sikkim; Darjeeling; Duars) ; North East India (Pashighat; Abor; Khasi Hills).

9. ***Typhlops loveridgei*** Constable, 1949

1949. *Typhlops loveridgei* Constable, *Bull. Mus. Comp. Zool.*, **103** : 59-160.

Common name : Loveridge's worm snake.

Type : Holotype : MCZ R2283.

Type locality : Probably from North India & likely from Ambala & Kulu Valley (Mc Diarmid, Campbell & Toure 1999).

Distribution : Known only from Type specimen which is requires confirmation.

10. ***Typhlops neszoelyi*** Wallach, 1999

1999. *Typhlops neszoelyi* Wallach, Van, *Herpetologica*, **55**(2) : 185-191.

Type : Holotype FMNH 191889.

Type locality : Darjeeling (West Bengal).

Distribution : INDIA : West Bengal.

11. ***Typhlops muelleri*** (Schlegel, 1839)

1839. *Typhlops mulleri* Schlegel, *Abbid Amphib.*, p. 3, pl. 32, figs. 25-28.

1934. *Typhlops diardi mulleri,* Brongersoma, *Zool. Meded.*, Leiden, **17** : 193.

1943. *Typhlops diardi muelleri*, Smith, *Fauna Brit. India*, **3** : 52.

2003. *Typhlops muelleri,* Das, *J. Bombay nat. Hist. Soc.,* **100**(2 & 3) : 484.

Type : Holotype : RMNH 3718.

Distribution : INDIA : (Das 2003).

Elsewhere : Myanmar; Thailand; Cambodia; Vietnam; West Malayasia; Pulu; Pinang; Singapore; Indonesia.

12. ***Typhlops oatesii*** Boulenger, 1890

1890. *Typhlops oatesii Boulenger, Fauna Brit. India, Rept. Batr.*, p. 218.

1893. *Typhlops oatesii* Boulenger, *Cat. Snakes Brit. Mus.*, **1** : 448, pl. 23. 2 figs.

1923. *Typhlops oatesi,* Wall, *J. Bombay nat. Hist. Soc.*, **29** : 350.

Common name : Oate's worm snake.

Type : Syntypes : BMNH

Type locality : "Table Island, Cocos group" Andaman.

Distribution : Previously it was known only from type specimen. Recently Murthy and Chakarapani, 1983 recorded it from Mayabander, Little Andaman.

13. ***Typhlops oligolepis*** Wall, 1909

1909. *Typhlops oligolepis* Wall, *J. Bombay nat. Hist. Soc.*, **19** : 337-357.

Common name : Wall's worm snake.

Type : Holotype : BMNH.

Type locality : Nagri valley below Darjeeling at an altitude of about 5000 ft.

Distribution : INDIA : Eastern Himalayas (Sikkim & Darjeeling).

Remark : According to Smith it is closely allied to *Typhlops beddomii.*

14. ***Typhlops pammeces*** Gunther, 1864

1864. *Typhlops tenuis* Gunther, *Rept. Brit. India*, p. 176, pl. 16, fig. C.

1864. *Typhlops pammeces* Gunther, *Rept. Brit. India*, p. 444.

1898. *Typhlops braminus* var. *pammeces,* Boettger, *Kat. Rept. Samnl. Mus. Senckenb. Natuforsch Ges.*, **2** : 2.

1906. *Typhlops pssamophilus,* Annandale, *Mem. Asiatic. Bengal,* **1** : 193.

1943. *Typhlops psammeces*, M. A. Smith, *Fauna Brit. India Amph. Rept.*, **3** : 48.

1980. *Typhlops pammeces*, Hahn, *Das Tierreich.*, **101** : 1-93.

Common name : Gunther's worm snake.

Type : Holotype : BMNH.

Type locality : Madras.

Distribution : Southern India.

Remark : It is a rare snake, known only from few examples.

15. ***Typhlops porrectus*** Stoliczka, 1871

1871 *Typhlops porrectus* Stoliczka, *J. Asiat. Soc. Bengal,* **40** : 426.

1893. *Typhlops porrectus*, Boulenger, *Cat. Snakes Brit. Mus.*, **1** : 19.

1910. *Typhlops mackinnoni*, Wall, *J. Bombay nat. Hist. Soc.*, **19** : 805. Holotype. *Type locality* : Mussoorie, India. (Listed in Synonamy by M. A. Smith Fauna Brit. India, Rept. Amph., **3** : 46.

1913. *Typhlops venningi*, Wall, *J. Bombay nat. Hist. Soc.*, **22** : 515.

1949. *Typhlops porrecta*, Constable, *Bull. Mus. Comp. Zool.*, **103** : 112.

1980. *Typhlops porrectus*, Hahn, *Das, Tierreich*, **101** : 67.

Common name : Slender worm snake.

Type : Syntypes (many).

Type locality : Northern & Eastern India.

Distribution : Whole of India.

Elsewhere : Sri Lanka; Pakistan; Northern Myanmar.

Remark : Smith 1943, Fauna Brit. India, Rept. Amph., **3** : 46, reported the Type from Bengal as lost.

16. ***Typhlops tenuicollis*** (Peters), 1864

1864. *Onychocephalus (Opthalmidian) tenuicollis* Peters, Monatsber, Pre"uss. Acad. Wiss. Berlin 272, figs. 2 a-c.

1871. *Typhlops theoboldianus* Soliczka *J. Asiat. Soc. Bengal*, **40** : 429. Holotype ZSI 6888, according to Scalater 1891 List Snakes Indian Museum, 79. pp3. Type locality : In all probability from India. A Second Specimen Reported by Wall. 1923 from Samaguting, Assam (Now in Nagaland).

1876. *Typhlops thoboldianus*, Theobald, *Cat. Rept. Brit. India*, p. 123.

1876. *Typhlops tenuicollis*, Theobald, *Cat. Rept. Brit. India*, p. 123.

1893. *Typhlops theobaldianus*, Boulenger, *Cat. Snakes Brit. Mus.*, **1** : 26.

1893. *Typhlops tenuicollis*, Boulenger, *Cat. Snakes Brit. Mus.*, **1** : 37.

Common name : Slender–necked worm snake.

Type : Holotype : ZMB 5042.

Type locality : Himalayas.

Distribution : INDIA : Nagaland; Assam.

Remarks : Boulenger *(F. B. I. 236)* has placed in a section itself by stating nostril to be inferior. Peter's fig. indicates nostril to be lateral and in all respects the specimen totally agrees with *T theoboldianus* and it is no surprise that Smith united them.

17. ***Typhlops thurstoni*** Boettger, 1890

1890. *Typhlops thurstoni* Boettger, *Ber. Senckenb. Naturforsch.* Ges., 297.

1893. *Typhlops thurstonii*, Boulenger, *Cat. Snakes Brit. Mus.*, **1** : 26.

1924. *Typhlops walli,* Procter, *Ann. Mag. Nat. Hist.,* (9)**13** : 139.

1936. *Typlops hurstonii*, Bourret, *Serp. Indochene*, **2** : 11.

2003. *Typhlops thurstoni*, Das, *J. Bombay nat. Hist. Soc.*, **100** : 449.

Common name : Thurston's worm snake

Type : Holotype : Madras Museum.

Type locality : Nilgiri Hills.

Distribution : South India, Nilgiris, Trichur; Western India South of Goa from sea level above 4000 ft.

Remarks : A rare worm snake.

18. ***Typhlops tindalli*** Smith, 1943

1893. *Typhlops thurstonii* Boulenger, Cat. Snakes Brit. Mus., **1** : 26.

1919. *Typhlops beddomei,* Wall, *J. Bombay nat. Hist. Soc.*, **26** : 556.

1943. *Typhlops tindalli,* M. A. Smith, *Fauna Brit. India Rept. Amph.*, **3** : 53.

Common name : Tindall's worm snake.

Types : Syntypes 3. BMNH.

Type locality : Nilumbur, Malabar district. India.

Remarks : A rare snake, known only from three type specimens.

Family BOIDAE

This family includes Pythons and Boas, which are largest, heaviest among snakes. The family is represented by three genera *i.e., Eryx*, *Gongylophis* and *Python* in India.

1 Genus ***Eryx*** Daudin, 1803

1803. *Eryx* Daudin, *Bull. Sci. Soc. Philomath Paris,* **3** : 188. Type species *Boa turcica.* This genus includes two species.

1. ***Eryx johnii*** (Russell, 1801)

1801. *Boa johnii* Russell, *Cont. Indian Serp.*, **2** : 18-20 pl. 16, 17.

1801. *Boa anguiformis* Schneider, *Hist. Amph.*, **2** : 269.

1803. *Clothonia anguiformis* Daudin, *Hist. Nat. Gen. Part Rept.*, **7** : 285.

1837. *[Tortrix] eryx indicus* Schlegel, *Essia Physion. Serp.*, **2** : 17. Type (s) 'Museede Paris' Type locality : Pondicherry, India.

1842. *Clothonia johnii* Gray, *Zool. Misc.*, (**2**) : 45.

1844. *Eryx johnii* Dumeril & Bibron, *Erp. Gen.*, **6** : 458.

1849. *Eryx maculates* Hallowell, *Proc. Acad. Nat. Sci. Philadelphia*, **4** : 84.

1890. *Eryx johnii,* Boulenger, *Fauna Brit. India*, p. 248.

1923. *Eryx jaculus* var. johni, Ingoldby, *J. Bombay nat. Hist. Soc.*, **29** : 217.

1993. *Eryx johnii,* Kluge, *Zool. J. Linn. Soc.*, **107** : 298.

Common name : Red sand boa.

Type : Syntypes 2.

Type locality : Tranquebar (Tanjore south east of TamilNadu, India).

Distribution : INDIA : Throughout drier zones of peninsula & north east.

Elsewhere : Pakistan & Nepal.

2. ***Eryx whitakeri*** Das, 1991

1991. *Eryx whitakeri* Das, *J. Bombay nat. Hist. Soc.*, **88** : 93 figs 1-3.

Common name : Whitaker's sand boa.

Type : Holotype : Z. S. I. 24810.

Type locality : Mangalore, Karnataka, India.

Distribution : INDIA : Kerala; Karnataka; Goa; Western Maharashtra.

Remark : This species is endemic to India.

2. Genus ***Gongylophis*** Wagler, 1830

1830. *Gongylophis* Wagler, *Nat. Syst. Amph.*, p. 92.

1989. *Neogongylophis* Tokar, *Vestn. Zool., Kiev.*, **4** : 54.

Type species "*Gongylophis conicus* Wagler" = *Gongylophis conicus* (Schneider) McDiarmid, Campbell, Toure' 1999.

Ths genus includes one species.

3. ***Gongylophis conicus*** (Schneider, 1801)

1801. *Boa conica* Schneider, Hist. Amph., **2** : 268.

1802. *Boa viperina,* Shaw, *Gen. Zool.*, **3**(2) : 313-615.

1803. *Boa ornata,* Daudin *Hist. Nat. Gen. Part. Rept.*, **5** : 210.

1830. *Eryx bengalensis,* Guerin, *Icon. Regne Animal Rept.* 23 pp.

1837. *[Tortrix] Eryx bengalensis*, Schlegel, *Essia Physion. Serp.*, **2** : 17.

1842. *Gongylophis conicus,* Wagler, *Zool. Misc.*, (**2**) : 45.

1844. *Eryx conicus*, Dumeril & Bibron *Erp. Gen.*, **6** : 470.

1869. *Eryx conicus* var. *laevis,* Peters *Monatsber Preuss. Acad. Wiss. Berlin* 436.

1890. *Gongylophis conicus*, Boulenger, *Fauna Brit. India*, p. 247, fig. 75.

1893. *Eryx conicus,* Boulenger, Cat. Snakes Brit. Mus., **1** : 24.

1951. *Eryx conicus brevis,* Deraniyagala, *Spolia Zeylan,* **26** : 147.

1967. *Eryx conicus conicus*, Rajendran. Snakes of Our Land. (**2**) : 32.

1971. *Eryx conicus gansi,* Rajendran *In* St. Xavier's College Magazine, (**2**) : 12.

1989. *Gongylophis (Gongylophis) conicus*, Tokar, *Vestn. Zool. Kiev.*, **4** : 54.

1993. *Eryx conicus*, Kluge, *Zool. J. Linn. Soc.*, **107** : 297.

1994. *Eryx conicus*, Syndlar & Schleich, *Amph. Rept.*, **3** : 235.

1995. *Gongylophis [(Gonglyophis)]*–Tokar, *Trop. Zool.*, **8** : 353.

Common name : Common sand boa.

Type : Syntypes 3 : ZMB 1470; "Pedian Cotoo"

Type locality : "India orientali" ZMB 1470 is from Tronquebar (Madras) ; The description of "Pedian Cotoo" (Russell, 1796 : 5-6) was based on three specimen, two from Madras & one from Ganjam.

Distribution : INDIA : South of about 30° N latitude.

Elsewhere : Pakistan : Sri Lanka.

3. Genus ***Python*** Daudin, 1803

1803. *Python* Daudin, *Bull. Sci. Soc. Philomoth Paris,* (2)**3** : 187.

1830. *Constricter* Wagler, *Nat. Syst. Amph.*, p. 154.

1830. *Engyrus* Wagler, *Nat. Syst. Amph.*, 166-167.

1831. *Engyrus* Gray, *Synops. Rept. Animal Kingdom* (Appendix), p. 97.

1842. *Engris* Gray, *Zool. Misc.*, (**2**) : 42.

1842. *Heleionomus* Gray, *Zool. Misc.*, **2** : 42-43.

1842. *Hortulia* Gray, *Zool. Misc.*, **2** : 43-44.

1843. *Asterophis* Fitzinger, Syst. Rept. p. 24.

1884. *Aspidoboa* Sauvage, *Bull. Soc. Philomoth Paris,* (7)**8** : 143.

Type species : Plates 24 (" Pedda Poda B") & 39 (" Bora") of P. Russell, 1796, Cont. Indian Serp. 2 : 53 (= *Coluber molurus* C. Linnaeus 1758)

This genus includes two species.

4. ***Python molurus*** (Linnaeus, 1758)

1758. *Coluber molurus* Linnaeus, *Syst. Nat. 10th ed.,* **1** : *225.*

1801. *Boa ordinata,* Schneider, *Hist. Amph.*, **2** : 260.

1801. *Boa cinerea,* Schneider, *Hist. Amph.*, **2** : 270.

1801. *Boa castanea,* Schneider, *Hist. Amph.*, **2** : 272.

1801. *Boa albicans,* Schneider, *Hist. Amph.*, **2** : 274.

1801. *Boa orbiculata,* Schneider, *Hist. Amph.*, **2** : 276.

1802. *Boa boeformis,* Shaw, *Gen. Zool.*, **3**(2) : 511.

1803. *Python bora,* Daudin, Hist. *Nat. Gen. Part. Rept.*, **5** : 236.

1803. *Python tigris,* Daudin, *Hist. Nat. Gen., Part. Rept.*, **5** : 241.

1803. *Python tigris castaneas,* Daudin, *Hist. Nat. Gen.* Part. Rept., **5** : 246.

1803. *Python tigris albicens,* Daudin, *en. Part Rept.*, **5** : 249.

1803. *Python ordinatus,* Daudin, *Hist. Nat. Gen. Part Rept.*, **5** : 252.

1820. *Python bivittatus,* Kuhl, Beiter. *Zool. Vergleich Anat.*, **1** : 94.

1820. *Python javanicus,* Kuhl, Beitr. *Zool. Vergleich Anat.*, **1** : 94.

1837. *Python bivittatus,* Schlegel, Essai. Physion. Serp., **2** : 403.

1837. *[Boa Python] bivittatus*, Schlegel, Essai. Physion. Serp., **2** : 606. pl. 15, figs. 1-4.

1842. *Python molurus,* Gray, *Zool. Misc.*, (**2**) : 44.

1842. *Python jamesonii,* Gray, *Zool. Misc.*, (**2**) : 44. Type (s) : Mus [uem] Univer [city] Edinb [urgh] Type locality : India.

1843. *Python (Asterophis) tigris*, Fitzinger, *Syst. Rept.* p. 24.

1893. *Python molurus,* Boulenger, *Cat. Snakes Brit. Mus.*, **1** : 87.

1899. *Python molurus molurus,* Werner, *Zool.*, **40** : 24.

1899. *Python molurus var. ocellatus,* Werner, *Zool. Garten,* **40** : 24.

1899. *Python molurus var. intermedia,* Werner, *Zool Garten,* **40** : 24.

1899. *Python molurus var. sandaica,* Werner, *Zool. Garten,* **40** : 24.

1910. *Python bivittatus,* Werner, *Zool. Johrb. Abt. Syst.*, **28** : 271.

1930. *Python molurus bivittatus,* Mertens, *Abh. Senckenb. Naturforsh Ges.*, **42** : 287.

1935. *Python molurus molurus,* Stull, *Proc. Boston Soc. Nat. Hist.*, **40** : 393.

1935. *Python molurus bivittatus,* Stull, *Proc. Bosten Soc. Nat. Hist.*, **40** : 387-408.

1943. *Python molurus molurus,* M.A. Smith, Fauna Brit. India Rept. Amph., **3** : 106.

1945. *Python molurus pimbura,* Deraniyagala, *Spolia Zeylan,* **24** : 105, pl. 13, fig. 1.

1969. *Python molurus molurus,* Stimson, *Das Tierreich,* **89** : 29.

1969. *Python molurus bivittatus,* Stimson, *Das Tierreich,* **89** : 30.

1970. *Python molurus* var. *molurus,* Deuve, *Mem. O.R.S.T.O.M.*, **39** : 65.

1970. *Python molurus* var. *bivittatus*, Deuve *Mem. O.R.S.T.O.M.*, **39** : 65.

1970. *Python molurus* var. *sandaica*, Deuve, *Mem. O.R.S.T.O.M.*, **39** : 65.

1993. *Python molurus*, Kluge, *Rec. Australian Mus. Suppl.*, **19** : 1-77.

Common name : Indian rock python.

Type : Holotype : NHRM.

Type locality : "Indis"

Distribution : Throughout India (except the Islands).

Elsewhere : Nepal; Bangladesh; Myanmar; S. China; Hainan; Hongkong; Thailand; Laos; Vietnam; Cambodia; West Malaysia; Indonesia.

Remarks : The species has become vulnerable due to decline of its population on account of overexploitation during the last 60 years.

5. ***Python reticulatus*** (Schneider) 1801

1801. *Boa reticulata* Schneider, *Hist. Amph.*, **2** : 264.

1801. *Boa rhombeata,* Schneider, *Hist. Amph.*, **2** : 266.

1802. *Boa phrygia,* Shaw, *Gen. Zool.*, **3**(2) : 348, pl. 97.

1802. *Coluber javanicus,* Shaw, *Gen. Zool.*, **3**(2) : 441.

1820. *Python schneideri,* Merrem, *Tent. Syst. Amph.*, p. 89.

1842. *Python reticulatus*, Gray, *Zool. Misc.*, (**2**) : 44.

1893. *Python reticulatus,* Boulenger, *Cat. Snakes Brit. Mus.*, **1** : 448.

1988. *Morelia reticulatus*, Welch, Snakes Orient, p. 24.

1993. *Python reticulatus*, Kluge, *Rec. Australion Mus. Suppl.*, **19** : 852.

Common name : Reticulated python.

Type : Based on plate 62 (fig. 2) in Seba & pl. 79 (fig. 1) & pl. 80.

Type locality : Restricted to Java.

Distribution : INDIA : Nicobar Island; likely to be found in N. E. India (Whitaker & Ashoke Captain, 2004).

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BUTTERFLIES (FAMILY : PAPILIONIDAE) FROM ANAMALAI RANGE, SOUTHERN WESTERN GHATS, TAMILNADU

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INTRODUCTION

Anamalai is a significant segment of the Western Ghats, which possesses many endemic species and is a unique ecological tract rich in biodiversity. The Anamalai, declared as a Wildlife Sanctuary in 1976, falls within three taluks of Coimbatore District namely Pollachi, Valparai and Udumalpet with six territorial ranges *viz.* Pollachi, Valparai, Ulandy, Manambolly, Udumalpet and Amaravathy. The forest tract of Anamalais exhibiting a wide diversity in terrain, elevation and climate supports diverse vegetation of striking differences. Thus, the forest types from luxuriant tropical evergreen forests to thorn forests and scrub jungles are represented here.

Location and Geographical aspects (Sekar and Ganesan, 2003)

Location	:	Coimbatore district, Tamilnadu
Access	:	Via Pollachi
Latitude	:	N 10°13'–10°33'
Longitude	:	E 76°49'–77°21'
Sanctuary Area	:	850 sq km
National Park Area	:	108 sq km
a. Karian Shola	:	05 sq km
b. Manjampatty	:	72 sq km
c. Grass Hills	:	31 sq km
Altitude	:	350 m to 2500 m above sea level (Sekar and Ganesan, 2003)
Average Annual Rainfall	:	500–5000 mm

The forests of Indira Gandhi Wildlife Sanctuary (IGWS) occur mainly on the Anamalai hills, which run along the southern boundary of the Coimbatore district. The Anamalai hills are a continuation of the vast range of Western Ghat mountains that runs southwards through the Travancore-Cochin. The IGWS is contiguous to the Parambikulam Wildlife Sanctuary (Kerala) to its west and on the east from the Palani hills by the valley of Pachiar. The northern slopes descend precipitously to the cultivated plains of Coimbatore. The range is separated from the Aiyamalai and Bolampatti hills of Coimbatore division which connect on to the Nilgiri hills by the break in the Western Ghats known as "Palghat gap" which is about 32 km wide.

The main range of Anamalai hills has a general direction from north west to south east, with an elevation ranging from about 900 m to 2500 m (Akkamalai – 2483 m, Thanakamalai – 2513 m). On the south west of the central spur, the gradient is more gentle, it is an undulation plateau with an elevation of 900–1400 m, now almost entirely taken up for cultivation of products such as coffee, tea, cardamom and cinchona. The northwestern portions draining westwards consist of low, undulation hills much broken up by the streams.

Traditional systems of conservation are still valuable for offering protection to certain elements of diversity including endemic and threatened species. Endemic species of the Anamalai range may require large unbroken forest in the protected area. The resource availability in the already degraded landscape in the form of useful species may be important in removing the pressure of resource use from the protected area to the traditionally managed land, thus achieving a better conservation of a strictly protected area. The protected area is instrumental in protecting many species of conservation importance. A combination of approaches is therefore necessary for conservation of biodiversity in Anamalai.

The Anamalai has certainly received the much-deserved special attention from the conservationists. There have been positive trends in the growth of knowledge on the ecology of the system. The results from this exercise have percolated into the management practices and conservation implementation. The wide coverage of taxa and ecological issues has created a strong information base for developing projects for the area that can proper conservation measures in the region.

Biological indicators are organisms, which are very sensitive to their environment. Now it is well known that certain insects, especially Butterflies and Moths, are particularly suited as biological indicators. This is manifested by their 'performances' in their habitat. Their very presence or absence, or their number, is a good indication of state of the environment. The diversity of habitats, ranging from grasslands to plantation areas to natural degraded scrub lands and ravines was responsible for the species richness. By using butterflies as biological indicators, in the present study it is found that the quality of the Anamalai hills is not exceptionally good. The tropical wet evergreen forests possessed the greatest butterfly diversity in the Anamalai range, some reduction in butterfly diversity was observed in both dry deciduous habitats and plantations areas.

Butterflies belong to the order Lepidoptera, from either of the superfamilies Hesperioidea (the skippers) or Papilionoidea (all other butterflies).

India has a rich butterfly fauna comprising 1501 species out of 16,823 species recorded from all over the world (Gaonkar, 1996). Of the various butterfly habitats found in India, the Western Ghats is one of the most diversified areas containing a wide variety of species due to the typical ecoclimatic and geographic features.

The Papilionidae, or Swallowtail, is a family of large and beautiful butterflies which is well represented in India (about 107 species according to Goankar, 1996). When compared to other butterflies, swallowtails can be considered as better bioindicators because of their significant size, elegance and number. Papilionids usually have prominent tails which have given the name to this family. They are often spectacular and much sought after by collectors, a number of Papilionids world wide are threatened.

The Swallowtails are generally easily identified in the field by their large size, prominent markings, colour patterns and variable wing and tail shape.

The family *Papilionidae* is divided into three subfamilies, namely Baroniinae Parnassiinae and Papilioninae. Out of which Baroniinae is not represented in India.

From the present study, 19 species belonging to five genera under family Papilionidae have been recorded. Status of these species has been given as per IUCN 2006, CITES 2007 and Indian Wild Life (Protection) Act. 1972 amended in 2004.

SYSTEMATIC ACCOUNT

Family PAPILIONIDAE (Leech, 1815)

1815. Papilionidae Leech, *Edinburgh Encycl.*, ix, p. 127.

Diagnostic characters : Wings very variable in shape. Fore wing (except in *Parnassius* and *Hypermnestra*) with 12 veins and in adition a short internal vein, venation of anterior portion of fore wing in *Parnassius*, that invariably terminates on the dorsal (inner) margin. There is also a short transverse vein, the median spur, present near the base of the wing between the cell (median vein) and venation of anterior portion of fore wing in *Papilio* in all genera except *Armandia*, *Parnassius* and *Hypermnestra*. Veins R_5 and R_4 are stalked. Vein culb rises before the middle of the cell and four veins rise from the outer lower edge of the cell. Cell cosed in both wings. Hind wing very frequently with a tail, which may be slender, or broad and spatulate, but is always and extension of the termen at vein M_3. In the genus Armandia the termen is prolonged into tails at the apices of veins culb and cula as at vein M_3. Venation of anterior portion of fore wing is absent. A basal cell and a precostal (basal) vein are both present. The inner (abdominal) margin is frequently folded over and within the fold, in the ♂ the wing often bears a patch of special scales known a

androconia or scent-scales, a mass of woolly pubescence, or a brush of hair often strongly scented. In the males of some species, certain veins on the fore wing above are edged with pilose scent-stripes.

Proboscis well developed, Palpi small and appressed to frons, rarely and projecting (*Teinopalpus*). Antennae comparatively short, with generally a distinct club; upperside either scaled or naked. Three types of antenna occur : The fine sensory hairs beneath and laterally are almost equally distributed over the proximal part of each segment, or there is a cavity on each side which is covered with sensory hairs (recalling the Nymphalids) or there is only one row of such cavities presents (recalling the Pierids). "Mesothorax very powerful, the sternum completely fused with the episternum, the suture outwardly quite wanting as in the Pierids, which distinguishes these two families from all other Lepidoptera" (Jordan, 1908).

Fore leg fully developed; fore tibia with spur on the underside. Hind tibia with middle spurs. Claws simple, rarely with a tooth; paronychium and pulvillus wanting.

Classification : The genera of extant Papilionidae are usually classified into three subfamilies, Baroniinae, Parnassiinae and Papilioninae the latter two being further divided into tribes. The tribes recognized are Baroniini, Parnassiini, Zerynthiini, Luehdorfiini, Leptocircinini, Teinopalpini, Troidiini and Papilioniini. An additional subfamily Praepapilioninae has a single extinct member and is known only from a single fossil (Durden and Rose, 1978).

Swallowtail tribes Zerynthiini (Parnassiinae), Luehdorfiini (Parnassiinae) and Troidini (Papilioninae) almost exclusively use the Aristolochiacea family as their host plants. Many species sequester aristolochic acids making them unpalatable, causing both the larval and adult stages to be unpalatable to predators (Von Euw *et al.*, 1968).

The subfamily Baroniinae is represented by the sole representative species *Baronia brevicornis*. They are unique in the family to use the Fabaceae as their larval host plants.

The Apollos, Parnassiinae, are a distinctive group and all species are alpine and capable of living at high altitudes. Most species have two small reddish spots on their hindwings. The genera *Parnassius* and *Hypermnestra* were found to be extremely close based on molecular studies (Katoh *et al.*, 2005). After mating, the male Parnassines produce glue like substance that is used to seal the female genital opening and prevent other males from mating.

The pupae are typically attached to the substrate attached by the cremaster but with head up held by a silk girdle. In the temperate regions the winters are passed in a pupal diapause stage.

Distribution : The family is found everywhere in the world except in the extreme north and south and in desert areas. It is as abundant in the tropics of America as it is in the tropics of the Old World. The number of species, excluding *Parnassius*, inhabiting the Oriental Region from India to the pacific.

Key to the Genera

1 Hindwing V8 short, not as long as vein 1 in forewing 2

– Hindwing vein Sc + R_1 as long as vein 1 in forewing 3

2. Forewing with vein R_1 arising opposite to vein cula ..... ***Pachliopta*** Reakirt

– Forewing with vein R_1 arising opposite to vein culb ..... ***Troides*** Hub

3. Forewing vein R_1 anastonussed to vein Sc ..... ***Graphium*** Scop

– Forewing vein R_1 free from vein Sc 4

4. Hindwing vein Rs either near vein Sc + R_1 or vein M_1 ..... ***Chilasa*** Moore

– Hindwing vein Rs midway between vein Sc + R_1 and vein M_1 ..... ***Papilio*** Linn

1. ***Pachliopta hector*** (Linnaeus, 1758)

1758. *Papilio hector*, Linnaeus, *Syst. Nat.*, ed. X, p. 459.

1842. *Aernauta hector*, Berge, *Schmett B.* p. 108.

1881. *Menelaides hector*, Moore, *Lep. Ceylon*, i, p. 58.

Material examined : Yanaikadu, Anamalai area, 2 exs., 24.xii.2005. Top slip, Indira Gandhi National Park and Wildlife Sanctuary, 3 exs., 26.xii.2005. Aliyar dam, Anamalai area, 1 ex., 01.i.2006. Sholaiyar, Valparai, 2 exs., 04.i.2006. Thirumurtinagar, Indira Gandhi National Park and Wildlife Sanctuary, 2 exs., 09.iv.2006. Amaravathi nagar, Indira Gandhi National Park and Wildlife Sanctuary, 1 exs., 15.iv.2006. Top slip, Indira Gandhi National Park and Wildlife Sanctuary, 1 exs., 29.xi.2006.

Diagnostic characters : ♂ : Upperside black. Fore wing with a broad white interrupted band from the subcostal vein opposite the origin of veins R_2 and R_1, extended obliquely to the tornus and a second similar subapical band; both bands composed of detached irregularly indented broad streaks in the interspaces. Hind wing with a discal posteriorly strongly curved serries of seven crimson spots followed by a submarginal series of crimson lunules. Cilia black alternating with white. Head, collar, sides of the breast and the abdomen, with the exception of the dorsal plates of the anterior segments, red.

♀ : Resembles the ♂ Discal and submarginal markings duller, pale crimson irrorated with black, scales; in some specimens the anterior spots and lunules almost white. Abdomen above with the black colour extending further towards the apex

Wing Expanse : ♂ ♀ 90–110 mm.

Larval Host Plants The larvae of the *P. hector* feed on *Aristolochia indica*, *Aristolochia bracteolata* and *Thottea siliquosa*.

Distribution : It is found in India and Sri Lanka and possibly the coast of western Myanmar. In India, it is found in the Western Ghats, southern India, eastern India (West Bengal and Orissa) and the Andaman Islands and also recorded from Pune.

Status : Generally common and not known to be threatened. It is common all along the Western Ghats up to Maharashtra but rare in Gujarat also in eastern India. It is considered to be very rare in the Andamans. This species is protected by Indian Wild Life (Protection) Act, 1972 (IWPA).

Remarks : The butterfly is commonly called Crimson Rose (*Atrophaneura (Pachliopta) hector*) is a large swallowtail butterfly belonging to the *Pachliopta* subgenus, the Roses, of the genus *Atrophaneura* or the Red-bodied Swallowtails. This species is commonly available in all the ranges of Anamalai and all the seasons also.

2. ***Pachliopta pandiyana*** (Moore, 1881)

1881. *Papilio pandiyana*, Moore, *Trans. Ento. Soc. Lon.*, p. 313.

1889. *Menelaides pandiana*, Hampson, *J. As. Soc. Beng.*, p. 368.

1891. *Menelaides pandiyana*, Fergusson, *J. Bomb. nat. His. Soc.*, p. 446.

1895. *Papilio pandiyanus*, Rothschild, *Nov. Zoo.*, ii, p. 234.

1907. *Papilio jophon pandiyana*, Bingham, *Fauna Brit. Ind., Butterflies*-II, p. 19, 22.

1923. *Byasa jophon pandiayana*, Evans, *J. Bomb. nat. His. Soc.*, p. 232.

1932. *Tros jophon pandiyana*, Evans, *Identification of Indian Butterflies*, ed., p. 44.

Material examined : Top slip, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 27.xii.2005. Blandy Valley, Valparai, 2 exs., 06.i.2006.

Diagnostic characters : ♂ ♀ : Compared with the nominotypical form the fore wing has more extended white, especially in the apical region, but is also more shaded with black scales; the internervular black streaks in areas 2 to 5 extend nearly to the cell. Hind wing with the posterior discal white spot usually reaching vein1; the anterior spot is very large in the ♂ small or divided into two spots, or obliterated in the ♀

Wing Expanse : ♂ ♀ 100–130 mm.

Larval Host Plants : The larval food plant is *Thottea siliquosa* (*Aristolochiaceae*).

Distribution : Southern India, particularly western slopes of the Nilgiris and elsewhere on the Western Ghats.

Status : Uncommon, but not considered to be threatened as a species. Locally common in the Western Ghats.

Remarks : The butterfly is commonly called Malabar Rose (*Atrophaneura (Pachliopta) pandiyana*) is a swallowtail butterfly belonging to the *Pachliopta* subgenus, the Roses, of the genus *Atrophaneura* or the Red-bodied Swallowtails. It resembles the Common Rose, *Pachliopta aristolochiae* from which it can be differentiated by the much larger white patch on its hindwings. It is an important endemic butterfly of South India.

3. ***Pachliopta aristolochiae*** (Fabricius, 1775)

1775. *Papilio aristolochiae*, Fabricius, *Syst. Ent.*, p. 443.

1885b. *Menelaides aristolochiae*, Niceville, *J. As. Soc. Beng.*, p. 52.

Material examined : Top slip, Indira Gandhi National Park and Wildlife Sanctuary, 2 exs., 26.xii.2005. Thirumurtinagar, Indira Gandhi National Park and Wildlife Sanctuary, 2 exs., 30.xi.2006. Upper Aliyar, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 7.iv.2006.

Diagnostic characters : ♂ ♀ : Upperside black, the fore wing discal area paler, with black fold-stripes and well-marked pale vein-stripes. Hind wing with a spatulate tail, white discal spots and red sub-marginal spots which above are more or less strongly shaded with black. The ♀ is paler, with broader wings. Abdomen red laterally and at the tip, also the margin of the ventral segments; the sides of the breast and also the head red.

Wing Expanse : ♂ ♀ 80–110 mm.

Larval Host Plants : The larvae food plants are *Aristolochia bracteolata*, *Aristolochia indica*, *Aristolochia tagala*, *Aristolochiae griffithi* and *Thottea siliquosa*.

Distribution : It is widely distributed in Asia. Afghanistan, Pakistan, India (including Andaman & Nicobar islands), Nepal, Sri Lanka, Myanmar, Thailand, Japan (south-western Okinawa only), Laos, Vietnam, Kampuchea(now Cambodia), peninsular and eastern Malaysia, Brunei, Philippines (Palawan and Leyte), Indonesia. In China, it is distributed in southern and eastern China (including Hainan, Guangdong province), Hong Kong and Taiwan. In Indonesia, it is distributed in Sumatra, Nias, Enggano, Bangka, Java, Bali, Kangean, Lombok, Sumbawa, Sumba, Flores, Tanahjampea and Kalimantan.

Status : Very common almost all over the plains of India and not threatened as a species. Extremely abundant during and after the monsoon.

Remarks : The butterfly is commonly called Common Rose (*Pachliopta aristolochiae*) is a swallowtail butterfly belonging to the *Pachliopta* subgenus, the Roses, of the genus *Atrophaneura* or Red-bodied Swallowtails. It is a common butterfly which is extensively distributed across South and South East Asia.

4. ***Troides minos*** (Cramer, 1779)

1779. *Papilio minos* Cramer, *Uitlandsche Kapellen* (Papillons exot.) **3** : 4, pl. 195.

Material examined : Top slip, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 26.v.2005. Upper canal, Indira Gandhi National Park and Wildlife Sanctuary, 2 exs., 05.iv.2006.

Diagnostic characters : ♂ : Hindwing : the black along the dorsal and terminal margins both on upper and undersides much broader; on the upperside entirely filling interspace 1, on the underside with only a narrow streak of yellow at the angle between the median vein and vein culb; the cone-shaped black markings on the terminal margin shorter and broader; on the costal margin the black is narrower than in *cerberus*, barely extended below vein R_4 except at the base and apex of the wing where it broadens; the abdomen is dull yellow above and below not shaded with black.

♀ : Hind wing : the black on the costal margin as in *cerberus*, but there is always a large yellow spot at base of interspace 7; interspace 1 black, with a pale patch in the middle; the black terminal border broader, the inwardly extended cone-shaped markings prominent, those in interspaces 2 and 3 with pale buff lateral edgings, extended inwards to the postdiscal spots. In both male and female the hind wing on the upperside is clothed with soft, silky, long brownish-black hairs from base along the dorsal area.

Wing Expanse : 140–180 mm.

Larval Host Plants : The larval host plants of these butterflies are the family *Aristolochiaceae* such as *Aristolochia indica*, *Aristolochia tagala* and *Thottea siliquosa*.

Distribution : Western Ghats and parts of the Eastern Ghats.

Status : The *Troides minos* is very common in the Western Ghats particularly Southern and Central Western Ghats. *T. minos* found in southern Maharashtra also. In Northern Goa it is uncommon. Despite its restricted range and endemicity, the butterfly is not known to be threatened but the IUCN recommends continuous monitoring. It is listed in Appendix II of Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES).

Remarks : The butterfly is commonly called Southern Birdwing (*Troides minos*) is a large and striking Swallowtail butterfly endemic to Peninsular India. With a wingspan of 140–180 mm, it is the largest butterfly found in southern India. It was earlier considered a subspecies of the Common Birdwing (*Troides helena*) but is now recognised as a valid species. The species is more common in the Western Ghats.

5. ***Graphium sarpedon*** (Linnaeus, 1758)

1758. *Papilio sarpedon*, Linnaeus, *Syst. Nat.*, (Edn 10) : 479.

1872. *Papilio parsedon*, Westwood, *Trans. Ent. Soc. Lond.* : 85-110.

2003. *Graphium (Graphium) sarpedon*, Page & Treadaway, *Butterflies of the world,* **17** : 3.

Material examined : Varakaliyar, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 28.xii.2005. Upper canal, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 05.iv.2006. Sholaiar Nagar, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 08.iv.2006. Thirumurtinagar, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 09.iv.2006.

Diagnostic characters : ♂ ♀ : Upperside brownish-black, with a green or greenish-blue discal band; fore wing with the band anteriorly strongly narrowed and separated into spots, on the hind wing narrowed posteriorly and ending in a point on vein culb near the anal angle; hind wing with the costal part of the band scaled with white, as also partly the veins intersecting the band; a row of green submarginal lunules; scent-fold grey on the inside, furnished with a tuft of long, somewhat stiff white hairs; ♀ paler, with slightly broader wings.

Underside with paler ground-colour, the discal band scaled with transparent whitish. Fore wing with slight indications of submarginal spots before the tornus. Hind wing near base with a red transverse bar, which extends from the costal margin to the cell and is separated from the discal band; five red discal spots, of which the anterior one encircles the apex of the cell. Body above brownish-black with dark grey hairs, beneath of the most party grey –white.

Wing Expanse : 80–90 mm.

Larval Host Plants : The larvae feed primarily on the leaves of trees in the families *Lauraceae*, *Myrtaceae*, *Sapotaceae* and *Rutaceae*. In particular, *G.s. sarpedon* and *G.s. teredon* often feed on leaves of the *Cinnamon* bark tree, *Cinnamomum zeylanica*, or of the *Indian laurel*, *Litsea sebifera*. The list of larval food plants also include *Alseodaphne semecarpifolia*, *Cinnamomum camphora*, *Cinnamomum macrocarpum*, *Cinnamomum malabatrum*, *Litsea chinensis*, *Polyalthia longifolia*, *Miliusa tomentosa*, *Persea macrantha* and *Michelia doltospa*.

Distribution : The common bluebottle is distributed throughout south and southeast Asia. Subspecies appear in India and Sri Lanka (*G. s. sarpedon* and *teredon*), China and Taiwan (*G. s. semifasciatus* and *connectens*), Japan (*G. s. nipponum*), Indonesia and the Solomon Islands, New Guinea (*G. s. messogis*) and Australia (*G. s. choredon*). In India it occurs in Southern India in the Western Ghats and in the Himalayas from Kashmir in the west to Myanmar in the east.

Status : Generally common and not threatened.

Remarks The butterfly is commonly called Common bluebottle (*Graphium sarpedon*), is a species of swallowtail butterfly found in South and Southeast Asia, as well as parts of Australia. There are approximately 15 subspecies with differing geographical distributions.

6. ***Graphium agamemnon*** (Linnaeus, 1758)

1758. *Papilio Agamemnon* Linnaeus, *Syst. Nat.* (Edn 10), p. 462.

2003. *Graphium (Macfarlaneana) Agamemnon*, Page & Treadaway, *Butterflies of the world*, **17** : 3.

Material examined : Varakaliyar, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 28.xii.2005. Upper canal, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 05.iv.2006.

Diagnostic characters : ♂ ♀ : Upperside brownish-black, with a blue-green patches, of which those placed towards the base are band-like and those below the cell of the fore wing large and elliptical. Hind wing with tail, which is longer in the ♀ Underside paler, the green patches partly covered with white or brownish scales, both wings clouded with violet-grey. Hind wing with a black crescent, basally margined with red between vein 8 and cell; beneath this spot usually a distinct second are; often a red anal spot and sometimes a row of red discal spots. Body brown-black above, beneath grey, with a grey-green lateral stripe.

Wing Expanse : 80–90 mm.

Larval Host Plants : The larvae *G. agamemnon* feed on the leaves of *Polyalthia longifolia*, *P. cerasoides*, *A. squamosa*, *A. reticulata*, *A. discolor*, *A. muricata* and *Uvaria narum* of the family Annonaceae. *Michelia doltospa*, *M. champaca*, *Milliusa tomentosum*, *Cinnamomum* spp. and *Artabotrys hexapetalus*.

Distribution : Southern India to Saurashtra, Northern India (Kumaon to Assam) Andaman & Nicobar Islands, Nepal, Sri Lanka, Bangladesh, Brunei, Myanmar, Thailand, Laos, Kampuchea, southern China (including Hainan), Taiwan, South East Asia to Papua & New Guinea, Bougainville, Solomon Islands and Australia (northern Queensland).

Status : Common and not threatened.

Remarks : The butterfly is commonly called Tailed Jay (*Graphium agamemnon*) is a predominantly green and black tropical butterfly that belongs to the swallowtail family. The butterfly is also called Green Spotted Triangle, Tailed Green Jay or the Green Triangle. It is a common, non-threatened species native to India, Sri Lanka through Southeast Asia and into Australia. Several geographic races are recognized.

7. ***Graphium doson*** (C. & R. Felder, 1864)

1864a. *Papilio doson* C. & R. Felder, *Verh. zool.-bot. Ges. Wien.*, p. 305.

2003. *Arisbe (Eurypleana) doson,* Page & Treadaway, *Butterflies of the world,* **17** : 4.

Material examined : Top Slip, 1 ex., 28.xii.2005. Upper canal, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 05.iv.2006.

Diagnostic characters : ♂ ♀ : Upperside white, with green or greyish-white makings which are scaleless for the most part. Fore wing with five cell-spots, of which the basal one is streak-like and the fourth comma-shaped; a posteriorly widened discal macular band a row of submarginal spots and a single subcostal spot between the submarginal and discal spots. Hind wing with a discal elongate-triangular band, which is anteriorly divided by a short, narrow black band; a submarginal row of spots; ♂ with yellow scent-wool which reaches to the inner marginal stripe.

Underside markings mostly larger and silver-scaled. Hind wing with red (rarely yellow) markings; a spot before the costa in the short black costal band, this band never united with the black subbasal stripe; a row of spots from apex of cell to inner margin, of which the posterior one in usually produced basad into a long stripe. ♀ paer, with smaller markings. Body above black, with bluish-grey hairs, abdomen with white lateral line, white below.

Wing Expanse : 70–80 mm.

Larval Host Plants : Larva of *G. doson* feed on *Desmos cochinechinensis*, *Uvaria microcarpa*, *Michelia alba, Annona* sp., *Desmos* sp., *Polyalthia* sp., *Rauwenhoffia* sp., *Mitrephora* sp., *Uvaria* sp., *Diploglottis* sp., *Cinnamomum* sp., *Magnolia* sp. and *Michelia* sp..

Distribution : S. India, Bengal, Kumaon-Assam, Myanmar, S. Japan, Riu Kiu and Sri Lanka.

Status : Common and not threatened.

Remarks : The butterfly is commonly called Common Jay (*Graphium doson*) is a black with a pale blue, semi-transparent central band that is formed by large spots tropical butterfly that belongs to the swallowtail family. The sexes look alike. It has mud-puddling character. The Common Bluebottle is brighter blue and lacks the series of marginal spots present in the Common Jay.

8. ***Graphium nomius*** (Esper, 1785)

1785. *Papilio nomius*, Esper *Die Schmett.*, **3** : 210.

Material examined : Varakaliyar, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 28.xii.2005. Upper canal, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 05.iv.2006.

Diagnostic characters : ♂ ♀ : Fore wing with four dark bars in the cell; anterior submarginal spots rounded. Beneath with the first and second brown bands blackish at the costal margin. Hind wing above with well developed black discal band; abdominal fold with a well marked cottony scent-organ.

Wing Expanse : 75–90 mm.

Larval Host Plants : The larval host plants of *G. nomius* are *Miliusa tomentosum*, *M. velutina* and *Polyalthia longifolia.*

Distribution : Southern and Eastern India (including Sikkim and Assam), Sri Lanka, Nepal, Bangladesh, Myanmar, Thailand, Vietnam, Laos and Kampuchea.

Status : Fairly common. Tends to be local. Not known to be threatened.

Remarks : The butterfly is commonly called Spot Swordtail (*Grphium* (*Pathysa) nomius*) is a beautiful butterfly found in India that belongs to the Swallowtail family. One of the grandest sights is a host of Spot Swordtails mud-puddling or swarming around a flowering forest tree. The Spot Swordtail gets it's name from the beautiful line of distinct white spots along the margin of its wings.

9. ***Graphium antiphates*** (Cramer, 1775)

1775. *Papilio antiphates* Cramer, *Uitl. Kapellen*, **1**(6) : 113.

Material examined Varakaliyar, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 28.xii.2005.

Diagnostic characters : ♂ ♀ : White, the fore wing above and beneath greenish towards the costa, as also the basal half of hind wing beneath; fore wing with seven black bands. Hind wing above with black marginal spots and a row of black submarginal spots; the posterior part of the marginal area dusted with grey-black, or the whole margin broadly grey-black.

Underside of fore wing with black markings as follows : Before the inner margin a stripe which is anally united with a subbasal stripe; a double discal band longitudinally divided by the ground-colour, the distal half of which is broken up into spots; a row of submarginal and a row of marginal spots the former ones shaped, at their proximal side yellow patches, which are for the most part indistinctly defined. Body above block with light lateral stripe, or the abdomen entirely white; underside white with black lateral stripe. Abdominal fold of ♂ without scent-wool.

Wing Expanse : 75–90 mm.

Larval Host Plants : The larval host plants of *G. antiphates* are *Desmos cochinchinensis*, *Uvaria microcarpa* and *Annona lawii*.

Distribution : India, China, Sri Lanka, Malaysia and Myanmar.

Status : Considered to be very rare, is not uncommon.

Remarks : The butterfly is commonly called Five-bar Swordtail (*Graphium antiphates*) is a species of papilionid butterfly found in South Asia. This butterflies are mostly found during November to April/May in Anamali range.

10. ***Chilasa clytia*** (Linnaeus, 1758)

1758. *Papilio clytia*, Linnaeus, *Syst. Nat.* (Edn 10), p. 479.

2003. *Chilasa clytia*; Page & Treadaway, *Butterflies of the world*, **17** : 8.

Material examined : Top Slip, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 28.xii.2005.

Diagnostic characters : ♂ ♀ : Both wings with light marginal spots; hind wing sinuous between the veins. Frons with two white spots. Abdomen in the light forms with the white spots merged together into longitudinal lines, in the dark forms usually separated and those of the subdorsal row small and partly suppressed.

Wing Expanse : 90–120 mm.

Larval Host Plants : The larvae of *C. clytia* feed on *Alseodaphne semicarpifolia*, *Cinnamomum camphora*, *C. macrocarpum*, *Litsea chinensis*, *L. deccansis*, *Tetranthera apetala*.

Distribution : This butterfly is found in India from Kangra to Sikkim, from Assam to Burma, Nepal, Bangladesh, Peninsular India and the Andaman Islands. It is also found in Sri Lanka, Thailand, Southern China (including Hainan), Hong Kong, Vietnam, Laos, Kampuchea, peninsular Malaysia, Philippines and Indonesia (Flores, Alor, Timor and Moa). Several regional variants and forms are recognized.

Status : Generally common and not threatened. The nominate subspecies is protected by Indian Wild Life (Protection) Act, 1972 (IWPA).

Remarks : The butterfly is commonly called Common Mime (*Papilio (Chilasa) clytia*) is a Swallowtail butterfly found in South and South-east Asia. The butterfly belongs to the *Chilasa* group or the *Black-bodied Swallowtails*. The Common Mime has two mimetic forms, *clytia* and *dissimilis*. The nominate form *clytia* mimics the **Common Indian Crow** (*Euploea core*) while the form *dissimilis* mimics the **Blue Tiger** (*Tirumala limniace*). It serves an excellent example of a Batesian mimic among the Indian butterflies.

11. ***Papilio paris tamilana*** (Moore, 1881)

1881b. *Papilio tamilana*, Moore, *Trans. Ent. Soc. Lond.*, p. 313.

1895. *Papilio paris tamilana*, Rothschild, *Nov. Zool.*, p. 385.

1903. *Achillidess tamilana*, Moore, *Lep. Indica*, p. 65.

Material examined : Iyarpadi, Valparai, 2 exs., 03.i.2006. Upper canal, Indira Gandhi National Park and Wildlife Sanctuary, 3 exs., 05.iv.2006. Amaravathi river, Indira Gandhi National Park and Wild life Sanctuary, 2 exs., 16.vi.2006.

Diagnostic characters : ♂ ♀ : Closely resembles the nominotypical form, but is much larger. Hind wing with a much larger and paler metallic blue discal patch, which extends from area 3 well into area 7, from the apex of the cell into areas 3 to 5 and from the middle of area 6 much further towards the margin than in the nominotypical form. Underside with the transverse post-discal pale band on the fore wing conspicuously narrower than in the nominotypical form and curved inwards towards the costa.

Wing Expanse : 120–140 mm.

Larval Host Plants : The larval host plant of these butterflies is *Evodia roxburghiana*.

Distribution Southern India, Kanara, Nilgiris, Travancore.

Status The butterfly is endemic to southern India particularly southern Western Ghats and not rare.

Remarks : The butterfly is commonly called Paris Peacock (*Papilio paris tamilana*) is an endemic swallowtail butterfly found in southern India. The species is more common in the Western Ghats.

12. ***Papilio buddha*** Westwood, 1872

1872. *Papilio Buddha* Westwood, *Trans. Ent. Soc. Lond.*, p. 186.

Material examined : Top slip, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 26.v.2005.

Diagnostic characters : ♂ ♀ : Upperside of both wings with a broad green discal band which on the fore wing is placed anteriorly with its greater part in the cell and on the hind wing extends far into the cell. The basal area of both wings dusted with green, the distal marginal area almost pure black. Hind wing with a yellow submarginal spot at the costal margin and a similar one at the anal angle; tail black. Underside of fore wing with a very broad post-discal grey band which is almost straight on its inner edge. Hind wing with a pale outer marginal border and a row of narrow yellow submarginal spots which are distally bordered with black and proximally with bluish-white. ♂ without scent-streaks on the fore wing. In the ♀ there is a second yellow spot placed behind the subcostal vein on the hind wing.

Wing Expanse : 90–100 mm.

Larval Host Plants : The larval host plants of these butterflies is *Xanthoxylon rhetsa* DC., family *Rutaceae.*

Distribution : Southern India.

Status : Locally common and not rare. Protected in India but not known to be threatened.

Remarks : The butterfly is commonly called Malabar Banded Peacock (*Papilio buddha*) is a species of swallowtail found in the Western Ghats of India.

13. ***Papilio demoleus*** Linnaeus, 1758

1758. *Papilio demoleus* Linnaeus, *Systema Naturae*, ed. X, p. 464.

1780a. *Papilio erithonius*, Cramer, *Pap. Exot.*, p. 76.

1881a. *Orpheides erithonius*, Moore, *Lep. Ceylon*, p. 147.

Material examined : Sethumadai, Pollachi, 3 ex., 23.xii.2005. Thirumorthy malai, Indira Gandhi National Park and Wildlife Sanctuary, 2 ex., 02.I.2006. Aruljothi nagar, Aliyar dam, 2 exs., 04.iv.2006. Amaravathy nagar, Indira Gandhi National Park and Wildlife Sanctuary, 2 exs., 15.iv.2006.

Diagnostic characters ♂ ♀ : Body below, head at the sides and a stripe on each side of thorax pale yellow. Fore wing above at the base dotted with pale yellow, these dots united into transverse lines; a large cell-patch, usually divided into two spots, at the upper angle of cell two or three spots; a macular discal band, the upper spots small and placed far apart, the posterior ones large and usually contiguous; band on the hind wing not interrupted; both wings with a row of submarginal spots and small marginal lunules; hind wing with a red anal spot. Not tailed.

Wing Expanse : 80–100 mm.

Larval Host Plants The larval food plants of the Lime Butterfly are Oranges and Citrus. *Ruta graveolens, Glycosmis pentaphylla, Aegle marmelos, Murraya koenigi, Chloroxylon swietenia.*

Distribution : India, Nepal, Burma, Thailand, Philippines, Kampuchea, southern China (including Hainan, Guangdong province), Taiwan, Japan (rare strays), Malaysia, Singapore, Indonesia (Kalimantan, Sumatra, Sula, Talaud, Flores, Alor and Sumba), Oman, UAE, Saudi Arabia, Kuwait, Bahrain, Qatar, western and possibly eastern Afghanistan and western Pakistan, Sri Lanka, Papua & New Guinea, Australia (including Lord Howe's island), apparently Hawaii and possibly other Pacific Ocean islands. Formerly absent from Borneo it is now one of the commonest *Papilionids* in Sabah and Sarawak in Malaysian Borneo, Kalimantan (Indonesian Borneo) and in Brunei. In the Western Hemisphere, Dominican Republic, Jamaica and Puerto Rico.

Status : Very common.

Remarks : The butterfly is commonly called Common Lime or the Lemon Butterfly (*Papilio demoleus*) is a common and widespread Swallowtail butterfly. It gets its name from its host plants which are usually citrus species such as the lime. It is also sometimes called the Chequered Swallowtail. Unlike most swallowtail butterflies it does not have a prominent tail. It is perhaps the most widely distributed swallowtail in the world (Collins and Morris, 1985).

14. ***Papilio liomedon*** Moore, 1874

1874b. *Papilio liomedon* Moore, *Proc. Zool. Soc. Lond.*, p. 575.

1895. *Papilio demolion liomedon*, Rothschild, *Nov. Zool.*, p. 283.

1902. *Araminta liomedon*, Moore, *Lep. Indica*, V, p. 466.

Material Observed : Top slip, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 28.ix.2006, Upper canal, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 30.ix.2006.

Diagnostic characters : ♂ ♀ : Upperside brownish-black. Both wings crossed by a broad, prominent, oblique, greenish-yellow band from the apex of fore wing to the middle of the inner margin of hind wing; on the fore wing the band is composed of separate spots; on the hind wing the band passes through the apex of the cell. Hind wing with a submarginal series of greenish-yellow lunules. Underside fuliginous-black with transverse band as above and other markings very similar to those in demolion.

Wing Expanse : 90–100 mm.

Larval Host Plants : The larval host plants of these butterflies are *Acronychia laurifolia* and *Evodia roxburghiana* of the family.

Distribution : Western Ghats and hills of southern India.

Status : The IUCN Red Data Book records the Malabar Banded Swallowtail as uncommon and not threatened as a species. However a survey in the early nineties by Harish Gaonkar showed the

butterfly to be rare but distributed from Kerala to Goa. The butterfly was considered to be common in Karwar in the past. It is not to be found in Maharashtra and Gujarat. It is protected by Indian Wild Life (Protection) Act, 1972 (IWPA).

Remarks The butterfly is commonly called Malabar Banded Swallowtail (*Papilio liomedon*) is a beautiful member of the Swallowtail family found in southern India. Earlier considered a subspecies of the Banded Swallowtail (*Papilio demolion*) of South-east Asia but now considered a distinct species.

15. ***Papilio helenus*** Linnaeus, 1758

1758. *Papilio helenus* Linnaeus, *Syst. Nat.*, p. 459.

2003. *Menelaides helenus*, Page & Treadaway, *Butterflies of the world,* **17** : 9.

Material examined : Sarkarpathi, Pollachi, 2 exs., 23.xii.2006. Aliyar, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 01.i.2006. Thunkavi, Udumalaipettai, 1 ex., 27.xi.2006. Thirumurthinagar, Indira Gandhi National Park and Wildlife Sanctuary, 2 exs., 01.xii.2006. Manjampatti, Indira Gandhi National Park and Wildlife Sanctuary, 2 exs., 16.iv.2006.

Diagnostic characters : ♂ ♀ Body black; occiput, pronotum, palpi and breast with white dots. Wings brown-black, the fore wing above in the ♂ thickly hairy on the disc, the only markings being four faintly visible stripes in the cell and beneath with two whitish stripes on the disc between each pair of veins. Hind wing with a white discal area which in the ♀ is usually more prolonged anally than in the ♂ and in both sexes consists of three or four spots of which the third is the largest. Hind wing with red submarginal lunules beneath; usually only the last one is distinct above. The ♀ is paler, with more distinct submarginal spots on the hind wing above.

Wing Expanse : 100–120 mm.

Larval Host Plants : The larvae of the *P. helenus* feed on plants of family Rutaceae such as *Zanthoxylum rhetsa*, *Zanthoxylum acanthopodium*, *Zanthoxylum nitidum*, *Glycosmis pentaphylla*, *Todalia asiatica*, *Philodendron* spp. and *Evodia* spp.

Distribution Southern and North-East India, Sri Lanka, Nepal, Bhutan, Bangladesh, Myanmar, Thailand, Laos, Kampuchea, Vietnam, southern China (including Hainan, Guangdong province), southern Japan, South Korea, Ryukyu Islands. Peninsular and Eastern Malaysia, Brunei, Philippines and Indonesia (Sumatra, Java, Bangka, Kalimantan and the Lesser Sunda Islands except Tanimbar). In India, along the Western Ghats from Kerala to Gujarat, also Palnis and Shevaroys. In the north from Mussoorie eastwards, to North-East India and onto Myanmar.

Status Common and not threatened. Common from Kerala to Maharashtra, rare in Gujarat.

Remarks The butterfly is commonly called Red Helen (*Papilio helenus*) is a large swallowtail butterfly found in the forests of southern India and parts of Southeast Asia. This is the third largest butterfly in India.

16. ***Papilio polytes*** Linnaeus, 1758

1758. *Papilio polytes* Linnaeus, *Syst. Nat.*, p. 459.

1865. *Papilio horsfieldi*, Reakirt, *Proc. ent. Soc. Philad.*, **3** : 476.

1879. *Papilio walkeri*, Janson, *Cistula ent.*, **2**(21) : 433.

1908. *Papilio depicta*, Fruhstorfer, *Ent. Wochenbl.*, **25**(9) : 38.

1908. *Papilio ocha*, Fruhstorfer, *Ent. Wochenbl.*, **25**(9) : 38.

1938. *Papilio chalcas*, Fabricius, Bryk, *Systema Glossatorum*, 24.

2003. *Menelaides polytes*, Page & Treadaway, *Butterflies of the world*, **17** : 9.

Material examined : Sarkarpathi, Pollachi, 3 exs., 23.xii.2006. Aliyar, Indira Gandhi National Park and Wildlife Sanctuary, 2 exs., 01.i.2006. Thunkavi, Udumalaipettai, 2 exs., 27.xi.2006. Thirumurthinagar, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 01.xii.2006. Manjampatti, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 16.iv.2006.

Diagnostic characters : ♂ : Palpi white laterally. Ground-colour black. Fore wing with white marginal spots which are broader proximally. Hind wing with a white post-discal band which consists of spots of about equal size.

♀ : There are three principal forms : one resembling the ♂ one with red discal patches on the hind wing and one with white discal patches on the hind wing. In the two latter forms the fore wing is black from the base to veins culb or cula and along the outer margin; the posteriorly narrowed central area is lighter and traversed by black vein and fold stripes; distal margin distinctly undulate, with thin white fringe-spots.

Wing Expanse : 90–100 mm.

Larval Host Plants : The larvae of *P. polytes* food plants are *Aegle marmelos* or Bael, *Atalantia racemosa* and *Citrus* spp. of *C. aurantifolia*, *C. grandis*, *C. limon*, *C. medica*, *C. sinensis*, *Glycosmis arborea*, *Murraya koenigii*, *Murraya paniculata*.

Distribution : India (including Andaman and Nicobar islands), Nepal, Sri Lanka, Myanmar Thailand, southern and western China (including Hainan, Guangdong province), Taiwan, Hong Kong, Japan (Ryukyu Islands), Vietnam, Laos, Kampuchea, Eastern and Peninsular Malaysia, Brunei and Indonesia (except Moluccas and Irian Jaya).

Status : Very common. Not threatened.

Remarks : The butterfly is commonly called Common Mormon (*Papilio polytes*) is a common species of swallowtail butterfly widely distributed across Asia. This butterfly is known for the mimicry displayed by the numerous forms of its females which mimic inedible Red-bodied Swallowtails, such as the Common Rose and the Crimson Rose.The Red Helen (*Papilio helenus*) is a large swallowtail butterfly found in forests in southern India and parts of Southeast Asia.

17. ***Papilio polymnestor*** Cramer, 1775

1775. *Papilio polymnestor* Cramer, *Uitlandsche Kapellen* (*Papillons exot.*), p. 83.

Material examined : Top Slip, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 28.xii.2005. Upper canal, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 05.iv.2006.

Diagnostic characters : ♂ ♀ : Upperside of fore wing with a pale blue discal band which is obsolescent anteriorly. Hind wing with distal area pale blue, enclosing a row of black discal patches and a similar row of submarginal spots, some of the latter united with the black distal margin. Underside opaque black. Fore wing with an elongate spot of dark red at base of cell; the post discal transverse streaks as on the upperside, but grey tinged with ochraceous and extended to the costa; in some specimens similar, but narrow streaks also in the cell. Hind wing with five irregular small patches of red at base, the outer three-fourths of wing touched with ochraceous, but generally narrower than the blue on the upperside; the inner margin of the grey area crosses the wing beyond the cell; the post-discal and submarginal black spots as above. In some specimens this grey area is greatly restricted, its inner margin crossing the wing well beyond the apex of the cell; the submarginal spots merged completely with the marginal spots, forming a comparatively broad marginal black band. Antennae, head, thorax and abdomen blackish-brown. ♀ Resembles the ♂ but the internervular streaks on the fore wing paler, extended into the cell on both sides of the wing. Hind wing with paler blue and grey areas. In some specimens there is a diffuse short crimson streak at the base of the cell of the fore wing above.

Wing Expanse : 120–150 mm.

Larval Host Plants : The *P. polymnestor* larvae feed on *Atalantia racemosa, Atalantia wightii, Glycosmis arborea, Paramigyna monophylla, Citrus grandis, Citrus limon.*

Distribution : Endemic to India and Sri Lanka. In India it is restricted to the Western Ghats, Southern India and the East coast. It has been recorded as far north as Gujarat. It is often seen even in the gardens and sometimes in the middle of busy traffic in large cities such as Mumbai, Pune and Bangalore. Wynter-Blyth recorded it in Madhya Pradesh, Jharkhand, West Bengal and Sikkim.

Status : Not uncommon. Not thought to be threatened. Occurs throughout the year but more common in the monsoon and immediately after it.

Remarks The butterfly is commonly called Blue Mormon (*Papilio polymnestor*) is a beautiful butterfly found in South India belonging to the Swallowtail family. It is a delight in any garden and its striking blue, black and white markings coupled with the large wingspan make it a memorable sight.

18. ***Papilio dravidarum*** Wood-Mason, 1880

1880. *Papilio dravidarum* Wood-Mason, *J. As. Soc. Beng.*, p. 134.

1881. *Papilio pollux* var. *dravidarum*, Westwood, *Arc. Entom.*, p. 482.

1903. *Tamera dravidarum*, Moore, *Lep. Indica*, p. 79.

Material examined : Sethumadai, Pollachi, 2 exs., 23.xii.2005. Varakaliyar, Indira Gandhi National Park and Wildlife Sanctuary, 2 exs., 28.xii.2005. Aliyar, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 01.i.2006. Sholaiar Nagar, Indira Gandhi National Park and Wildlife Sanctuary, 1 ex., 08.iv.2006. Thirumurtinagar, Indira Gandhi National Park and Wildlife Sanctuary, 09.iv.2006.

Diagnostic characters ♂ ♀ Upperside velvety black. Fore wing with the outer half and four somewhat indistinct longitudinal lines in the cell irrorated with yellowish-brown scales; a small white spot across the middle discocellular; a submarginal series of inwardly conical white spots and a marginal series of large white spots that decrease in size towards the costs; most often the spots do not extend beyond area 6; following each submarginal spot are spots of the black ground-colour formed by the absence of the irroration of yellowish-brown scales. Hind wing with the posterior three-fourths irrorated with yellowish-brown scales; a very prominent discal series of inwardly conical, outwardly emarginate, elongate white spots followed by a submarginal series of white lunules with spots of the black ground-colour that succeed them as on the fore wing. Cilia black, largely alternated with white in the interspaces.

Underside ground-colour a rich hair-brown with larger markings than above and with the yellowish irroration of the group. Antennae, head, thorax and abdomen dark brownish-black, head and abdomen minutely speckled with white; beneath, the white specklings larger and more numerous.

The ♀ has a paler ground-colour with larger white markings and more conspicuous yellowish-brown irroration.

Wing Expanse : 80–100 mm.

Larval Host Plants : The *P. dravidarum* larvae feed on *Glycosmis pentaphylla* of the family Rutaceae.

Distribution : It occurs in the states of Kerala, Tamil Nadu, Karnataka and Goa. Endemic to the Western Ghats in South India.

Status : Uncommon but not known to be threatened. Commonest in Waynad and Coorg in the past. Rarer towards the extremities of its range.

Remarks : The butterfly is commonly called Malabar Raven (*Papilio dravidarum*) is a species of Swallowtail butterfly found in India.

19. ***Papilio crino*** Fabricius, 1793

1793. *Papilio crino* Fabricius, *Ent. Syst.*, p. 5.

1903. *Harimala crino*, Moore, *Lep. Indica*, p. 67.

1881a. *Harimala montanus*, Moore, *Lep. Ceylon*, p. 146.

1864a. *Harimala montanus*, C. & R. Felder, *Verh. Zool. Bot. Ges. Wien*, pp. 289-378.

1895. *Papilio crino*, ab. *Montanus*, Rothschild, *Nov. Zool.*, p. 389.

1998. *Papilio (Achillides) crino*, Bauer & Frankenbach, *Butterflies of the world,* **1** : (2).

Material examined Varakaliyar, Indira Gandhi National Park and Wildlife Sanctuary, 2 exs., 28.xii.2005. Upper canal, Indira Gandhi National Park and Wildlife Sanctuary, 5 exs., 05.iv.2006. Sholaiar Nagar, Indira Gandhi National Park and Wildlife Sanctuary, 3 exs., 08.iv.2006. Thirumurtinagar, Indira Gandhi National Park and Wildlife Sanctuary, 3 exs., 09.iv.2006.

Diagnostic characters ♂ ♀ Upperside uniformly dusted with green and with a green post-discal band on both wings. The tail is tipped with green. Fore wing of the ♂ with thin pilose scent-streaks on veins 1 vein culb and cula. The bluish-green post-discal band does not enter the cell, is slightly sinuous and curved and distinctly decreases in width towards the costal margin; in the ♀ more sinuous than in the ♂ Hind wing with the bluish-green post-discal band very variable in width, not entering the cell and its inner edge fairly straight; above vein R_5 the band is abruptly narrowed; tornal ocellus claret-red, with a large black centre inwardly edged with blue; a dull whitish sub-apical spot; submarginal diffuse green lunules in areas 2 to 4.

Underside dull pale brown to blackish-brown irrorated with scattered yellowish scales, which, however, on the fore wing are absent from a large triangular discal patch that lies between the inner margin, the median vein, vein M_2 and a line of white lunules that crosses the wing in an outward curve from the upper third of the costa to just before the tornus; these white lunules are outwardly diffuse and merge gradually into the ground-colour. Hind wing with the tornal ocellus much as on the upperside; an obscure ill-defined highly arched post-discal narrow whitish band from above the tornal ocellus to the costa, ending near the apex of area 7 in a broad white lunule; beyond this a double submarginal row of somewhat straight ochreous-white lunules, each lunule of the inner row bordered outwardly with blue, this bordering very faint in many specimens. Cilia of fore and hind wings brown alternated with white.

Wing Expanse : 80–100 mm.

Larval Host Plants : The larva feeds on *Chloroxylon swietenia* DC.

Distribution Central and Southern India, Lower Bengal and Sri Lanka.

Status : The species is not rare, being rather common in the plains and ascending to about 6000 ft.

Remarks The butterfly is commonly called Common Banded Peacock (*Papilio crino*) is a species of swallowtail butterfly found in South Asia.

SUMMARY

The paper deals with the systematic account of 19 species of butterflies belonging to five genera *viz.*, *Pachliopta*, *Troides*, *Graphium*, *Chilasa* and *Papilio* of the family Papilionidae from Anamalai range, Southern Western Ghats, Tamilnadu. Common name, wing expanse, distribution and nomenclatural changes have been described for all the species. The host plants of larvae and adult species described were also mentioned. Keys to identification of species and genera were also provided.

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NEW RECORDS OF CORALS FROM LAKSHADWEEP ISLANDS

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INTRODUCTION

The Lakshadweep (Laccadive Islands) is situated in the Arabian Sea (71°–74°E Longitudes and 8°–12°N Latitudes) about 225-450 km from the southwest coast of India. There are 27 islands in Lakshadweep covering a total land area of 28.54 km^2 of which, 11 islands are inhabited and have a land area of 26.89 km^2, while the 16 uninhabited islets are 1.65 km^2 (Attakoya, 2000). Most of the islands are located within the 12 atolls. The height of the land above sea level in the islands is generally 1-2 m and the terrain is mostly flat. Lakshadweep is lying along a north-south axis (except Androth Island, the length of which is in East-West direction) with lagoon on the west and open sea on the east. Estimated total coral reef area in these islands is 276 km^2 including the reef flat area of 136.5 km^2 (Bahuguna and Nayak, 1998).

Taxonomic studies of Indian corals are almost totally restricted to the pioneering works of Pillai (1971a, 1971b, 1972), Scheer and Pillai (1974), Reddiah (1977), Pillai and Patel (1988), Pillai and Jasmine (1989) in the 70s and 80s. Logistic constraints, notably lack of SCUBA facilities, had limited the collections in all these surveys from no more than a few meters depth. The total number of 199 species of scleractinian corals (155 hermatypes under 50 genera and 44 ahermatypes under 21 genera) recorded in the eighties stands unaltered since then; only recently, when extensive collections were made in Andamans, nearly 100 species not reported previously were found (Venkataraman *et al.*, 2003).

A compilation by Pillai and Jasmine (1989) showed 104 coral species under 37 genera in these atolls (9°–12°N; 72°–74°E), mainly from the southern ones. Extensive surveys were made from the year 2001 to 2003 at 5–20 m depth in Lakshadweep Islands revealed, the 20 coral species not reported so far from these islands were recorded for the first time. The systematic details of each

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species are given below. Among these, *Montipora foveolata*, *Cycloseris tenuis*, *Fungia seychellensis*, *Lobophyllia serratus* and *Oulophyllia bennettae* are being recorded for the first time from any of the Indian reefs. Lakshadweep Islands are located in the Laccadive-Maldive-Chagos ridge and its coral species composition, therefore, can be expected to reflect those of Chagos or Maldives. So far, 220 species under 58 genera, and 248 species under 57 genera, have been reported respectively from Chagos (Sheppard, 2000) and Maldives (Pichon and Benzoni, 2007). Compared with these, it is safe to presume that the diversity of corals in Lakshadweep is likely to be twice higher than what is known now.

MATERIALS AND METHODS

Scleractinian corals of India are protected under Schedule I of Wild Life Protection Act of India, 1972. Collection of coral specimens are strictly prohibited under this act. Hence, coral identification was made based on the field observation during SCUBA diving and underwater photographs. Regular field trips to Lakshadweep Islands had been organized by the author from the year 2001 to 2003, using SCUBA diving vessels made available by the Lakshadweep Coral Reef Monitoring Network (LCRMN). Under water photography was done by using Nikonos V camera with close-up-outfit and Nikonos 105 strobe illumination. The identification of all the coral species were made following the taxonomic monographs of Veron and Pichon (1976), Veron *et al.*, (1977), Veron and Pichon (1980 & 1982), Veron and Wallace (1984), Veron (1986), Hoeksema (1989), Veron (2000).

SPECIES NEWLY RECORDED FROM LAKSHADWEEP ISLANDS

1. *Montipora foveolata* (Dana, 1846)*
2. *Acropora valida* (Dana, 1846)
3. *Physogyra lichtensteini* (Edwards and Haime, 1851)
4. *Pavona explanulata* (Lamarck, 1816)
5. *Pavona duerdeni* Vaughan, 1907
6. *Pachyseris rugosa* (Lamarck, 1801)
7. *Cycloseris cyclolites* (Lamarck, 1801)
8. *Cycloseris costulata* (Ortmann, 1889)
9. *Cycloseris tenuis* (Dana, 1846)*
10. *Fungia granulosa* Klunzinger, 1879
11. *Fungia seychellensis* Hoeksema, 1993*
12. *Herpolitha limax* (Esper, 1797)

13. *Pectinia lactuca* (Pallas, 1766)
14. *Hydnophora exesa* (Pallas, 1766)
15. *Lobophyllia serratus* Veron, 2000*
16. *Symphyllia recta* (Dana, 1846)
17. *Platygyra pini* Chevalier, 1975
18. *Oulophyllia bennettae* (Veron and Pichon, 1977)*
19. *Porites murrayensis* Vaughan, 1918
20. *Porites vaughani* Crossland, 1952

*New to India

SYSTEMATIC ACCOUNT

Phylum CNIDARIA Hatschek, 1888

Class ANTHOZOA Ehrenberg, 1834

Order SCLERACTINIA Bourne, 1900

Family ACROPORIDAE Verrill, 1902

Genus ***Montipora*** de Blainvillae, 1830

Montipora foveolata (Dana, 1846) Velvet coral

(Fig. 1)

1846. *Montipora foveolata* Dana, *Zoophytes,* **7** : 1-740, pl. 1-61.

1954. *Montipora socialis* Wells, *Prof. Pap. U.S. Geol. Surv*, **260**-I : 385-486, pl. 94-187.

2000. *Montipora foveolata* Veron, *Corals of the World*, **1** : 131.

Materials examined : Kavaratti island 5 colonies, Amini island 2 colonies, Androth island 3 colonies, Chetlat island 1 colony, Kiltan island 1 colony, Bitra island 7 colonies.

Distribution : New record to India.

Elsewhere : Southeast Asia and Australia.

Genus ***Acropora*** Oken, 1815

Acropora valida (Dana, 1846) Table coral

(Fig. 2)

1846. *Madrepora valida* Dana, *Zoophytes*, **7** : 1-740, pl. 1-61.

1976. *Acropora variabilis* Pillai and Scheer, *Zoologica* (Stuttgart), **43**(126) : 1-83, pl. 1-32.

1984. *Acropora (Acropora) valida* Veron & Wallace, *Australian Inst. Mar. Sci. Monogr. Ser.* Vol. **6** : 346-350

2000. *Acropora valida* Veron, *Corals of the World*, Vol. **1** : 404-405.

Materials examined : Kavaratti island 3 colonies.

Distribution : India-Gulf of Mannar and Andaman & Nicobar Islands.

Elsewhere : Red Sea to Central America and Australia.

Family EUPHYLLIDAE Veron, 2000

Genus ***Physogyra*** Quelch, 1884

Physogyra lichtensteini (Edwards and Haime, 1851) Small bubble coral
(Fig. 3)

1851. *Plerogyra lichtensteini* Edwards & Haime, *Arch. Mus. Natl. Hist. Nat,* (Paris), **5** : 1-505, pl. 1-20.

1928. *Physogyra lichensteini* Matthai, *Bri. Mus (Nat. His.),* **7** : 288, pl. 1-72.

2000. *Physogyra lichensteini* Veron, *Corals of the World*, Vol. **2** : 92-93.

Materials examined : Kavaratti island 9 colonies, Chetlat island 2 colonies, Kiltan island 1 colony, Androth island 2 colonies, Bitra island 3 colonies, Suheli island 8 colonies.

Distribution : India-Andaman & Nicobar Islands.

Elsewhere : Madagascar east to Marshall Islands and Australia.

Family AGARICIIDAE Gray, 1847

Genus ***Pavona*** Lamarck, 1801

Pavona explanulata (Lamarck, 1816) Star column coral
(Fig. 4)

1816. *Agaricia explanulata* Lamarck, *Historie des animaux sans vertebres. Verdière,* Paris. **2** : 1-568.

1976. *Pavona explanulata* Pillai & Scheer, *Zoologica* (Stuttgart), **43**(126) : 1-83, pl. 1-32.

2000. *Pavona explanulata* Veron, *Corals of the World*, Vol. **2** : 184-185.

Materials examined : Kavaratti island 3 colonies, Amini island 2 colonies, Agatti island 4 colonies, Suheli island 3 colonies, Minicoy island 5 colonies.

Distribution : India-Andaman & Nicobar Islands.

Elsewhere : Madagascar east to Philippines and Eastern Australia.

Pavona duerdeni Vaughan, 1907 Star coral
(Fig. 5)

1907. *Pavona duerdeni* Vaughan, *U.S. Natl. Mus. Bull.*, **59**(9) : 1-427, pl. 1-96.

1974. *Pavona duerdeni* Scheer & Pillai, *Zoologica* (Stuttgart), **42**(122) : 1-75, pl. 1-33.

2000. *Pavona duerdeni* Veron, *Corals of the World*, Vol. **2** : 200-201.

Materials examined : Kavaratti island 3 colonies, Androth island 5 colonies, Kiltan island 2 colonies, Chetlat island 2 colonies, Kadmat island 1 colony.

Distribution : India-Andaman & Nicobar Islands.

Elsewhere : Maldives, Red Sea to Central America and Australia.

Genus ***Pachyseris*** Milne Edwards and Haime, 1849

Pachyseris rugosa (Lamarck, 1801) Elephant skin coral
(Fig. 6)

1816. *Agaricia rugosa* Lamarck, *Historie des animaux sans vertebres. Verdière,* Paris. **2** : 568 pp.

1974. *Pachyseris rugosa* Scheer and Pillai, *Zoologica* (Stuttgart), **42**(122) : 1-75, pl. 1-33.

2000. *Pachyseris rugosa* Veron, *Corals of the World*, Vol. **2** : 226-227.

Materials examined : Kavaratti island 3 colonies, Kiltan island 3 colonies, Chetlat island 1 colony, Bitra island 1 colony, Amini island 1 colony, Androth island 4 colonies.

Distribution : India-Gulf of Mannar, Andaman & Nicobar Islands.

Elsewhere : Red Sea east to Marshall Islands, Micronesia, Samoa and Australia.

Family FUNGIIDAE Dana, 1846

Genus ***Cycloseris*** Milne Edwards and Haime, 1849

Cycloseris cyclolites (Lamarck, 1801) Mushroom coral
(Fig. 7)

1801. *Fungia cyclolites* Lamarck, *Historie des animaux sans vertebres. Verdière*, Paris. **1** : 1-432.

1974. *Cycloseris cyclolites* Scheer and Pillai, *Zoologica* (Stuttgart), **42**(122) : 1-75, pl. 1-33.

1989. *Fungia (Cycloseris) cyclolites* Hoeksema, *Zool. Verhandelingen,* **254** : 41-46.

2000. *Cycloseris cyclolites* Veron, *Corals of the World*, Vol. **2** : 236-237.

Materials examined : Kavaratti island 4 colonies, Chetlat island 2 colonies, Bitra island 7 colonies.

Distribution : India-Gulf of Mannar, Andaman & Nicobar Islands.

Elsewhere : Red Sea east to Japan and Australia.

Cycloseris costulata (Ortmann, 1889) Mushroom coral
(Figs. 8a & 8b)

1889. *Fungia costulata* Ortmann, *Zool. Jahrb. Abt. Syst. Geor. Biol. Tiere,* **4** : 493-590, pl. 11-18.

1976. *Cycloseris costulata* Pillai & Scheer, *Zoologica* (Stuttgart), **43**(126) : 1-83, pl. 1-32.

1989. *Fungia (Cycloseris) costulata* Hoeksema, *Zool Verhandelingen,* **254** : 64-69.

2000. *Cycloseris costulata* Veron, *Corals of the World*, Vol. **2** : 245.

Materials examined : Kavaratti island 3 colonies, Chetlat island 1 colony, Bitra island 11 colonies.

Distibution : India-Andaman & Nicobar Islands.

Elsewhere : Maldive islands east to Bismark Archipelago and Australia.

Cycloseris tenuis (Dana, 1846) Mushroom coral
(Figs. 9a & 9b)

1846. *Fungia tenuis* Dana, *Zoophytes* **7** : 1-740, pl. 1-61.

1972. *Cycloseris cooperi* Pillai, *Symp. Mar. Biol. Assoc. India*, **5** : 191-216.

1989. *Fungia (Cycloseris) tenuis* Hoeksema, *Zool Verhandelingen*, **254** : 70-74.

2000. *Cycloseris tenuis* Veron, *Corals of the World*, Vol. **2** : 244.

Materials examined : Chetlat island 1 colony, Bitra island 2 colonies.

Distibution : New record to India.

Elsewhere : Maldives, Philippines to Micronesia and Australia.

Genus ***Fungia*** Lamarck, 1801

Fungia granulosa Klunzinger, 1879 Mushroom coral
(Fig. 10)

1879. *Fungia granulose* Klunzinger, *Die Korallenthiere des Rothen Meeres* **3** : 1-100, pls. 1-10.

1980. *Fungia (Verrillofungia) granulosa* Veron & Pichon, *Australian Inst. Mar. Sci. Monogr. Ser.* Vol. **4** : 156-159.

1989. *Fungia (Wellsofungia) granulosa* Hoeksema, *Zool Verhandelingen*, **254** : 125-129.

2000. *Fungia granulosa* Veron, *Corals of the World*, Vol. **2** : 276.

Materials examined : Kavaratti island 1 colony, Bitra island 2 colonies.

Distribution : India-Andaman & Nicobar Islands.

Elsewhere : Red Sea east to Philippines and Australia.

Fungia seychellensis Hoeksema, 1993 Mushroom coral
(Figs. 11a, 11b & 11c)

1993. *Fungia (Pleuractis) seychellensis* Hoeksema, *Zool Mededelingen*, **67** : 639-654.

2000. *Fungia seychellensis* Veron, *Corals of the World*, Vol. **2** : 279.

Materials examined : Bitra island 1 colony.

Distribution : New record to India.

Elsewhere : Seychelles and Chagos Archipelago.

Genus ***Herpolitha*** Eschscholtz, 1825

Herpolitha limax (Esper, 1797) Tongue coral
(Fig. 12)

1797. *Madrepora limax* Esper, *Fortsetzungen,* **1** : 1-230.

1976. *Herpolitha limax* Pillai & Scheer, *Zoologica* (Stuttgart), **43**(126) : 1-83, pl. 1-32.

1980. *Herpolitha limax* Veron & Pichon, *Australian Inst. Mar. Sci. Monogr. Ser.* Vol. **4** : 178-180.

1989. *Herpolitha limax* Hoeksema, *Zool Verhandelingen,* **254** : 168-175.

2000. *Herpolitha limax* Veron, *Corals of the World,* Vol. **2** : 292-293.

Materials examined : Bitra island 2 colonies.

Distribution : India-Andaman & Nicobar Islands.

Elsewhere : Red Sea east to Tuamoto Archipelago and Australia.

Family PECTINIIDAE Vaughan & Wells, 1943

Genus ***Pectinia*** Oken, 1815

Pectinia lactuca (Pallas, 1766) Hibiscus coral
(Figs. 13a & 13b)

1766. *Madrepora lactuca* Pallus, *Elenchus Zoophytorum.* Den Haag. 1-451.

1980. *Pectinia lactuca* Veron &Pichon, *Australian Inst. Mar. Sci. Monogr. Ser.* Vol. **4** : 330-331.

2000. *Pectinia lactuca* Veron, *Corals of the World,* Vol. **2** : 350-351.

Materials examined : Kavaratti island 3 colonies, Chetlat island 1 colony, Bitra island 1 colony, Suheli island 5 colonies.

Disribution : India-Andaman & Nicobar Islands.

Elsewhere : From Madagascar east to Fiji and Australia.

Family MERULINIDAE Verrill, 1846

Genus ***Hydnophora*** Fischer de Waldheim, 1807

Hydnophora exesa (Pallas, 1766) Horn coral
(Fig. 14)

1766. *Madrepora exesa* Pallas, *Elenchus Zoophytorum.* Den Haag. 1-451.

1904. *Hydnophora maldivensis* Gardiner, *Fauna and Geography of the Maldives and Luccadives Archipelagoes'* Cambridge, **2** : 756-90, pl. 59-64.

1977. *Hydnophora exesa* Veron, Pichon & Wijsman-Best, *Australian. Inst. Mar. Sci. Monogr. Ser.* Vol. **3** : 129-134.

2000. *Hydnophora exesa* Veron, *Corals of the World,* Vol. **2** : 370-371.

Materials examined : Kavaratti island 3 colonies, Kadmat island 2 colonies, Androth island 3 colonies, Minicoy island 1 colony.

Distribution : India-Gulf of Kachchh, Gulf of Mannar, Andaman & Nicobar Islands.

Elsewhere : Maldives, Red Sea east to Tuvalu and Australia.

Family MUSSIDAE Ortmann, 1890

Genus ***Lobophyllia*** de Blainville, 1830

Lobophyllia serratus Veron, 2000 Tooth coral

(Fig. 15)

2000. *Lobophyllia serratus* Veron, *Corals of the World*, Vol. **3** : 41.

Materials examined : Kavaratti island 1 colony.

Distribution : New record to India.

Elsewhere : Philippines and Indonesia.

Genus ***Symphyllia*** Milne Edwards and Haime, 1848

Symphyllia recta (Dana, 1846) Brain coral

(Fig. 16)

1846. *Mussa recta* Dana, *Zoophytes,* **7** : 1-740, pl. 1-61.

1924. *Symphyllia sinuosa* Matthai, *Bri. Mus. (Nat. His.)* **7** : 288, pl. 1-72.

1980. *Symphyllia recta* Veron & Pichon, *Australian Inst. Mar. Sci. Monogr. Ser.* Vol. **4** : 282-289.

2000. *Symphyllia recta* Veron, *Corals of the World*, Vol. **3** : 56-57.

Materials examined : Suheli island 1 colony, Amini island 2 colonies, Kiltan island 1 colony, Chetlat island 2 colonies, Androth island 3 colonies, Minicoy island 2 colonies.

Distribution : India-Andaman & Nicobar Islands.

Elsewhere : Maldive Islands east to the Marshall Islands and Australia.

Family FAVIIDAE Gregory, 1900

Genus ***Platygyra*** Ehrenberg, 1834

Platygyra pini Chevalier, 1975 Maze coral

(Fig. 17)

1975. *Platygyra pini* Chevalier, *2éme Partie. Expéd. Récifs Corallins Nouvelle-Calédonie,* **7** : 5-407, pl. 1-42.

1977. *Platygyra pini* Veron, Pichon & Wijsman-Best, *Australian Inst. Mar. Sci. Monogr. Ser.* Vol. **3** : 108-110.

2000. *Platygyra pini* Veron, *Corals of the World*, Vol. **3** : 178-179.

Materials examined : Kavaratti island 2 colonies, Kadmat island 1 colony, Androth island 2 colonies, Suheli island 2 colonies, Minicoy island 1 colony.

Distribution : India-Andaman & Nicobar Islands.

Elsewhere : Western Pacific Ocean and Australia.

Genus ***Oulophyllia*** Milne Edwards & Haime, 1848

Oulophyllia bennettae (Veron and Pichon, 1977) Labyrinth coral

(Fig. 18)

1977. *Favites bennettae* Veron, Pichon & Wijsman-Best, *Australian Inst. Mar. Sci. Monogr. Ser.* Vol. **3** : 73-78.

1986. *Oulophyllia bennettae* Veron, *Corals of Australia and the Indo-Pacific*. 500-501.

2000. *Oulophyllia bennettae* Veron, Corals *of the World*, Vol. **3** : 200-203.

Materials examined : Kavaratti island 2 colonies, Androth island 5 colonies.

Distribution : New record to India.

Elsewhere : South East Asia and Australia.

Family PORITIDAE Gray, 1842

Genus ***Porites*** Link, 1807

Porites murrayensis Vaughan, 1918 Mustard coral

(Fig. 19)

1918. *Porites murrayensis* Vaughan, *Geol. Rijksmus. Leiden* **2**(2) : 1-91.

1976. *Porites murrayensis* Pillai & Scheer, *Zoologica* (Stuttgart) **43**(126) : 1-83, pl. 1-32.

1982. *Porites* (*Porites*) *murrayensis* Veron & Pichon, *Australian Inst. Mar. Sci. Monogr. Ser.* Vol. **5** : 18-20.

2000. *Porites murrayensis* Veron, Corals *of the World*, Vol. **3** : 292.

Materials examined : Kavaratti island 6 colonies, Chetlat island 5 colonies, Bitra island 2 colonies, Suheli island 7 colonies.

Distribution : India-Andaman & Nicobar Islands.

Elsewhere : Maldives to Samoa and Australia.

Porites vaughani Crossland, 1952 Pore coral

(Fig. 20)

1952. *Porites* (*Synaraea*) *vaughani* Crossland, *Br. Mus. (Nat. Hist.)*, **6**(3) : 85-257, pl. 1-56.

1976. *Porites seminularis* Nemenzo, *Nat Appl Sci Bull Univ Philippines* **28** : 229-276, pl. 1-9.

1982. *Porites (Nanopora) vaughani* Veron & Pichon, *Australian Inst. Mar. Sci. Monogr. Ser.* Vol. **5** : 53-57.
2000. *Porites vaughani* Veron, Corals *of the World*, Vol. **3** : 308-309.

Materials examined : Kavaratti island 9 colonies, Bitra island 5 colonies, Androth island 2 colonies.

Distribution : India-Andaman & Nicobar Islands.

Elsewhere : South China Sea and Australia.

SUMMARY

Underwater survey of the coral reefs at 10 of 27 islands of Lakshadweep *i.e.*, Agatti, Androth, Amini, Bitra, Chetlat, Kadmat, Kavaratti, Kiltan, Minicoy and Suheli islands revealed 20 species to be new record to the fauna of Lakshadweep. Among these, 5 species namely *Montipora foveolata, Cycloseris tenuis, Fungia seychellensis, Lobophyllia serratus* and *Oulophyllia bennettae* are new record to the Indian coral reefs. Systematic account of the 20 species with distribution is given.

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Pillai, C.S.G. 1972. Stony corals of the seas around India. In 'Proceedings of the Symposium on Corals and Coral Reefs, 1969' *Symp. Mar. Biol. Assoc. India.*, **5** : 191-216.

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Veron, J.E.N. and Pichon, M. 1980. Scleractinia of Eastern Australia. Part 3, Families Agariciidae, Siderastreidae, Fungiidae, Oculinidae, Merulinidae, Mussidae, Pectiniidae, Caryopilliidae, Dendrophylliidae. *Australian Inst. Mar. Sci. Monogr. Ser.*, **IV** : 471

Veron, J.E.N. and Pichon, M. 1982. Scleractinia of Eastern Australia. Part 4, Family Poritidae. *Australian Inst. Mar. Sci. Monogr. Ser.*, **V** : 210.

Veron, J.E.N. and Wallace, C. 1984. Scleractinia of Eastern Australia. Part 5, Family Acroporidae. *Australian Inst. Mar. Sci. Monogr. Ser.*, **VI** : 485.

Veron, J.E.N., Pichon, M. and Wijsman-Best, M. 1977. Scleractinia of Eastern Australia. Part 2, Families Faviidae, Trachyphyllidae. *Australian Inst. Mar. Sci. Monogr. Ser.*, **III** : 233.

PLATE I

Fig. 1 : *Montipora foveolata*

Fig. 2 : *Acropora valida*

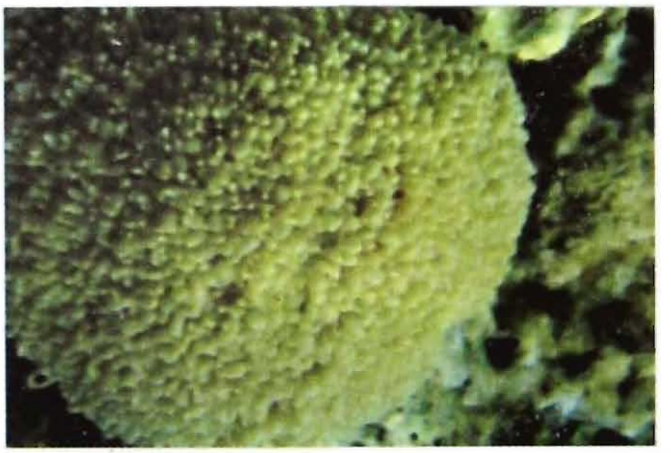

Fig. 3 : *Physogyra lichtensteini*

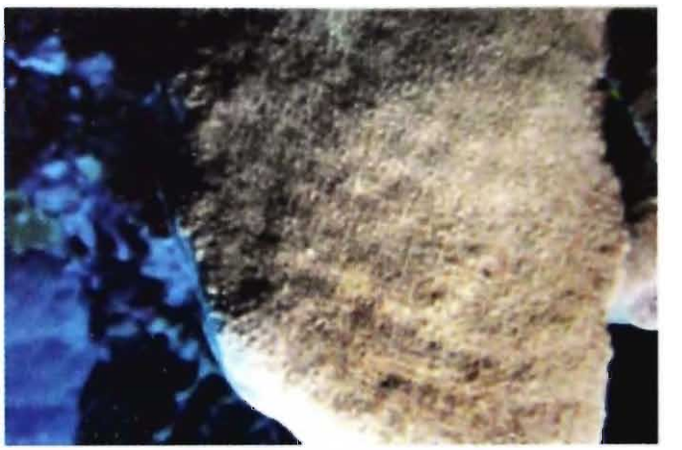

Fig. 4 : *Pavona explanulata*

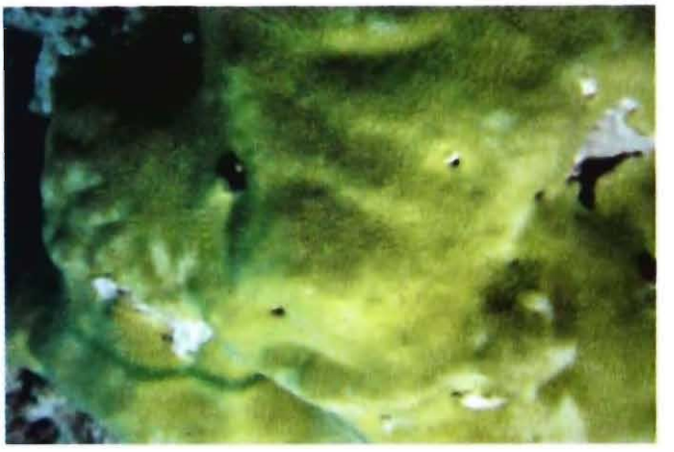

Fig. 5 : *Pavona duerdeni*

PLATE II

Fig. 6 : *Pachyseris rugosa*

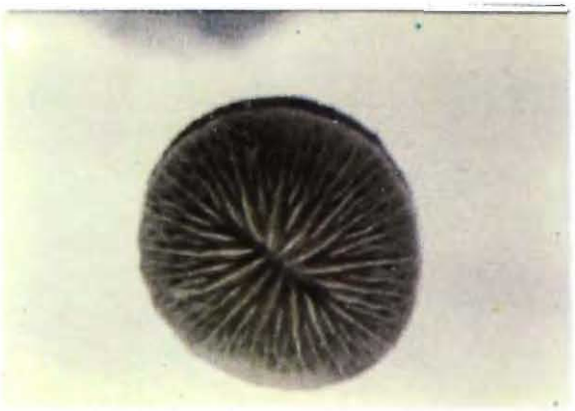

Fig. 7 : *Cycloseris cyclolites*

Fig. 8a : *Cycloseris costulata*

Fig. 8b : *Cycloseris costulata*

Fig. 9a : *Cycloseris tenuis*

Fig. 9b : *Cycloseris tenuis*

Fig. 10 : *Fungia granulosa*

PLATE III

Fig. 11a : *Fungia seychellensis*

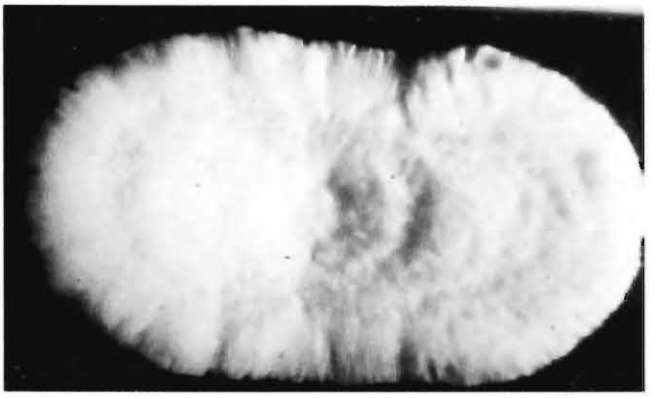

Fig. 11b : *Fungia seychellensis*

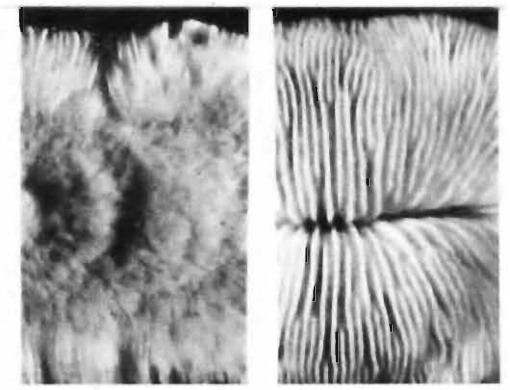

Fig. 11c : *Fungia seychellensis*

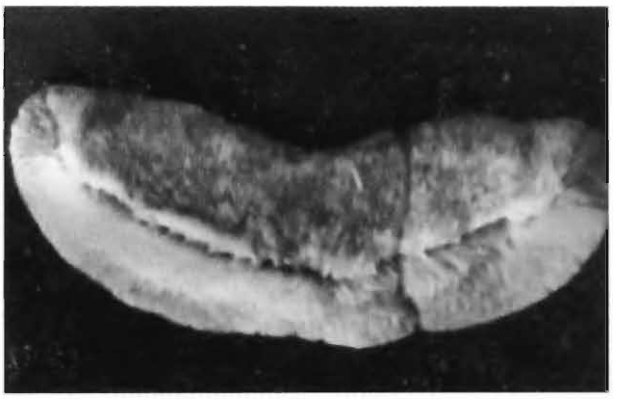

Fig. 12 : *Herpolitha limax*

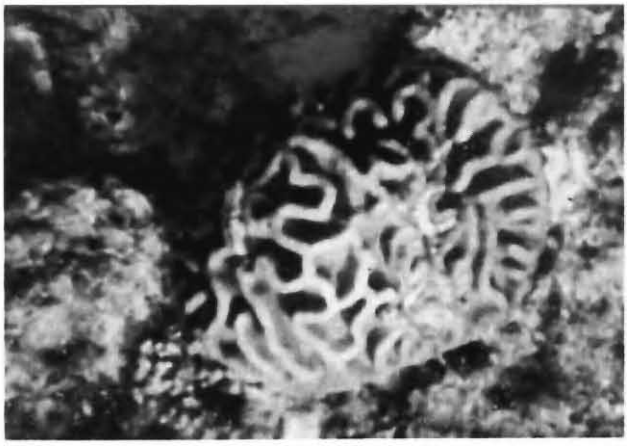

Fig. 13a : *Pectinia lactuca*

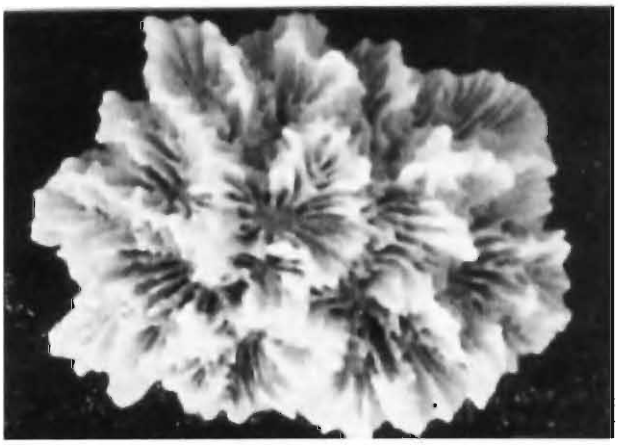

Fig. 13b : *Pectinia lactuca*

PLATE IV

Fig. 14 : *Hydnophora exesa*

Fig. 15 : *Lobophyllia serratus*

Fig. 16 : *Symphyllia recta*

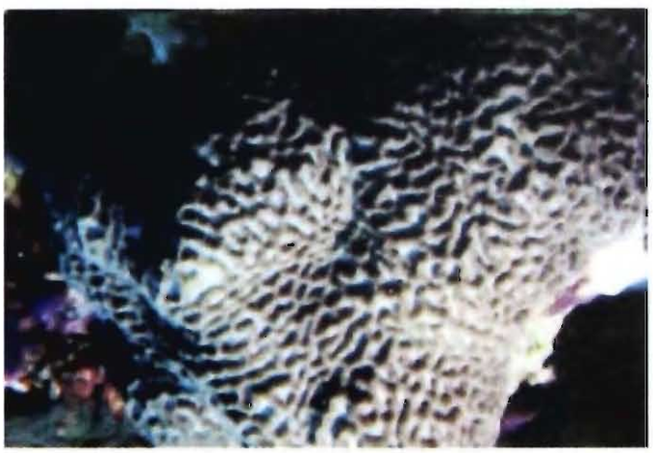

Fig. 17 : *Platygyra pini*

Fig. 18 : *Oulophyllia bennethae*

Fig. 19 : *Porites murrayensis*

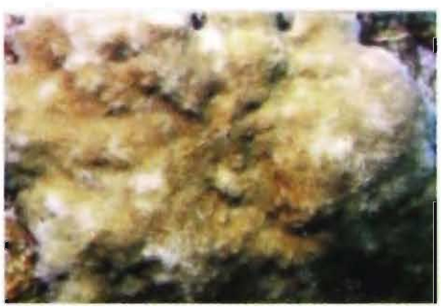

Fig. 20 : *Porites vaughani*

Rec. zool. Surv. India : **109**(Part–1) : 65-72, 2009

ECOLOGY AND MACROBENTHIC FAUNAL DIVERSITY OF SOME FLOODPLAIN WETLANDS OF RIVER GANGA IN WEST BENGAL

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INTRODUCTION

Floodplain wetlands of West Bengal, locally known as beels, offer diverse ecological attributes and diversified faunal elements of which macrozoobenthic communities of some floodplain wetlands of river Ganga located in the districts of Malda, Murshidabad and Nadia in West Bengal have been investigated and reported in the present communication. It may be mentioned that although some reports (Mandal and Moitra, 1975; Sarkar, 1989, 1992; Mukherjee and Nandi, 2004; Banerjee and Banerjee, 2005) are available regarding benthos from freshwater wetlands of West Bengal, but very little is known on the benthic fauna of floodplain lakes of lower Ganga river basin of West Bengal, and hence the present study. Studies on faunal resources of wetlands in West Bengal mostly pertain to southern part of West Bengal (De *et al.*, 1989; Ghosh, 1990; Nandi *et al.*, 1993, 1999, 2001a, b, 2005, 2007; Mukherjee and Nandi, 2004).

MATERIALS AND METHODS

Study Area :

Six floodplain wetlands of Ganga river basin in West Bengal, two from each of Malda, Murshidabad and Nadia districts, were selected from rural and urban environments (Table 1) for survey work. The geographical locations of these wetlands are shown in the Fig. 1 The brief descriptions of six selected wetlands are as follows :

Golbaka—Haripur beel (GHB), Malda : This wetland is located at about 50 km north west of Malda town, and is situated near Ratua. The total area of the wetland is about 30 ha which is moderately infested with marginal macrophytes.

Barasagar Dighi (BSD), Malda : This wetland is situated near Sadhullapur at about 22 km northeast of Malda town with water area covering about 83 ha. It is infested with low growth of macrophytes.

Sagardighi (SD), Murshidabad : This wetland with a water area of about 149.8 ha is located at about 25 km northwest of Berhampur. It is highly infested with aquatic weeds.

Bhandardaha beel (BD), Murshidabad : It has the water area of about 330 ha. It is located at about 32 km southeast of Berhampur town. This wetland is also highly infested with macrophytes during the course of investigation.

Hasadanga beel (HD), Nadia : This wetland is shallow and located at about 30 km southeast of Krishnanagar Sadar. It is situated in between northwest of Jalangi river and southwest of Bhagirathi river. The water area is about 66.65 ha, which is mainly infested with water hyacinth at its margin.

Haarkhali beel (HK), Nadia : This wetland is situated near Puratan Sambhunagar at about 18 km east of Krishnanagar, in between Jalangi and Churni rivers with an approximate water area of 250 acre and highly infested with weeds.

Table-1. Physiographic features of the selected wetlands

Parameter	BSD	GHB	SD	BD	HD	HK
Water area (ha)	83	30	149.8	330	66.65	101.21
Water depth (m)	0.9-1.8	1.2-2.7	1.2-3.0	2.0-6.5	0.9-2.4	0.7-1.5
Temp. (°C)						
Summer	41-43	41-43	43	43	40-42	40-42
Winter	4-9	4-9	7-9	7-9	9-12	9-12
Rainfall (mm)	1652-1919	1652-1919	1255-1471	1255-1224	1172-1224	1172-1224
Landscape type	Semi urban	Rural	Semi urban	Rural	Rural	Rural
Fishery type	Semi-intensive	Traditional	Traditional	Traditional	No fishery	Traditional
Macrophyte cover (%)	10	25	55	40	35	70
River connection	Nil	Yes	Nil	Nil	Yes	Yes

METHODS

The surveys were conduted during 2004 and 2005. Physico-chemical parameters of the water were measured in the field and in the laboratory, chiefly following standard methods of APHA (1998) and Mukherji and Nandi (2004). The qualitative benthic samplings were done with the aid of a box-type sampler and sieve.

RESULTS AND DISCUSSION

The physiographic features of selected wetlands, physico-chemical parameters of water of the wetlands and the benthic faunal elements inhabiting the selected wetlands are presented in Tables 1, 2 and 3. These include seven water parameters (Table-2) and 29 benthic species belonging to 3 phyla, representing 19 families under 7 major groups/classes (Table 3). It is evident from the Table-2 that the water in all these selected floodplain wetlands is alkaline with poor to moderate dissolved oxygen to support aquatic life. From Table-3 it is, however, revealed that gastropod molluscan macrobenthos representing 12 species belonging to 5 families dominate these wetlands over the other benthic ommunities *viz.*, annelids (5 species), insects (7 species), crustaceans (3 species), etc. Among the selected wetlands, Barasagardighi of Malda district represents the highest macrozoobenthic diversity harbouring 21 species under 16 families. The lowest macrobenthic diversity of 13 species under 9 families was observed in the Hasadanga beel of Nadia district.

Recent studies on macrobenthic diversity of wetlands in West Bengal have revealed that Mukherji and Nandi (2004) reported 29 species of benthic invertebrates from Rabindra Sarovar and also 29 species from Subhas Sarovar, while Mandal and Moitra (1975) recorded 21 macrobenthic species in a pond at Burdwan, West Bengal. Sarkar (1989) encountered 19 macrozoobenthic species in a pond at Sonamukhi in Bankura district, West Bengal and also reported 13 species in a lentic pond of Calcutta (Sarkar, 1992). In all 18 species of aquatic invertebrates have been recorded from Malda, Murshidabad and Nadia districts (O' Malley, 1990; Distrit Gazetters). It seems floodplain wetlands of these districts are less rich in diversity of benthic fauna in comparison to Rabindra Sarovar and Subhas Sarovar, representing 29 species each. However, monthly intensive or at least seasonal surveys are needed to ascertain the actual richness of benthic species occurring in these wetlands.

Table-2. Physio-chemical parameters of the slected wetlands in premonsoon season

Parameter	Malda		Murshidabad	Nadia	
	BSD	GHB	SD	HD	HK
Air Temperature (°C)	31	35	28.5	31	34.5
Water Temp (°C)	34	36	30	33.5	37
DO (mg/1)	3.9	6.4	3.0	3.5	7.8
pH	8.4	9.1	9.52	9.15	9.09
Total Alk (mg/1)	440.44	320.32	100.1	220.22	120.12
Transparency (cm)	34	22	26	114.5	25.5
Conductivity (mS/cm)	1.81	2.06	1.11	1.96	2.78
TDS (mg/1)	107	124	70	116	166

Table-3. List of macrozoobenthos collected from the wetlands of Malda, Murshidabad and Nadia districts

Sl No.	Groups/Species	Malda		Murshidabad		Nadia	
		BSD	GSB	SD	BD	HD	HK
Phylum **ANNELIDA**							
Class **OLIGOCHAETA**							
	Family **TUBIFICIDAE**						
1.	*Branchiura sowerbyi* Bedd.	+	–	–	–	–	–
2.	*Limnodrilus hoffmeisteri* Claparede	+	–	–	–	–	–
3.	*Tubifex tubifex* (Miller)	+	–	–	–	–	+
Class **HIRUDINEA**							
	Family **GLOSSOPHONIDAE**						
4.	*Hemiclepsis marginata marginata* Muller	+	+	–	–	–	–
	Family **HIRUDIDAE**						
5.	*Hirudinaria manillensis* (Lesson)	+	+	+	+	+	+
Phylum **ARTHROPODA**							
Class **CRUSTACEA**							
	Order **DECAPODA**						
	Family **PALAEMONIDAE**						

Sl No.	Groups/Species	Malda		Murshidabad		Nadia	
		BSD	GSB	SD	BD	HD	HK
6.	*Macrobrachium* sp.	+	+	+	+	–	–
	Family **GECARCINIDAE**						
7.	*Sartoriana spinigera* (Wood Mason)	+	–	–	–	+	–
	Order **CHONCHOSTRACA**						
	Family?						
8.	Undetermined species	+	–	+	–	+	+
Class **INSECTA**							
	Order **EPHEMEROPTERA**						
	Family **BAETIDAE**						
9.	*Cloeon* sp.	–	+	–	–	–	–
	Order **ODONATA**						
	Family?						
10.	Damselfly larvae	+	+	+	–	–	+
	Family?						
11.	Dragonfly larvae	–	–	+	–	+	+
	Order **HEMIPTERA**						
	Family **BELOSTOMIDAE**						
12.	*Diplonychus annulatus* (Fabricius)	+	–	+	+	+	+
	Order **COLEOPTERA**						
	Family **HYDROPHILIDAE**						
13.	*Helochares* sp.	–	–	+	+	–	–
14.	*Sternolophus rufipes* (fabricius)	–	–	+	+	–	–
	Order **DIPTERA**						
	Family **CHIRONOMIDAE**						
15.	Chironomid larvae	+	–	–	–	–	–

Sl No.	Groups/Species	Malda		Murshidabad		Nadia	
		BSD	GSB	SD	BD	HD	HK
Phylum **MOLLUSCA**							
Class **GASTROPODA**							
	Family **BITHYNIDAE**						
16.	*Digoniostoma cerameopoma* (Benson)	+	+	+	+	+	+
17.	*Digoniostoma pulchella*	+	+	+	+	–	+
18.	*Gabbia orcula* (Nevill)	+	+	+	+	+	+
	Family **LYMNAEDAE**						
19.	*Lymnaea accuminata* (Lamarck)	+	+	–	+	+	+
20.	*Lymnaea luteola* (Lamarck)	–	–	–	+	+	–
	Family **PILIDAE**						
21.	*Pila globosa* (Swainson)	+	+	+	+	+	+
	Family **PLANORBIDAE**						
22.	*Gyraulus convexiusculus* (Hutton)	+	+	+	+	+	+
23.	*Gyraulus labiatur* (Benson)	–	+	–	–	+	+
24.	*Indoplanorbis exustus* (Deshayes)	–	+	+	–	+	+
	Family **THIARIDAE**						
25.	*Brotia costula* (Rafinesque)	–	+	–	–	–	–
26.	*Thiara lineata* (Gray)	+	+	–	+	–	–
27.	*Tarebia tuberculata* (Mueller)	+	–	–	–	–	–
Class **BIVALVIA**							
	Family **VIVIPARIDAE**						
28.	*Bellamya bengalensis* (Lamarck)	+	+	+	+	–	+
	Family **UNIONIDAE**						
29.	*Lamellidens marginalis* (Lamarck)	+	–	–	–	–	–
Total number of species		**21**	**16**	**15**	**14**	**13**	**16**

SUMMARY

A total of 29 species of macrozoobenthos belonging to seven major groups/classes under 3 phyla have been reported from six freshwater floodplain wetlands of Malda, Murshidabad and Nadia districts of West Bengal. Of the 6 selected wetlands, Barasagardighi of Malda district represents the highest diversity of 21 species under 16 families.

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GYNANDROMORPHISM IN *NEUROTHEMIS TULLIA TULLIA* (DRURY) AND *RHINOCYPHA BISIGNATA* (SELYS) (ODONATA : INSECTA) FROM KERALA

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Gynandromorphism is a condition in which an organism exhibits both male and female characteristics. In insects it is a common feature, especially in Lepidoptera and Hymenoptera. But in Odonata it is a rare incident. In India some studies have already been carried out and recorded by Lahiri (1979), Kumar (1988), Mitra (1991) and Prasad et. al. (2000). This phenomenon is being recorded for the first time from Kerala.

Females and males of a particular species can generally be distinguished on the basis of their secondary external sexual characters. Occasionally, individuals with both male and female "external" characters occur. Such gynandromorphic individuals are widespread among taxa, but typically occur at very low frequencies. They have been reported from mammals, birds, fish, and insects (Stern, 1968). Several distinctive male/female patterns within individuals have been found including mosaic, bilateral, and anterior/posterior. Gynandromorphism can occur due to several reasons, viz. the incorrect functioning of the sex determination system; derived from unfertilized eggs; by environmental conditions such as low or high temperature during oogenesis and early egg development; moreover, maternal effects as well as heritable cytoplasmic effects (presumably mitochondrial) play a prominent role in the occurrence of gynandromorphism (Albert et. al. 2007).

The present study is based on odonata collections made from Kasaragod district, Kerala, during March 2006. The collection included normal specimens of *Neurothemis tullia tullia* (Drury) and *Rhinocypha bisignata* (Selys), besides two gynandromorphic specimens of both the species. These two species are widely distributed in Kerala. Males and females can be easily distinguished on the basis of the following characters.

Neurothemis tullia tullia (Drury) : wings–male wings are black at base and white border outwardly with a milky white band and transparent at the tips; where as in female, bases of all wings bright

amber-yellow; large blackish-brown spot at node, tips of all wings opaque blackish-brown; abdomen; in male black with creamy yellow stripe on segments 1 to 8; in female bright yellow with a broad black band from segment 1 to 10.

Gynandromorphic form : In the gynandromorphic specimen studied, the wings and abdomen are coloured like that of male; and appendage is that of a normal female specimen; accessory (secndary) genitalia on the ventral side of 2nd abdominal segment is absent.

	Normal male	**Normal female**	**Gynandromorph**
Abdomen	17 mm	16 mm	16 mm
Forewing	22 mm	21 mm	21 mm
Hindwing	21 mm	20 mm	20.7 mm
Nodal index	8-12½/12½-8	7-10½/10½-8	8-11½/12½-7
	7-8/10-7	7-9/9-7	8-10/9-8

Rhinocypha bisignata (Selys) : wings- (male) bases of all wings hyaline, tinted with yellow, opaque blackish brown at tips; forewings with outer fourth or more opaque with brilliant coppery colouration; hindwing with apical third opaque, and marked with two series of coppery or violaceous vitreous spots; pterostigma black in all wings; in female, wings entirely hyaline, tinted palely with yellow, apices narrowly enfumed; pterostigma black, with pale cream colour at the center.

Gynandromorphic form : In the gynandromorphic specimen studied, wings are like that of female, entirely hyaline, tinted with yellow at the base, pterostigma black with pale cream colour at the center; accessory genitalia present and anal appendage is that of a normal male specimen.

	Normal male	**Normal female**	**Gynandromorph**
Abdomen	18 mm	17 mm	17.5 mm
Forewing	23 mm	24 mm	24 mm
Hindwing	22 mm	23.8 mm	23.8 mm
Nodal index	24-13/14-25	20-13/12-18	29-14/13-29
	23-14/13-14	17-12/12-20	28-14/12-27

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IDENTIFICATION KEY OF WEST BENGAL LEECHES (ANNELIDA : HIRUDINEA)

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INTRODUCTION

As in animal kingdom every organism has a specific importance under non-chordate group, leeches have also great importance both in taxonomy and medicinal field. Jalaukas the name of leech is in "Susruta", Jalauka in "Mahabharata" Jaluka in Sanskrit, Jaru in Sindhi, and Juku in Nepali. Due to medicinal value and venomous quality leeches are becoming attractive to human beings, so many scientists are engaged to discover the leeches. Leeches are very important so far regulation of size and shape of the invertebrate communities is concerned. They, on way of sucking blood from cattle, reptiles, amphibians and fishes transmit the blood parasites and thereby inviting trypanosomiasis and helminthiasis in these animal groups.

More than 549 species of leeches are reported from the world (Bondyopadhyay, P.K. and Mandal, C.K. 2006) of which about 63 species have so far been recored in Indian region. In West Bengal, however 28 species are now known to occur in varied ecological conditions from plains to the mountains, low to heavy rainfall areas and from river bed to ponds. Some species live permanently in water while others in dampy bushes under rotten leaves, bricks and stones.

Leeches never destroy agriculture crops, fruits and vegetations and only subsist on blood of various animals. Sometimes they take small insect larvae.

The present study is based on the material collected by the author from different districts of West Bengal during 1990-2003.

The material is represented by 28 species belonging to 13 genera under 4 families. Of these, 3 species are new in the world and 7 forms have new locality record, Mandal (2004-2006).

Harding and Moore (1927) provided a comprehensive account of the Indian leeches. The other workers like Baugh (1960) and Sanjeeva Raj and Gladstone (1981) contributed their mights to the taxonomy of this group.

MATERIAL AND METHODS

The bulk of the materials dealt with the present materials were collected by me during 15 years (1990-2005) taking personal endeavour in West Bengal. All the material so collected has been deposited in the National Zoological Collection (N.Z.C.) of India at the Zoological Survey of India, Calcutta. The rest of the materials including the "types" have been selected from the extensive collection present at the N.Z.C. of India. Collections were made from all districts of West Bengal. Hilly area, dry area, river, ponds, lakes, marshy land, plain land, national park, tiger reserve, were the target collection spot.

The field observations and collections were made during all the seasons of year. In course of survey almost all niches are taken into consideration to find out the leech individuals occurring in the habitat/ecosystem. A sampler is used to collect the specimens. A net hangs from a quadrangular body, made of still. Each arms of the structure is 30 cm. and a handle of steel is attached in the middle of one arm of the quadrangular structure. In the case of free-living species five sites from a selected ecosystem (water body) are taken into consideration to note the number of leeches occurring in the system. From each site/station an area of 30cm. square, has been selected at random and the number of leeches occurring there, are counted. The mean of such five readings are considered for actual population density per 30 cm. square, which will be computed into no/ m^2. In case of parasitic and malacophagous leeches, attempts have been made to note the number of leeches attached with the host body. In such case five or more host individuals are taken into account at random and mean would be considered for population density of this external parasite per host. The malacophagous leeches are counted on the basis of samplings of pelagic molluscs from an area of 30 cm. square from the concerned water body. Also in this case five such samplings are taken and the leeches attached/infested with snails are counted and mean of the five readings have been considered for the final data. In course of such studies, soil and water samples were collected to study some of the important factors of the environment. The climatic factors have also been recorded from the meteorological stations at district headquarters. The pH of water samples was recorded with the help of pH indicator instrument. Breeding seasons of leeches are determined on the basis of observation of the egg, young and mating activities. The leeches are narcotized and preserved following the method recorded in the book entitled, "Hand Book for Zoological Collectors" published by the Director, Zoological Survey of India, Calcutta (1985).

The samples were preserved in 70% alcohol after necessary narcotization. Preserved samples were sorted very carefully using binocular. Immediately after collection, the material was washed in pond water or in any fresh water and allowed to relax in water mixed with drops of 70% alcohol for about 2 hours to avoid twisting or breaking. For the good dissection, specimens are kept in 4% formalin for 24 hours and then transferred to 70% alcohol after proper washing in fresh water for preservation. It is necessary to dissect and examine the caeca, epididymis, and vaginal duct of the specimens for taxonomic study.

SYSTEMATIC ACCOUNT

Phylum ANNELIDA

Class CLITELLATA

Order HIRUDINEA

Suborder RHYNCHOBDELLAE

I. Family ICHTHYOBDELLIDAE

1. Genus ***Ozobranchus*** Quatrefages, 1852

1. *Ozobranchus shipleyi* Harding, 1909

II. Family GLOSSIPHONIDAE

2. Genus ***Glossiphonia*** Johnson, 1816

*2. *Glossiphonia annandalei* oka, 1921

3. *Glossiphonia weberi* Blanchard, 1897

*4. *Glossiphonia heteroclita* (Linnaeus, 1761)

*5. *Glossiphonia reticulata* Kaburaki, 1921

3. Genus ***Helobdella*** Blanchard, 1896

6. *Helobdella nociva* Harding, 1924

4. Genus ***Hemiclepsis*** Vejdovsky, 1883

7. *Hemiclepsis marginata marginata* (Muller, 1774)

8. *Hemiclepsis marginata asiatica* Moore, 1924

5. Genus ***Paraclepsis*** Harding, 1924

9. *Paraclepsis praedatrix* Harding, 1924

10. *Paraclepsis gardensi* Mandal, 2004

6. Genus ***Placobdella*** Blanchard, 1893

11. *Placobdella emydae* Harding, 1920

12. *Placobdella fulva* Harding, 1924

13. *Placobdella harasundarai* Mandal, 2004

14. *Placobdella horai* Baugh, 1960

*15. *Placobdella undulata* Harding, 1924

Suborder ARHYNCHOBDELLAE

III. Family EROPOBDELLIDAE

7. Genus ***Nematobdella*** Kaburaki, 1921

16. *Nematobdella indica* Kaburaki, 1921

8. Genus ***Herpobdelloidea*** Kaburaki, 1921

17. *Herpobdelloidea lateroculata* Kaburaki, 1921

9. Genus ***Barbronia*** (Blanchard) 1897

*18. *Barbronia weberi* (Blanchard, 1897)

IV Family HIRUDIDAE

10. Genus ***Dinobdella*** Moore, 1927

19. *Dinobdella ferox* (Blanchard, 1896)

11. Genus ***Poecilobdella*** Blanchard, 1893

20. *Poecilobdella granulosa* (Savigny, 1820)

21. *Poecilobdella manillensis* (Lesson, 1842)

12. Genus ***Hirudo*** Linnaeus, 1758

22. *Hirodo birmanica* (Blanchard, 1894)

V Family HAEMADIPSIDAE

13. Genus ***Haemadipsa*** Tennent, 1859

23. *Haemadipsa montana* Moore, 1927

24. *Haemadipsa ornata* Moore, 1927

25. *Haemadipsa sylvestris* Blanchard, 1894

26. *Haemadipsa zeylanica agilis* Moore, 1927

27. *Haemadipsa zeylanica montivindicis* Moore, 1927

*28. *Haemadipsa kodairensis* Bandyopadhyay and Mandal, 2006

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*Recorded for the first time from West Bengal.

Key to the Families

Body ovate, flattened; anterior suckes ventral and fused with the body; posterior sucker cupuliform, distinct from rest of the body; eyes confined to head; three annuli per mid-body segment; qastric caeca present ..... Glossiphonidae

Body cylindrical and usually divided into distinct anterior and posterior regions; anterior sucker usually distinct; posterior sucker large discoid organ and marked off from the body. Usually more than three annuli per segment; eyes may be present on head nock..... Ichthyobdellidae

Eyes 3-6 pairs in labial and buccal groups in two transverse rows; pharynx long; mouth with muscular ridges but without jaws; testes sacs small and numerous; gastric caeca absent .... Erpobdellidae

Eyes 5 pairs forming lateral crescent; pharynx short; mouth with toothed jaws; tests arranged segmentally in pairs; gastric caeca present ..... Hirudidae

Land and terrestrial leeches only; size small to medium; complete somites; third and fourth pairs of eyes usually on contaguous annuli; buccal fril and anal appendages usually present ..... Haemadipsidae

Key to the species of **Leeches**

Ozobranchus shipleyi Harding, 1909
- I. Eleven pairs lateral digitate branchiae.
- II. Branchiae colour less and body dull yellow.
- III. Eyes on ring 5.
- IV Female ducts open by a common pore between ring 19 and 20.

Glossiphonia annandalei Oka, 1921
- I. The three pairs of eyes has a position unique among the glossiphonidae family.
- II. Two pairs of eyes lie in the posterior part of ring 4.
- III. Smaller pair of eyes lies in between the larger Pair.

Glossiphonia weberi Blanchard, 1897
- I. Larger forms attain a length of about 12 mm.
- II. Colour grayish white to light orange.
- III. Five longitudinal rows of dark brown spots.
- IV Dorsal surface bears seven longitudinal rows of prominent papillae.
- V Eyes three pairs on ring 6, 7 and 8.
- VI. Six pairs of sublobate lateral caeca.

Glossiphonia heteroclita (Linnacus, 1761)	I. Three pairs of eyes lies in rings 5, 7 and 8. II. The body is ovate acuminate, flatend, smooth, transparent. III. The first and smallest pair of eyes closely approximated.
Glossiphonia reticulata Kaburaki, 1921	I. Two pairs of eyes in ring 4 and 5. II. Caudal sucker small. III. Three longitudinal rows of sensory papillae (one median and two intermedians).
Helobdella nociva Harding, 1924	I. Colour dull green but usually white in preserved state. II. Dorsal surface with five brown Longitudinal stripes. III. Papillae two pairs on dorsal side. IV Eyes one pair on ring 4. V Crop with six pairs of simple lateral caeca.
Hemiclepsis marginata marginata (Muller, 1774)	I. Flattened translucent body is richly pigmented. II. Seven longitudinal rows of lemon-yellowspots on dorsal surface. III. Two pairs of eyes are on ring three and four. IV Male and female pore opens between ring 29 and 30.
Hemiclepsis marginata asiatica Moore, 1924	I. Eyes two pairs on rings 3 and 4 but anterior pair very minute. II. Head region dilated and distinct from rest of the body. III. Transverse stripes broken, pale yellow in colour found on the dorsal surface.
Paraclepsis praedatrix Harding, 1924	I. Three pairs of eyes are disposed in two sub-parallel rows in rings 3, 4 and 7. II. Ovate-acuminate body. III. Roughened dorsal surface due to numerous small papillae closely set on every ring.

Paraclepsis gardensi Mandal, 2004	I. Eyes three pairs (2nd pair largest). II. Stomach with seven pairs of caeca (Branched and leafy). III. 18 greenish brown sub parallel longitudinal lines on the dorsal side 6 mid ventral. IV A bulb shaped structure on the dorsoventral part of the anterior portion of the body.
Placobdella emydae Harding, 1920	I. Larger forms attain a length of 13 mm. II. Elliptic body with head region dilated. III. Three pairs of papillae on dorsal surface. IV Male and female pores open between rings 26/27 and 28/29 respectively. V Mouth opens terminal.
Placobdella fulva Harding, 1924	I. Body flattend but very slender anteriorly. II. Upper surface bright reddish-yellow but ventral surface white. III. Each ring bears a large median papilla. IV Eyes one pair on ring 2. V Head region continuous with the body.
Placobdella harasundarai Mandal, 2004	I. One pair round eyes. II. Green in colour in living. III. Three lines dorsal papilla palpable. IV Eggs seven to ten in number. V One mid ventral line. VI. Anterior sucker triangular in shape. VII. Anterior sucker is one fourth of the posterior sucker.
Placobdella horai Baugh, 1960	I. Body ovate acuminate. Upper surface light brown. II. Papillae small, closely set on dorsal surface. III. Eyes one pair, closely placed. IV Male and female pores open between rings 24/25 and 26/27 respectively.

Placobdella undulata Harding, 1924	I.	Head region some what dilated and distinct from body.
	II.	Dorsal surface with a roughened appearance due to numerous closely set papille.
Nematobdella indica Kaburaki, 1921	I.	Larger forms attain a length of about 20 mm. very slender.
	II.	Colour bright buff when alive.
	III.	Six pair eyes, first pair larger on somite 111 remaining five pairs smaller.
	IV	Gonopores separated by five annuli.
Herpobdelloidea lateroculita Kaburaki, 1921	I.	Larger forms attain a length of 27 mm.
	II.	Very slender, attenuated anteriorly.
	III.	Eyes five pairs to six, the first pair larger and dorsal on somite IV
	IV	Remaining submarginal on somites V to VIII.
	V	Gonopores separated by two and one-half to three annuli.
Barbronia weberi (Blachard, 1897)	I.	Size, 25-35 mm. long.
	II.	Colour grayish brown in living.
	III.	Eyes three pairs, one large pair on dorsum of 11.
	IV	Two smaller pairs on sides of anterior annulus of IV
	V	Gonopores separated by four and half annuli.
	VI.	Accessory copulatory pores at X/XI.
Dinobdella ferox (Blanchard, 1896)	I.	Size very large from 20 to 25 cm. or more in life.
	II.	Colour dark green, with any markings.
	III.	Head small, caudal sucker very large.
	IV	Jaws small and no teeth.
Poecilobdella granulosa (Savigny, 1820)	I.	Colour olive green with one or two pairs of yellowish longitudinal stripes marked by black broken line.
	II.	Gonopores separated by five annuli.
	III.	Penis sac larger than prostate.

Poecilobdella manilensis (Lesson, 1842)	I. Body larger and robust. II. Colour light green ventrally and brown dorsally. III. Four pairs olive green stripes on dorsal area disappears with the increasing of size. IV Vaginal stalk absent. V Gonopores separated by five annuli like granulose.
Hirudo birmanica (Blanchard, 1894)	I. Slender body, length about 70 cm. II. Head small and colour brown with seven dark brown dorsal stripes. III. Vaginal sac fusiform, without caecum.

LAND OR TERRESTRIAL LEECHES

Haemadipsa montana Moore, 1927	I. 35 mm. long, slender, cylindrical body. II. colour yellow to buff with median dorsal black stripe. III. One pair of black chain stripe. IV. Third and fourth pair of eyes separated by complete or partial annulus.
Haemadipsa ornata Moore, 1927	I. Size medium. II. Velvety black cream coloured stripes on dorsal area of the body. III. One median and a pair of black intermediate stripes. IV Reddish colour ventrally, sucker pale blue. V Sucker rays 86-94. VI. Eyes 3 and 4 usually separated by a complete annulus.
Haemadipsa sylvestris Blanchard, 1894	I. Larger forms about 50mm. long. II. Colour brown with three dorsal black stripes. III. Third and fourth pair of eyes separated by a complete annulus.
Haemadipsa zeylanica aqilis Moore, 1927	I. Small size, slender body. II. crown brown, with black stripe. III. Median head tessellae present. IV Dorsal intermediate papillae prominent.

Haemadipsa zeylanica montivindicis Moore, 1927	I.	Size small, slender, cylindrical body.
	II.	Colour yellowish-brown with mid-dorsal field paler and a continuous black median line.
	III.	Median head tessellate and dark blotched pattern absent.
Haemadipsa kodairensis Bandyopadhyay and Mandal, 2006	I.	Black spots all over the body, clitellum rudiment.
	II.	Stomach three chambered, Vaginal stalk short.
	III.	Caecum rudimental.

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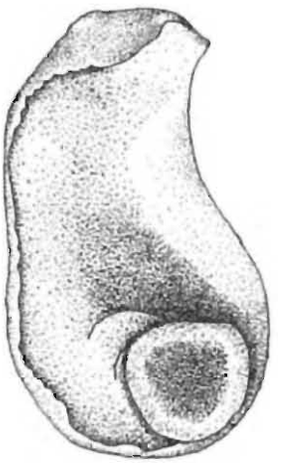
PLATE I

Ozobranchus shipleyi



Glossiphonia annandalei (Ventral view)

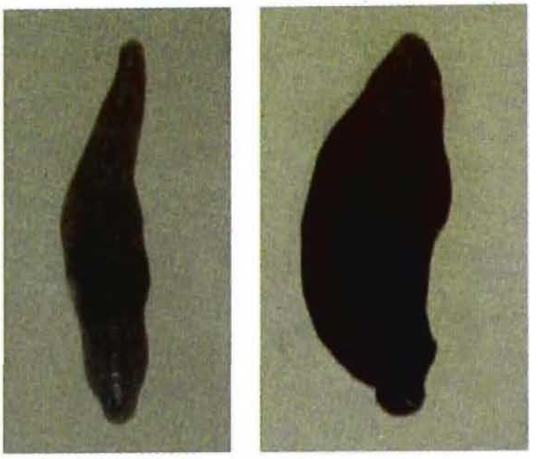
Glossiphonia heterocliṭa

Glossiphonia reticulata

Glossiphonia weberi

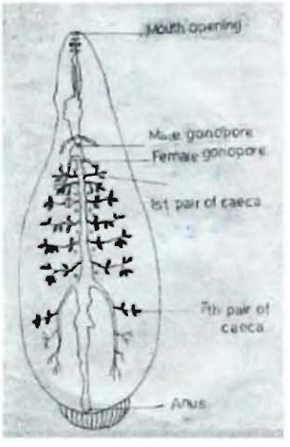
Helobdella nociva (Dorsal & Ventral view)

PLATE II



Hemiclepsis marginata marginata (Dorsal & ventral)

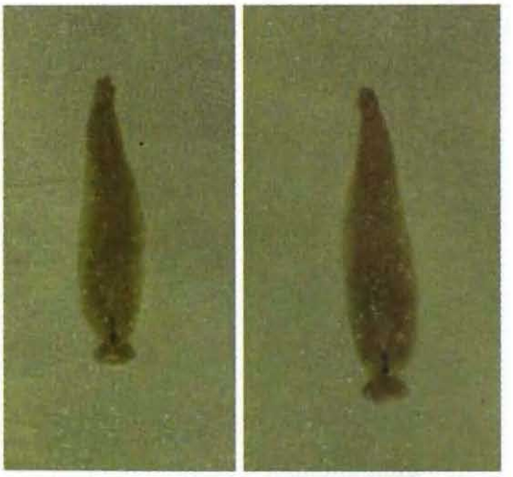
Hemiclepsis m. asiatica



Caecal arrangement of *P gardensi*

Paraclepsis praedatrix (Dorsal & Ventral)

Placobdella emydae (Ventral view)



Placobdella fulva (Dorsal & Ventral)

PLATE III

Placobdella harasundarai

Placobdella horai (Ventral)

Placobdella undulata

Herpobdelloidea indica

Herpobdelloidea lateroculata

Barbronia weberi

PLATE IV

Poecilobdella manillensis

Hirudo birmanica (Dorsal & Ventral view)

Poecilobdella granulosa

Dinobdella ferox

Haemadipsa kodairensis sp. Nov.

Rec. zool. Surv. India : **109**(Part–1) : 89-96, 2009

TAXONOMIC STUDIES ON A COLLECTION OF CHALCIDOID WASPS (HYMENOPTERA : CHALCIDOIDEA) FROM SUNDERBANS, WEST BENGAL, INDIA

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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 the districts North and South 24 Parganas of the state of West Bengal within the Indian territory and the districts Khulna and Barishal 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 the juridiction of India.

No detailed study on the chalcidoid wasps of Sunderbans is done so far. So in this paper we are listing 20 species of them from Sunderbans for the first time. The sample collections were taken from Dwarikapur and Bagabadpur. All the identified specimens are deposited in the 'National Zoological Collections' of the Zoological Survey of India, Kolkata (NZSI).

The following abbreviations are used in the text : BMNH = The Natural History Museum, London, England; DZCU = Department of Zoology, University of Calicut, Kerala, India; NM = Entomologicke oddeleni Museum, Praha, CSSR; NRS = Naturhistoriska Riksmuseet, Stocholm, Sweeden; NZSI = 'National Zoological Collections' of the Zoological Survey of India, Kolkata, India; QMB = Queensland Museum, Brisbane, Australia; USNM = United States National Museum, Washington DC, USA; ZMUM = Zoological Museum of Moscow Lomonslov State University, Moscow, Russia; ZSIC = Zoological Survey of India, Culcutta (= Kolkata), India; ZSIK = Western Ghats Field Research Station, Zoological Survey of India, Kozhikode, Kerala, India.

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Family CHALCIDIDAE

1. ***Antrocephalus validicornis*** (Holmgren)

1869. *Halticella validicornis* Holmgren, 438, Lectotype Male, Java (NRS).

1989. *Antrocephalus validicornis* (Holmgren) : Narendran, 45, Lectotype examined.

Material examined : 2 Males, India : West Bengal; S- 24 Parganas Dt.; Sunderbans; Dwarikapur, 24.xi.2007, Coll. Girish Kumar, P., Reg. Nos. 10606/H3 & 10607/H3 (NZSI).

Distribution : India (Present record) : West Bengal (Present record).

Elsewhere : Indonesia (Java), Malaysia and Philippines.

2. ***Brachymeria lasus*** (Walker)

1841. *Chalcis lasus* Walker, 219, Lectotype Female, India (BMNH).

1973. *Brachymeria lasus* (Walker) : Joseph *et al.*, 29-32.

Material examined : 1 Male, India : West Bengal; S- 24 Parganas Dt.; Sunderbans; Dwarikapur, 24.xi.2007, Coll. Girish Kumar, P., Reg. No. 10608/H3 (NZSI).

Distribution : India : Andaman & Nicobar Islands, Arunachal Pradesh, Bihar, Delhi, Gujarat, Himachal Pradesh, Jammu& Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Punjab, Tripura, Uttar Pradesh and West Bengal.

Elsewhere : Worldwide.

3. ***Hockeria fronta*** Narendran

1989. *Hockeria fronta* Narendran, 104, Female, India (DZCU).

Material examined : 1 Female, India : West Bengal; S- 24 Parganas Dt.; Sunderbans; Bagabadpur, 25.xi.2007, Coll. Girish Kumar, P., Reg. No. 10609/H3 (NZSI).

Distribution : India : Kerala, Tamil Nadu, West Bengal (Present record).

4. ***Tropimeris monodon*** Boucek

1958. *Tropimeris monodon* Boucek, 481, Female, India (NM).

Material examined : 1 Female, India : West Bengal; S- 24 Parganas Dt.; Sunderbans; Bagabadpur, 25.xi.2007, Coll. Girish Kumar, P., Reg. No. 10614/H3 (NZSI).

Distribution : India : Kerala, Maharashtra, West Bengal (Present record).

Elsewhere : Indonesia and Sri Lanka.

Family EULOPHIDAE

5. ***Aprostocetus bangaloricus*** Narendran

2003. *Aprostocetus bangaloricus* Narendran, (in Hayat *et al.*), 323, Female, India (ZSIK).

Material examined : 1 Female, India : West Bengal; S- 24 Parganas Dt.; Sunderbans; Dwarikapur, 24.xi.2007, Coll. Girish Kumar, P., Reg. No. 10558/H3 (NZSI).

Distribution : India : Karnataka, West Bengal (Present record).

6. ***Aprostocetus ricosus*** Narendran

2007. *Aprostocetus ricosus* Narendran, 88, Female, India (ZSIC).

Material examined : 2 Females, India : West Bengal; S- 24 Parganas Dt.; Sunderbans; Dwarikapur, 24.xi.2007, Coll. Girish Kumar, P., Reg. No. 10559/H3 & 10560/H3 (NZSI).

Distribution : India : Kerala, Orissa, Uttar Pradesh, West Bengal (Present record).

7. ***Aprostocetus vatiata*** Narendran

2007. *Aprostocetus vatiata* Narendran, 103, Female, India (ZSIC).

Material examined : 1 Female, India : West Bengal; S- 24 Parganas Dt.; Sunderbans; Dwarikapur, 24.xi.2007, Coll. Girish Kumar, P., Reg. No. 10561/H3 (NZSI).

Distribution : India : Kerala, Maharashtra, Uttar Pradesh, West Bengal (Present record).

8. ***Leptocybe invasa*** Fisher & LaSalle

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

Material examined : 31 Females, India : West Bengal; S- 24 Parganas Dt.; Sunderbans; Bagabadpur, 25.xi.2007, Coll. Girish Kumar, P., Reg. Nos. 10562/H3 to 10592/H3 (NZSI).

Distribution : India : Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, West Bengal (Present record).

Elsewhere : 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.

9. ***Neotrichoporoides curiosus*** Narendran & Girish Kumar

2006. *Neotrichoporoides curiosus* Narendran & Girish Kumar, 12, Female, India (ZSIC)

Material examined : 1 Female, India : West Bengal; S- 24 Parganas Dt.; Sunderbans; Bagabadpur, 25.xi.2007, Coll. Girish Kumar, P., Reg. No. 10593/H3 (NZSI).

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

10. ***Tetrastichus dulciculus*** Narendran

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

Material examined : 10 Females, India : West Bengal; S- 24 Parganas Dt.; Sunderbans; Dwarikapur, 24.xi.2007, Coll. Girish Kumar, P., Reg. Nos. 10594/H3 to 10603/H3 (NZSI). 1 Female, India : West Bengal; S-24 Parganas Dt.; Sunderbans; Bagabadpur, 25.xi.2007, Coll. Girish Kumar, P., Reg. No. 10604/H3 (NZSI).

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

11. ***Elasmus punensis*** Mani & Saraswat

1972. *Elasmus punensis* Mani & Saraswat, 479, Female, India (USNM).

Material examined : 1 Female, India : West Bengal; S- 24 Parganas Dt.; Sunderbans; Bagabadpur, 25.xi.2007, Coll. Girish Kumar, P., Reg. No. 10605/H3 (NZSI).

Distribution : India : Karnataka, Kerala, Maharashtra, Tamil Nadu, Uttar Pradesh, West Bengal (Present record).

Elsewhere : Sri Lanka.

Family EURYTOMIDAE

12. ***Philolema albitarsis*** (Motschulsky)

1863. *Eurytoma albitarsis* Motschulsky, 41, Female, Sri Lanka (ZMUM).

1988. *Acantheurytoma albitarsis* (Motschulsky): Boucek, 117.

2008. *Philolema albitarsis* (Motschulsky), Noyes, Universal Chalcidoidea database. Updated.

Material examined : 1 Female, India : West Bengal; S- 24 Parganas Dt.; Sunderbans; Bagabadpur, 25.xi.2007, Coll. Girish Kumar, P., Reg. No. 10610/H3 (NZSI).

Distribution : India : Andhra Pradesh, Karnataka, Kerala, West Bengal (Present record).

Elsewhere : Sri Lanka.

13. ***Eurytoma agalica*** Narendran

1994. *Eurytoma agalica* Narendran, 239, Female, India (DZCU).

Material examined : 1 Female, India : West Bengal; S- 24 Parganas Dt.; Sunderbans; Dwarikapur, 24.xi.2007, Coll. Girish Kumar, P., Reg. No. 10611/H3 (NZSI).

Distribution : India : Kerala, Tamil Nadu, West Bengal (Present record).

14. ***Eurytoma chaitra*** Narendran

1994. *Eurytoma chaitra* Narendran, 228, Female, India (DZCU).

Material examined : 1 Female, India : West Bengal; S-24 Parganas Dt.; Sunderbans; Bagabadpur, 25.xi.2007, Coll. Girish Kumar, P., Reg. No. 10612/H3 (NZSI).

Distribution : India : Karnataka, Kerala, West Bengal (Present record).

15. ***Eurytoma tanjorensis*** Narendran

1994. *Eurytoma tanjorensis* Narendran, 246, Female, India (DZCU).

Material examined : 1 Female, India : West Bengal; S- 24 Parganas Dt.; Sunderbans; Bagabadpur, 25.xi.2007, Coll. Girish Kumar, P., Reg. No. 10613/H3 (NZSI).

Distribution : India : Tamil Nadu, West Bengal (Present record).

Family PTEROMALIDAE

16. ***Metastenus indicus*** Sureshan & Narendran

2002. *Metastenus indicus* Sureshan & Narendran, 125, Female, Male, India (ZSIK).

Material examined : 4 Females, India : West Bengal; S- 24 Parganas Dt.; Sunderbans; Dwarikapur, 24.xi.2007, Coll. Girish Kumar, P., Reg. No. 10615/H3 to 10618/H3 (NZSI).

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

17. ***Notoglyptus scutellaris*** (Dodd & Girault)

1915a. *Merismus scutellaris* Dodd & Girault, (in Girault, 1915a), 328, Female, Australia (QMB).

1988. *Notoglyptus scutellaris* (Dodd & Girault): Boucek, 466.

Material examined : 2 Females, India : West Bengal; S-24 Parganas Dt.; Sunderbans; Dwarikapur, 24.xi.2007, Coll. Girish Kumar, P., Reg. No. 10619/H3 & 10620/H3 (NZSI).

Distribution : India : Delhi, Kerala, Uttar Pradesh, West Bengal (Present record).

18. ***Propicroscytus mirificus*** (Girault)

1915b. *Arthrolysis mirificus* Girault, 191, Female, Australia (QMB).

1941. *Propicroscytus mirificus* (Girault): Szelenyi, 123.

Material examined : 3 Females, India : West Bengal; S-24 Parganas Dt.; Sunderbans; Bagabadpur, 25.xi.2007, Coll. Girish Kumar, P., Reg. No. 10621/H3 to 10623/H3 (NZSI). 2 Males, India : West Bengal; S-24 Parganas Dt.; Sunderbans; Dwarikapur, 24.xi.2007, Coll. Girish Kumar, P., Reg. No. 10624/H3 & 10625/H3 (NZSI).

Distribution : India : Andhra Pradesh, Karnataka, Kerala, Maharashtra, Orissa, Uttar Pradesh, West Bengal (Present record).

Elsewhere : Australia, Indonesia, Malaysia, China and Sri Lanka.

19. ***Pteromalus keralensis*** Sureshan

2001. *Pteromalus keralensis* Sureshan, 12, Female, India (ZSIK).

Material examined : 1 Female, India : West Bengal; S-24 Parganas Dt.; Sunderbans; Dwarikapur, 24.xi.2007, Coll. Girish Kumar, P., Reg. No. 10626/H3 (NZSI).

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

20. ***Pteromalus puparum*** (Linnaeus)

1758. *Ichneumon puparum* Linnaeus, 567, Sweden (*Linn. Soc. London*).

1795. *Pteromalus puparum* (Linnaeus): Swederus, 203. Additional citation: Fitton (1978).

Material examined : 1 Female, India : West Bengal; S-24 Parganas Dt.; Sunderbans; Bagabadpur, 25.xi.2007, Coll. Girish Kumar, P., Reg. No. 10627/H3 (NZSI).

Distribution : India : Assam, Bihar, Himachal Pradesh, Kerala, Meghalaya, Punjab, Tamil Nadu, Uttar Pradesh, Uttarakhand, West Bengal (Present record).

SUMMARY

Four species of Chalcididae viz., *Antrocephalus validicornis* (Holmgren), *Brachymeria lasus* (Walker), *Hockeria fronta* Narendran and *Tropimeris monodon* Boucek, Seven species of Eulophidae viz., *Aprostocetus bangaloricus* Narendran, *A. ricosus* Narendran, *A. vatiata* Narendran, *Leptocybe invasa* Fisher & LaSalle, *Neotrichoporoides curiosus* Narendran & Girish Kumar, *Tetrastichus dulciculus* Narendran and *Elasmus punensis* Mani & Saraswat, Four species of Eurytomidae viz., *Philolema albitarsis* (Motschulsky), *Eurytoma agalica* Narendran, *E. chaitra* Narendran and *E. tanjorensis* Narendran and Five species of Pteromalidae viz., *Metastenus indicus* Sureshan & Narendran, *Notoglyptus scutellaris* (Dodd & Girault), *Propicroscytus mirificus* (Girault), *Pteromalus keralensis* Sureshan and *P. puparum* (Linnaeus) are identified and reported here for the first time from Sunderbans, West Bengal, India.

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Rec. zool. Surv. India : **109**(Part–1) : 97-103, 2009

TAXONOMIC NOTES ON HAIRY WASPS (HYMENOPTERA : SCOLIIDAE) OF ANDHRA PRADESH, INDIA

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INTRODUCTION

The family Scoliidae is a group of fossorial aculeate wasps. All species are solitary. They are commonly known as hairy wasps. Adults are often predominantly black, commonly marked with yellow, white or red. Their wings are usually dark with metallic reflections. The vestiture varies from entirely black or black mixed with white to entirely golden or reddish. Size may vary in length from 5 mm to 35 mm, rarely up to 50 mm. Sexual dimorphism slight to moderate and even stronger. They are cosmopolitan in distribution but predominantly found in tropical region, containing about 300 species in two subfamilies: Proscoliinae and Scoliinae. The larvae are ectoparasitoides of the larvae of Coleoptera, usually Scarabaeoidea but rarely Curculionoidea.

Seventy nine species under 19 genera have been reported from Indian subregion so far (Gupta and Jonathan, 2003). The knowledge of Scoliid fauna of Andhra Pradesh is very scanty and fragmentary. Only three species are reported so far. So in this paper, in addition to this three species, three more species are reported as new records from Andhra Pradesh.

All the specimens are deposited in the 'National Zoological Collections' of the Hymenoptera Section, Zoological Survey of India, Kolkata (NZSI).

SYSTEMATIC LIST

Family SCOLIIDAE

Subfamily SCOLIINAE

I. Tribe **Campsomerini** Betrem

1. Genus ***Micromeriella*** Betrem

1. ***Micromeriella marginella marginella*** (Klug)

2. Genus ***Campsomeriella*** Betrem

2. ***Campsomeriella (Campsomeriella) collaris collaris*** (Fabricius)

3. Genus ***Megacampsomeris*** Betrem

3. ***Megacampsomeris reticulata*** (Cameron)

II. Tribe ***Scoliini***

4. Genus ***Scolia*** Fabricius

4. ***Scolia (Discolia) binotata binotata*** Fabricius

5. ***Scolia (Discolia) fichteli*** Betrem

6. ***Scolia (Discolia) rubrosinuata*** Betrem

SYSTEMATIC ACCOUNT

1. *Micromeriella marginella marginella* (Klug)

1810. *Scolia marginella* Klug, *Beitr. Naturk.*, **2** : 214. Male, India-Orient (Type in Zoologicshes Museum Der Humboldt universitat, Berlin)

1858. *Elis (Campsomeris) hirsuta* Saussure, *Ann. Soc. Ent. Fr.*, (3) **6** : 234. Female, India : Tranqueber (Type in Zoological Museum of the University of Copenhagen).

1864. *Elis (Dielis) hirsuta* Saussure: Saussure & Sichel, *Cat. Spec. Gen. Scolia*: 216, Female, India.

1864. *Elis (Dielis) marginella (Klug)* : Saussure & Sichel, *Cat. Spec. Gen. Scolia* : 186, Male, India.

1974. *Micromeriella marginella marginella* (Klug): Bradley, *Revue. Suisse Zool.*, **81** (2) : 443; (notes on the synonymy of *E. hirsuta* Saussure with typical *M. m. marginella*).

Diagnosis : Male : Length 6-12 mm. Integument black, antennal flagellum blackish brown; the following yellow : mandible at their bases, clypeus except at the middle, on callosities, pronotum except at its anterior margin, scutellum and metanotum, coxae below, femora below, first and second tibiae dorsally and third with a linear mark above, first pretarses dorsally, apical bands on first to fifth tergites, second to fifth sternites with narrow apical bands. Vestiture white, wings hyaline. Frontal spatium not distinctly defined posteriorly, sparsely punctate punctures mostly separated by the diameter of a puncture. Genitalia with parameres slender, basal part of volsellae with small, sparse hair.

Variations : Male specimens shows slight variations in the colour patterns from the descriptions provided by Gupta and Jonathan (2003). Their descriptions varies from this specimens on the

yellow maculations as follows : extensive linear marks above on all the femora; first and second tibiae wholly and third usually with a linear mark or sometimes wholly, first tarsus usually, second metatarsus, sometimes all the three tarsi with yellow maculations.

Material examined : 1 Male, India : Andhra Pradesh; Vishakapatanam Dt.; Gopalapatanam, Coll. D.R. Maulik and Party, 8.ii.2004, Reg. No. 10114/H3. 1 Male, India: Andhra Pradesh; Vishakapatanam Dt.; Sarabaram, Coll. D.R. Maulik and Party, 5.ii.2004, Reg. No. 10455/H3 (NZSI).

Distribution: India : Andhra Pradesh, Bihar, Delhi, Gujarat, Rajasthan, Karnataka, Kerala, Maharashtra, Orissa, Pondichery, Tamil Nadu, Uttarakhand and West Bengal.

Elsewhere : Sri Lanka.

2. ***Campsomeriella (Campsomeriella) collaris collaris*** (Fabricius)

1775. *Tiphia collaris* Fabricius, *Syst. Ent.,*: 354; Female, coast of Malabar (type in Zoological Museum of the University of Copenhagen).

1967. *Campsomeriella (Campsomeriella) collaris collaris* (Fabricius): Betrem, *Ent. Ber., Amst.,* **27** : 29.

Diagnosis : Female : 14-27 mm. Body black, Vestiture black, except clypeus and front usually with intermixed cinereous setae, occiput and scapula with dense erect and mesoscutum with decumbent white setae. Wings dark brown with deep blue reflections. Clypeus impunctate in the middle; Upper front and vertex impunctate except for a few scattered punctures; Upper plate of metapleuron impunctate except for a few fine, scattered punctures along upper margin.

Male : Length 11-19 mm. Integument black, abdomen with faint blue reflections. The followings are yellow: clypeus except for a median triangular black mark; mandibles at basal half; pronotum anteriorly in the middle; a narrow strip adjacent to tegula, a narrow strip interrupted in the middle, on scutellum anteriorly; a small antero-median spot on metanotum; a spot on each callosity; strip on apical half of all femora; outer surface of all tibiae; almost entire surface of first tergite, about apical two- thirds of second, apical half of third and fourth, second and third sternites with paired minute postero-lateral spots. Vestiture white except black on apical three abdominal segments; sixth and seventh sternites with long dense black setae. Wings hyaline, very lightly infumated, with weak yellowish reflections.

Variations : The female specimens show variations from the descriptions provided by Gupta and Jonathan (2003) in the pattern of arrangement of white setae on mesoscutum. Setae on mesoscutum arranged uniformly except at postero-median area with sparse setae (In the descriptions of Gupta and Jonathan (2003), mesoscutum with white setae on anterior half only).

The male specimens show variations in the yellow colour pattern on first and last fore tarsal segments. No yellow colour on first and last fore tarsal segments (In the descriptions of Gupta and Jonathan, 2003, yellow colour on the outer surface of first and last fore tarsal segments present).

Material examined : 1 Female, India : Andhra Pradesh; Rangareddy Dt.; Rajendranagar, Coll. S.P. Chakraborty and Party, 9.x.1998, Reg. No. 10086/H3. 1 Female, India : Andhra Pradesh; East Godavary Dt.; Coring Wild Life Sanctuary, Coll. P.H. Roy and Party, 26.xi.2000, Reg. No. 10091/H3. 2 Male, India : Andhra Pradesh; Naguldevpadu; Coll. Durga Prasad, 31.vii.1975, Reg. Nos. 10449/H3 and 10450/H3. 1 Male, India : Andhra Pradesh; Vishakapatanam Dt.; Gopalapatanam, Coll. D.R. Maulik and Party, 8.ii.2004, Reg. No. 10113/H3 (NZSI).

Distribution : India : Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Lakshadeep, Madhya Pradesh, Maharashtra, Meghalaya, Orissa, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh and West Bengal.

Elsewhere : Nepal and Sri Lanka.

3. ***Megacampsomeris reticulata*** (Cameron)

1892. *Elis (Dielis) reticulata* Cameron, *Mem. Proc. Manch. Lit. Phil. Soc.*, **5** (4) : 109; Male, India : Pune (type in Hope Department of Entomology, University Museum, Oxford).

1928. *Campsomeris (Megacampsomeris) reticulata* (Cameron): Betrem, *Treubia,* **9** (suppl.) : 157; Female, Male. India : Bangalore, Malabar, Sangli, Jabalpur.

1972. *Megacampsomeris reticulata* (Cameron): Betrem *in* Betrem and Bradley, *Mon. Ned. Ent. Ver.*, **6** : 164.

Diagnosis : Female : Length 25 mm. Integument and vestiture black; wings dark brown with dark blue reflections; clypeal disc broadly impunctate in the middle; frontal fissura extending up to anterior ocellus; vertex with coarse, close to scattered punctures, its declivous portion with close punctures; mesoscutum with an impunctate area posteriorly in the middle; upper plate of metapleuron impunctate except for some close punctures above.

Material examined : 1 Female, India : Andhra Pradesh; West Godavary Dt.; Ramasaingavaram, Coll. S.K. Mandal and Party, 4.x.1998, Reg. No. 10088/H3 (NZSI).

Distribution : India : Andhra Pradesh, Bihar, Delhi, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan and Tamil Nadu.

Remarks : This is the first report of the species from Andhra Pradesh.

4. ***Scolia (Discolia) binotata binotata*** Fabricius

1804. *Scolia binotata* Fabricius, *Syst. Peiz* : 244 Male, Tranquebar (type in Zoological Museum of the University of Copenhagen).

1978. *Scolia (Discolia) binotata binotata* Fabricius: Krombein, *Smithsonian Contr. Zool.*, **283** : 41- 43. Female, Male; localities from Sri Lanka.

Diagnosis : Male : Length 11-17 mm. Body black, usually third and fourth tergites with paired, rounded, light red spots, sometimes only third or fourth tergite with such spots, rarely abdomen entirely black. The males from eastern Himalaya and Northeast India having sometimes, red marks on front, vertex and scapula. Vestiture black mixed with white on head and thorax anteriorly, legs and ventral side of abdomen predominantly white. Wings dark brown at base and paler at apices with bluish purple effulgence.

Material examined : 1 Male, India : Andhra Pradesh; Hyderabad Dt.; Golkonda, Coll. S.K. Mandal and Party, 27. ix. 1998, Reg. No. 10090/H3. 3 Male, India: Andhra Pradesh; Prakasam Dt.; Srisailam; Sunnipetta, Coll. S.K. Mandal and Party, 23. ix. 1998, Reg. Nos. 10092/ H3, 10093/ H3 and 10094/H3 (NZSI).

Distribution : India : Andhra Pradesh, Arunachal Pradesh, Delhi, Karnataka, Kerala, Manipur, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttarakhand and West Bengal.

Elsewhere : Sri Lanka.

Remarks : This is the first report of the species from Andhra Pradesh.

5. *Scolia (Discolia) fichteli* Betrem

1928. Scolia (Scolia) fichteli Betrem, Treubia, **9** (suppl.) : 257, 258, 313- 314. Female, Male; India, Malabar and unknown locality (types in Naturhistorisches Museum, Vienna).

1964. *Scolia (Discolia) fichteli* Betrem : Betrem & Bradley, *zool. Meded.*, **40** : 93.

Diagnosis : Female : Length 14-20 mm. Reddish spots on some abdominal tergites, rest black; anterior margin of median lobe of clypeus rounded or subtruncate; front subcontiguously punctate medially, weak frontal fissura not extending up to anterior ocellus, upper plate of metapleuron very narrowly punctate along upper margin only.

Male : Length 10-17 mm. Males variable in having number of paired red spots on abdominal tergites. Third and fourth tergites usually marked with paired reddish spots, some males with entirely black abdomen. Antennal flagellum not capitate towards apex, upper plate of metapleurum only narrowly punctate along upper margin.

Distribution : India : Andhra Pradesh, Arunachal Pradesh, Bihar, Delhi, Kerala, Meghalaya, Pondicherry, Punjab and West Bengal.

Remarks : The specimens of this species is not represented in this study and the above diagnosis is based on the descriptions provided by Gupta and Jonathan (2003).

6. ***Scolia (Discolia) rubrosinuata*** Betrem

1928. *Scolia (Scolia) rubrosinuata* Betrem, *Treubia,* **9** (suppl.) : 248, 249, 266-267. Female, Male; India : Kolkata, Julapore, Surat (type in National Zoological Collectionns of Z.S.I., Kolkata). Type examined.

1964. *Scolia (Discolia) rubrosinuata* Betrem : Betrem & Bradley, *Zool. Meded.,* **40** : 92.

Diagnosis : Female : Length 12 mm. Body black except head with reddish brown maculation on ocular sinus extends to frontal pit and temples above; vestiture black except white hairs on occiput; wings dark brown with bluish reflections; frontal fissura extending half way to anterior ocellus.

Variations : The female specimen shows variations from the holotype in having reddish brown patches extends to the frontal pit and temples above.

Material examined : 1 Female, India : Andhra Pradesh; East Godavari Dt.; Addatigala village, Coll. T.P. Bhattacharjee & Party, 7. iv. 1996, Reg. No. 10089/H3 (NZSI).

Distribution : India : Andhra Pradesh, Gujarat, Karnataka and West Bengal.

Remarks : This is the first report of the species from Andhra Pradesh.

SUMMARY

This paper deals with the Scoliid fauna of Andhra Pradesh state. 6 species under 4 genera are reported from Andhra Pradesh of which 3 species are new reports from the state.

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NEW RECORD OF *MEGASCOLIA (REGISCOLIA) AZUREA CHRISTIANA* (BETREM & GUIGLIA) (HYMENOPTERA : SCOLIIDAE) FROM MIZORAM, ORISSA AND SIKKIM, INDIA

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INTRODUCTION

During the studies of large collections of scoliid wasps present in the Hymenoptera Section of Zoological Survey of India, Kolkata, the author of this paper found out three new records of the species *Megascolia (Regiscolia) azurea christiana* (Betrem & Guiglia) : one from Mizoram, one from Orissa and one from Sikkim. Jonathan and Gupta (2003) listed the scoliid species from Sikkim. Gupta and Jonathan (2003) studied the family Scoliidae of India and adjacent countries in detail. This short communication is intended to report the extended distribution of species to Mizoram, Orissa and Sikkim.

Megascolia (Regiscolia) azurea christiana (Betrem & Guiglia)

(Fig. 1)

1892. *Scolia (Triscolia) rubiginosa* Fabricius : Magretti, *Ann. Mus. Civico. Stor. Nat. Geneva*, **32** : 236; Female, Male. Myanmar.

1927. *Triscolia azurea azurea* (Christ) : Micha, *Mitt. Zool. Mus. Berlin*, **13** : 117; Female, Male. Myanmar, India.

1928. *Scolia (Triscolia) azurea rubiginosa* Fabricius : Betrem, *Treubia*, **9** (suppl.) : 231- 232; Female, Male (specimens from Myanmar, Bangladesh and northern India only).

1958. *Scolia (Triscolia) azurea christiana* Betrem & Guiglia : Guiglia and Betrem, *Ann. Mus. Civico Stor. Nat. Geneva*, **70** : 96 (a new name for the population from Myanmar and northern India).

1964. *Megascolia (Regiscolia) azurea christiana* (Betrem & Guiglia) : Betrem & Bradley, *Zool. Meded.*, **39** : 444.

Diagnosis : *Female* : Length 30-42mm. Body black, the following red or yellowish red : frontal spatium along its upper margin; front; vertex entirely including ocular sinuses; paired large oval spots on third tergite, fourth to last tergite usually with reddish tinge. Vestiture black except yellowish red or red on third to last abdominal segments including pygidium. Wings dark brown with violaceous effulgence. Anterior rim of clypeus subtruncate in the middle; clypeal disc not raised in the middle, flat, a subapical strip of small and dense punctures, at sides with close punctures, centre of the disc smooth or rugulose. Scapulae without any tubercle in front of tegulae; forewing with three Submarginal cells; first abdominal tergite with a very strong tubercle anteriorly in the middle.

Male : Length 23-30mm. Body black, the following reddish yellow : ocular sinuses entirely or partly, paired large oval spots on third tergite, fourth to last tergites almost entirely. Vestiture black except reddish yellow on third to last abdominal tergites and sternites. Wings dark brown with violaceous effulgence. Median section of posterior surface of propodeum closely punctate adjacent to dorsal surface, elsewhere with sparse to scattered punctures; forewing with three Submarginal cells. First abdominal tergite with a strong antero-median tubercle, surface with small subcontiguous punctures except impunctate behind tubercle; apical portion of volsellae with a blade-like appendage along inner edge.

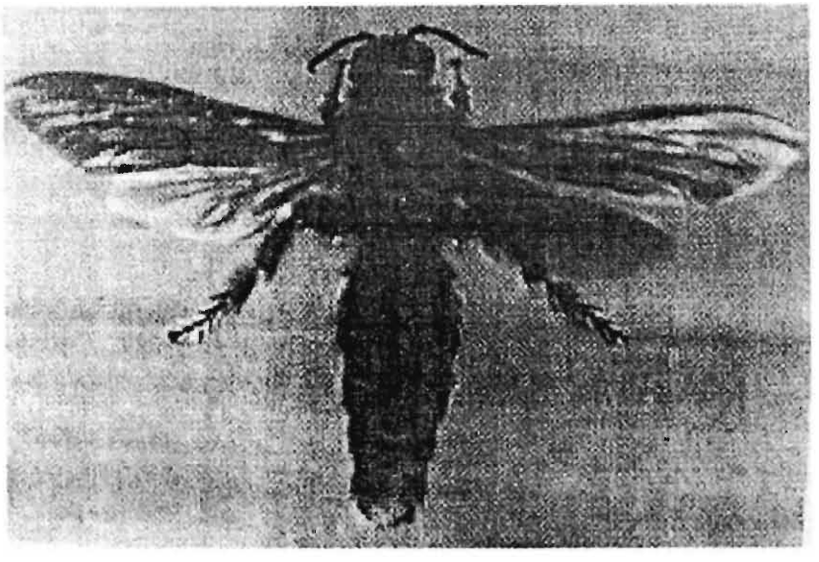

Fig. 1. *Megascolia (Regiscolia) azurea christiana* (Betrem & Guiglia). Female.

Variations : The female specimen from Orissa having a small red spot on scapulae posteriorly in front of tegula.

Material examined : 1 Male, India : Mizoram; Siahatta, 07.iv.1994, Coll. A.K. Hazra & Party, Reg. No. 10112/H3. 1 Female, India : Orissa; Kendumandi; 18.v.1972, Coll. A.R. Bhaumik & Party, Reg. No. 10471/H3. 3 Female & 2 Male, India : Sikkim; Bugtan, Alt. 520m, 09.iv.1959, Coll. A.G.K. Menon,

Reg. Nos. 10451/H3, 10452/H3, 10453/H3, 10454/H3 & 4198/H3. All specimens are deposited at Hymenoptera Section, Zoological Survey of India, Kolkata (NZSI).

Distribution : India : Arunachal Pradesh, Assam, Himachal Pradesh, Manipur, Meghalaya, Mizoram, Orissa, Sikkim, Tripura, Uttarakhand and West Bengal.

Elsewhere : Bangladesh, Myanmar and Nepal.

Remarks : This is the first report of this taxon from Mizoram, Orissa and Sikkim.

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Rec. zool. Surv. India : **109**(Part–1) : 109-110, 2009

Short Communication

FIRST RECORD OF THE TERAI CRICKET FROG, *FEJERVARYA TERAIENSIS* (DUBOIS, 1984) FROM UTTAR PRADESH

Terai Cricket Frog, *Fejervarya teraiensis* (Dubois, 1984) is a small sized frog having a maximum SVL of 56.00 mm in females and 51.0 mm in males. It is the largest species of *Fejervarya* found in Nepal with an ovoid, stocky body. The development of a middorsal line is highly variable. The dorsum has more or less patches of orange, red, or green and males have characteristic W-shaped dark marking on the throat (Schleich and Kastle 2002). The forelimbs are more or less darkly spotted. The hindlimbs have no stipes but has oval spots. The toe webbing is faintly marbled. The males have a thickened metacarpal tubercle at the base of the first finger. The finger tips are rounded. The relative finger length is 2 = 4 < 1 < 3 with the first finger longer than the second and fourth.

Fejervarya teraiensis is recorded from the entire Terai zone of Nepal. The species was first described in 1984 (Dubois, 1984) and earlier records of *Limnonectes* in the region may include this species (Schleich and Kastle, 2002). In India, there is a record from Nagaland (Ao *et al.*, 2003) and from Loktok lake, Manipur (Ningombam and Bordoloi, 2007) and from Assam (Borthokur *et al.*, 2007).

On 9th August 2007, 4 examples of *Fejervarya teraiensis* (Dubois, 1984) were collected from Katerniaghat Wildlife Division, near Nishanagadha Forest Range (28° 14' 26.2" N and 81° 13' 43.8" E and Altitude of 150-183 metre above MSL) which is on the India-Nepal border in district Behraich of Uttar Pradesh. This forest division has total area of 551.64 sq. km, wherein combinations of grasslands, wetlands and dense forests are found. Part of the Wildlife division is declared as Wildlife Sanctuary in 1976 having an area of 400.00 sq. km. The present collection constitutes the first record of the species from Uttar Pradesh.

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Fig. 1. *Fejervarya teraiensis* (Dubois, 1984)

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Short Communication

RANGE EXTENSION OF A TREE FROG *POLYPEDATES TAENIATUS* (BOULENGER, 1906)

Polypedates taeniatus (Boulenger, 1906) was described from Purneah District of Bihar State. Subsequently, it was reported from Dudhwa National Park, Uttar Pradesh (Ray, 1991) and Orang National Park, Assam (Ahmed and Dutta 2000).

Polypedates taeniatus (Boulenger, 1906) is a slender, smooth-skinned arboreal frog. The body is torpedo shaped. Snout–Vent length : 47 mm. Vomerine teeth in two oblique series between the choanae. Head a little longer than broad, snout truncate or obtusely acuminate, as long as the diameter of the orbit, concave nostril much nearer the end of the snout than the eye, inter orbital space broader than the upper eyelid, tympanum two third or three fourth the diameter of the eye. Fingers free, toes barely half webbed, disks moderately large, that of the third finger measuring about two fifth the diameter of the eye. Subarticular tubercles moderate. Tibio-tarsal articulation reaching the eye. Skin smooth or finely areolate above, belly granular. Purplish brown above, a narrow lighter vertebral line, a broad light band from the upper eyelid to the groin, bordered above and beneath by a dark-bown band, the lower extending over the temple and the loreal region to the end of the snout, a white streak from below the eye to the shoulder, no dark bars on the limbs, a light streak along the outer side of the tibia, lower parts white.

Compared to *P.maculatus* and *P. leucomystax* this species differs by having narrower head with vertical lores, smaller digital disks and by absence of all traces of web between the fingers.

On our survey tour in Uttar Pradesh in the month of July, 2008, 06 specimens of *Polypedates taeniatus* were collected. The collection data of which are given below.

Registration Number	**Sex**	**Collection Area**	**Date of collection**	**Habitat**
A10774	Male	Ravali Forest Area, Bijnor	21.07.2008	Crop land area collected on Maize Plant
A10775	Male	Ravali Forest Area, Bijnor	21.07.2008	Crop land area collected on Maize Plant
A10776	Male	Hastinapur Forest, Meerut	25.07.2008	Grass land area collected on tall grasses

Registration Number	Sex	Collection Area	Date of collection	Habitat
A10777	Male	Hastinapur Forest, Meerut	25.07.2008	Grass land area collected on tall grasses
A10778	Male	Ram-Ganga River bank, Moradabad	29.07.2008	Grass land area collected on grasses
A10779	Male	Ram-Ganga River bank, Moradabad	29.07.2008	Grass land area collected on grasses

Fig. 1. *Polypedates taeniatus* (Boulenger, 1906)

The presence of *P. taeniatus* in western districts of Uttar Pradesh indicates its possible occurrence in adjacent states of Uttaranchal and Haryana too. However, the occurrence of *P. taeniatus* in fair numbers in Western districts of Uttar Pradesh state extends the westward range distribution of this species for about 272 km from its earlier known distributional limits in Uttar Pradesh.

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Short Communication

NOTES ON FREE-LIVING CILIATES IN FRESHWATER PONDS OF KOLKATA

INTRODUCTION

Freeliving ciliates play an important role in the aquatic ecosystem and form an important component of the environment monitoring surveillance. These ciliophorans show their significance as biological indicators and occupy an important position in the aquatic foodchain. In West Bengal, in all 152 species of ciliates, belonging to 2 classes, 16 orders, 52 families and 75 genera have been recorded by several investigators since 1840s. (Das *et al.*, 1993; Piyali and Das, 1997). But no serious survey was conducted for the ciliates of Kolkata wetlands, and hence a survey was conducted from April 2006 to July 2007 in Kolkata wetlands for the exploration of the freeliving ciliate fauna including Rabindra Sarovar, a National lake, representing an important freshwater wetland in the heart of the metrocity of Kolkata.

MATERIAL AND METHODS

Water samples were collected from five water bodies *viz.*, Rabindra Sarobar (RS), Indian Museum Tank (IMT), Brace Bridge Jheel (BBJ), Pond in Lakegarden (LGP) and pond near Saltlake (SLP) along with some algae, water weeds, flocculent matter and bottom oozes and were kept in the laboratory for subsequent study. Those samples were examined under the microscope from time to time for about 15 days. The free-living ciliates occurring in them were isolated, processed and stained following standard fixation and preservation methods (Mandal *et al.*, 1990; Das *et al.*, 1993).

RESULTS AND DISCUSSION

A total of 15 species were identified of which 5 species were not reported earlier from Kolkata wetlands *viz.*, *Dileptus monilatus, Loxophyllum levigatum, L. undulatum, Loxodes vorax* and *Leptopharynx torpens.* These 15 species belong to 6 orders and 9 families. Of the 6 orders

prostomatid ciliates represent 4 species followed by 3 species each of pleurostomatids and karyostomatids (Table-1). Among them, 5 species such as *Holophrya bengalensis, Litonotus fasciola, Colpoda cucullus, Nassula ornata, and Paramecium caudatum* were recorded from other states in India (Das *et al.*, 1987, 2004 and Mahajan, 1971).

Table-1. Systematic list of ciliate species recorded from Kolkata wetlands (Classification according to Levine *et al.*, 1980)

Systematic list of species	**Occurrence in Kolkata wetlands**	**Earlier records in India (Ref.)**
Phylum CILIOPHORA		
Class KINETOFRAGMINOPHORA		
Subclass GYMNOSTOMATA		
Order PROSTOMATIDA		
Family HOLOPHRYIDAE		
1. *Holophrya bengalensis* Ghosh	RS, BBJ, SLP	Kol, Raj (Das *et al.*, 1993; Mahajan, 1971)
Family PRORODONTIDAE		
2. *Prorodon discolor* (Ehrenberg)	RS, BBJ, LGP	Kol (Das *et al.*, 1993)
3. *Prorodon teres* Ehrenberg	IMT, LGP, SLP	Kol (Das *et al.*, 1993)
Family TRACHELIIDAE		
4. *Dileptus monilatus* (Stokes)	IMT	Hg, Kol (Das *et al.*, 1993)
Order PLEUROSTOMATIDA		
Family AMPHILEPTIDAE		
5. *Loxophyllum levigatum* Sauerby	RS	S. 24, P. Kol (Das *et al.*, 1993)
6. *Loxophyllum undulatum* Sauerby	RB	Hwh. Kol (Das *et al.*, 1993)
7. *Litonotus fasciola* (Ehrenberg)	BBJ	Kol, Raj (Das *et al.*, 1993; Mahajan, 1971; Piyali and Das, 1977)
Order KARYORELICTIDA		
Family LOXODIDAE		
8. *Loxodes vorax* Stokes	RS	N. 24. P. Kol (Das *et al.*, 1993)
9. *Loxodes magnus* Stokes	RS, IMT	Kol, K. Bhr (Das *et al.*, 1993)
10. *Loxodes striatus* (Engelmann)	RS, IMT, BBJ	Kol, Bnk, Pur (Das *et al.*, 1993)

Systematic list of species	Occurrence in Kolkata wetlands	Earlier records in India (Ref.)
Order COLPODIDA		
Family COLPODIDAE		
11. *Colpoda aspera* Kahl	RS, IMT, LGP	Kol, Mbd (Das *et al.*, 1993)
12. *Colpoda cucullus* Muller	BBJ	Kol, A. P (Das *et al.*, 1993; 2004)
Order NASSULIDA		
Family NASSULIDAE		
13. *Nassula ornata* Ehrenberg	RS, BBJ, LGP	Kol, Darj, Raj (Das *et al.*, 1993; Mahajan, 1971)
Family LEPTOPHARYNGIDAE		
14. *Leptopharynx torpens* (Kahl)	RS, LGP	Kol, Hg (Das *et al.*, 1993)
Order HYMENOSTOMATIDA		
Family PARAMECIDAE		
15. *Paramecium caudatum* Ehrenberg	RS, IMT, BBJ, LGP, SLP	W.B. (all 17 districts), Osa, Raj (Das *et al.*, 1987, 1993; Mahajan, 1971; Piyali and Das, 1977)

(RS-Rabindra Sarovar, IMT-Indian Museum Tank, BBJ-Brace bridge Jheel, LGP-Pond in Lakegarden, SLP-Saltlake pond; Kol-Kolkata, Raj-Rajasthan, HG-Hugli, S. 24. P-South 24 Pargas, Hwh-Howrah, K.Bhr-Kuch Bihar, Bnk-Bankura, Pur-Purulia, Mbd-Murshidabad, A.P.-Andhra Pradesh, Darj-Darjiling, W.B.-West Bengal, Osa-Orissa).

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