



Conservation Area Series, 46

**FAUNA OF
BHADRA
WILDLIFE SANCTUARY
AND
TIGER RESERVE
KARNATAKA**

Zoological Survey of India



Conservation Area Series, 46

**FAUNA OF BHADRA WILDLIFE
SANCTUARY & TIGER RESERVE
(Karnataka, India)**

*Edited by
The Director, Zoological Survey of India, Kolkata*

**Zoological Survey of India
Kolkata**

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CONSERVATION AREA SERIES
FAUNA OF BHADRA WILDLIFE SANCTUARY
AND TIGER RESERVE

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FAUNA OF BHADRA WILDLIFE SANCTUARY : AN OVERVIEW

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INTRODUCTION

Bhadra Wildlife Sanctuary (BWLS) is a conservation area in the Karnataka State of India. It is situated amidst the Western Ghats in Chikkamagaluru and Shimoga districts of Karnataka. The area falls in an almost wholly saucer shaped basin, enclosed within the horse shoe shaped Chandra Drona Hill Ranges (Bababudan Hill Ranges). Tucked away amidst the lofty peaks of the Western Ghats, the Bhadra Wildlife Sanctuary is a Tiger reserve too.

The Sanctuary takes its name from its lifeline, the river 'Bhadra', on which a dam has been constructed in 1967 near Lakkavalli. Tributaries like Somavahini, Thadabehalla and Odirayanahalla originates in BWLS and joins the reservoir. The Wildlife Sanctuary, is situated about 40 km. northwest of Chikkamagaluru town, and is well linked by road and is about 250 km from Bengaluru.

HISTORY

The Bhadra Wildlife Sanctuary was earlier known as Jagara Valley game Sanctuary during the British period (1912-1950). This area was declared as 'Jagara Valley Wildlife Sanctuary' in 1951 by the then government of Mysore vide Government Notification No. A & F. 6175/90/10 FT-112-40-2, dated 21.02.1951, encompassing an area of 77.45 km². The adjacent area, which were rich in wildlife was surveyed and the Sanctuary was reconstituted in the year 1974, as the "Bhadra Wildlife Sanctuary", vide Notification No. AFD-25-FWL-74, dated 6.9.74, covering an area of 492.46 sq. km. as per section 18 of Wildlife (Protection) Act 1972 (Intention), and confirmed under section 26 of Wildlife (Protection) Act 1972, vide notification Fee-58-FW-96, dated 9.3.98. Due to its rich tiger population, BWLS was declared as the 25th Project Tiger of India in 1998. For tourism and other activities, a buffer zone (Table: 1) was earmarked, restricting the entry of tourists to the core region of BWLS.

Table 1: Zones of BWLS	
Zones	Area (km²)
Core	317.46
Buffer	175.00
Total	492.46

PHYSIOGRAPHY

BWLS is situated in the cradle of the hill ranges of Mullayanagiri, Dattapeeta and Kemmanugundi to the northeast and Bhadra reservoir to the northwest and coffee plantations and teak plantations to the south. The south-western and western boundaries of the reserve are defined by the Bhadra River. BWLS stretches in an area of 492.46 sq. km located between 13022'N- 13047'N latitudes and 75029'E- 75047'E longitudes, bordering the districts of Chikkamagaluru and Shimoga. BWLS is divided into three forest ranges (Table: 2), of which Lakkavalli range is the largest and Thanigebyle the smallest. Mountain ranges of Dattapeeta (Bababudan) Hills bisect BWLS into two halves, first lower half is the Jagara Valley (Muthodi Range) and the other being the elevated ranges of Thanigebyle and lower ranges of Lakkavalli. Chandra Drona hill ranges (Bababudan Hill ranges) are the highest in Karnataka which rise to a height of 1927m above m.s.l. One of the peaks, the "Mullayyanagiri" is the highest in Karnataka and also the second highest in South India with an elevation of 6317 ft. The back waters of the Bhadra reservoir in the northwest have a catchment area of 1,968 km². The teak forests in the south and the adjoining plantations open a corridor into the Kudremukh National Park.

Table 2: Names of Forest Ranges in BWLS	
Range	Area (km²)
Muthodi	245.08
Lakkavalli	229.65
Thanigebyle	17.73
Total	492.46

Within a crescent formed by the hills, as well as the Lakkavalli Range, the terrain vary from gently undulating types to hilly ones ranging between 670m to 760m above m.s.l. The hill ranges encompass grasslands and evergreen shola forests. The entire area is dissected by numerous *nullahs* (small rivulets) and several perennial streams, such as Somavahini Halla, Tadve Halla, Wate Halla and Hippla Halla.

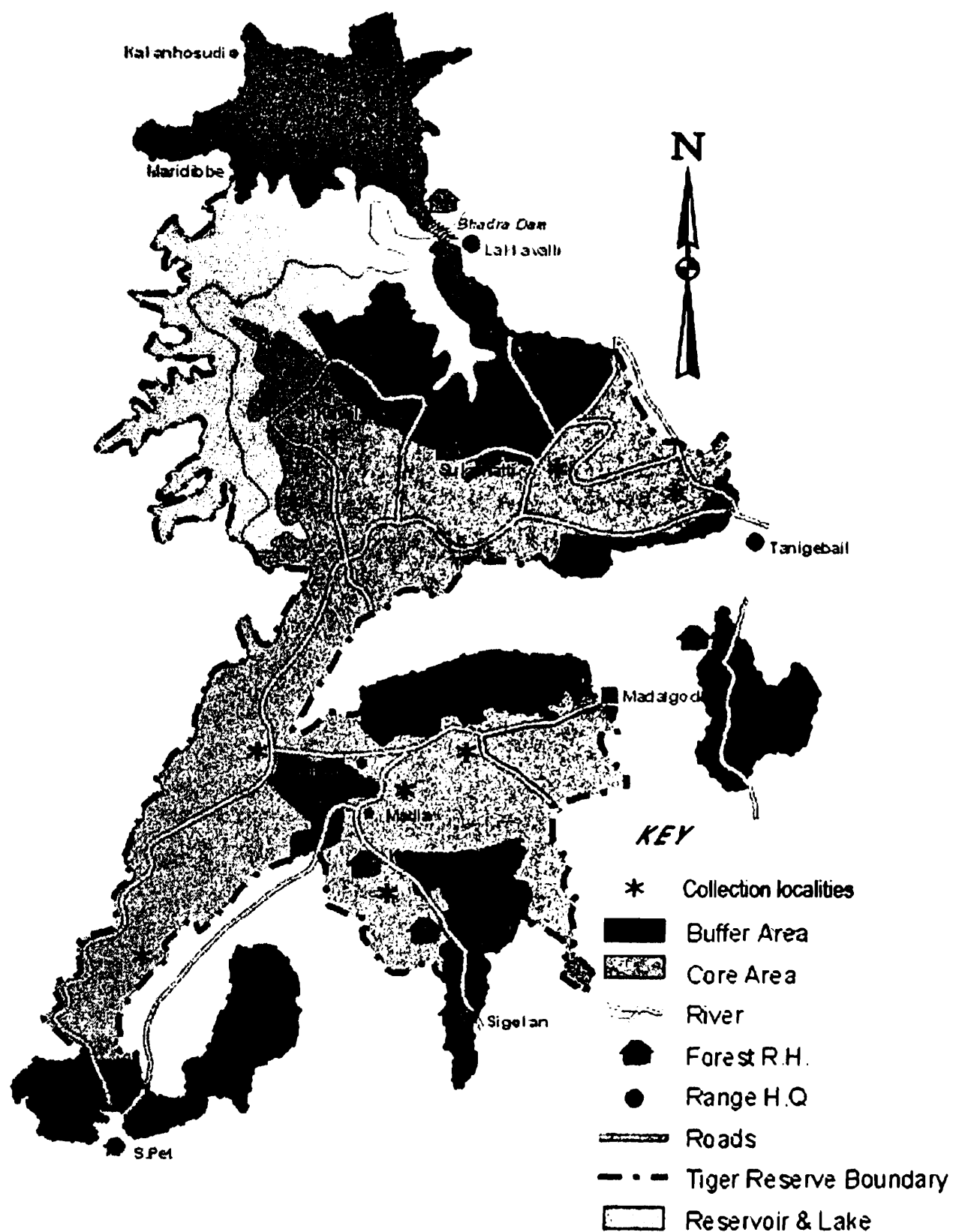


Fig. 1. Map of Bhadra Wildlife Sanctuary indicating collection localities.

VEGETATION

The predominant vegetation in BWLS is of moist deciduous to evergreen forest types (Table: 3) and *shola*-grassland habitat at the higher elevations. Wikramanayake *et al.*, (1999) classified the reserve as tropical moist forest (TMF) in priority category I.

Table 3: Types of forests in BWLS

Forest types	Range
1. Dry deciduous forest	Lakkavalli
2. Moist deciduous forest	Muthodi
3. Semi evergreen forest	Muthodi & Thanigebyle
4. Evergreen forests	Thanigebyle
5. Shola forests	Thanigebyle
6. Grasslands	Thanigebyle

Major portion of BWLS is covered by moist deciduous forests comprising of *Tectona-Dillenia-Lagerstroemia* series (Meher-Homji 1990), corresponding to the Southern Tropical Moist Deciduous Forests in the revised classification by Puri *et al.*, (1983). It gradually merges with the Southern Tropical Dry Deciduous Forests towards the north-eastern edges. The inner slopes of the Kemmanugundi and Bababudan Hill Ranges are covered by grassy downs interspersed with evergreen '*sholas*' (Karanth 1982).

One noteworthy feature of the forests, in both the Muthodi range, as well as the Lakkavalli range areas is the predominant occurrence of bamboo (*Bambusa arundinacea*, in wide belts along streams and *nullahs*). *Dendrocalamus strictus* forms the under storey extensively, and is found throughout the reserve. In addition, *Ochlandra readii* is found along the streams. *Oxytenanthera monostigma* and *O. stocki* are found on the steeper hills within the Muthodi range.

The dominant tree species forming the upper canopy include *Tectona grandis*, *Dalbergia latifolia*, *Terminalia tomentosa*, *T. paniculata*, *T. bellerica*, *Pterocarpus marsupium*, *Adina cordifolia*, *Lagerstroemia lanceolata* and several species of *Ficus*. The middle storey comprises of species such as *Randia dumetorum*, *Embllica officinalis*, *Kydia calcina*, *Wrightia tinctoria*, *Dillenia pentagyna* and *Gmelina arborea*. The northern valley, being dry, has species such as *Anogeissus latifolia* and *Dalbergia paniculata*. Even within the deciduous forests, strips of evergreen vegetation with species like *Syzygium cumini* are seen along the riparian tracts, often extending down into the valley from the *sholas*.

BWLS has, similar to other south Indian deciduous forests (e.g. Nagarhole), low-lying swampy fallows, locally known as '*Hadlus*' (swampy grass lands). These are often perennially moist and covered by luxuriant grass growth. '*Hadlus*' are especially important for large ungulates, and help maintain high densities of grazer species (Karanth and Sunquist, 1992).

Santalum album, *Anogeissus latifolia*, *Tamarindus indica*, *Pongamia glabra*, *Albizia lebbek*, *Stereospermum xylocarpum*, *Cassia fistula*, *Bauhinia malabarica*, *Xylia xylocarpa*, *Phyllanthus emblica*, *Diospyros melanoxylon*, *D. montana* and *Wrightia tinctoria* etc. are the other common tree types found here. The common shrubs found in the sanctuary are, *Helicteres isora*, *Lantana camara*, *Caesalpinia mimosoides*, *Crotalaria pallida* and *Dendrocalamus strictus*. There are many important medicinal plants also reported from the Sanctuary. Some of them are *Bidens pilosa*, *Borreria hispida*, *Rauwolfia serpentina*, *Phyllanthus amara*, *Cassia mimosoides*, *Zingiber cernuum*, *Leucas aspera*, *Leonotis nepetifolia*, *Mimosa pudica*, *Sida acuta*, *S.rhomboidea* and *Urena lobata*.

There are more than 20 species of climbers growing in the Sanctuary; *Dioscorea bulbifera*, *D. glabra*, *D. pentaphylla*, *Ipomoea alata*, *I.palmata*, *Passiflora foetida*, *Nervelia zeylanica*, *Hemidesmus indicus*, *Zizipus oenopla* and *Cryptolepis buchnani* are some of them. In the dry deciduous forests, the canopy is low and trees are more widely spaced.

A big teak tree called "Jagara Giant" with a girth of 5.21 mts and aged about 300 years is one of the attractions of the Sanctuary.

WEATHER

Temperature ranges from 10°C to 36°C. The hottest months are April and May and the coolest, December and January. Annual precipitation, which occurs mainly between June and September due to the south-west monsoon, ranges from 1200 to 2600 mm and some times as high as 2000 to 2540mm (Karanth 1982) in Kemmanugundi areas. The Lakkavalli range, being in the rain shadow receives less rain and the Muthodi range receives heavy rainfall. Wind blows mainly from southwest direction, from which bulk of the rainfall is received in this region. Northeast wind is weak and velocity of wind during February and March is comparatively more. The Sanctuary has more than 200 days of sunny days during winter and summer.

ECOLOGY

Due to good rainfall in the mountain ranges of BWLS, small rivulets are quite common inside the Sanctuary. There are several perennial streams, like Somavahini

Halla, Tadve Halla, Wate Halla and Hippla Halla which flow inside the Sanctuary and join the reservoir with Bhadra River.

GEOLOGY

The topography of the Bhadra sanctuary is such that the Bababudan mountain ranges of the Western Ghats rise rapidly from the Deccan plateau forming crescent shaped mountain ranges. Inside this bowl, the land is gently undulating and the mountain reaches an elevation of 750 to 2100 m. The Mullayanagiri, Bababudan and Kemmanugundi hill ranges have the main underlying rocks and these rocks are roughly classified as,

1. Granite and quartzite giving rise to sandy loam
2. Horne blende trap and haematite, the characteristic rocks of the Bababudans producing soft ferruginous clay loam and
3. Chlorite schist yielding a poor impervious sort of clay

The southern portions of Lakkavalli are abundant in Horne blende, whilst chlorite schist is very conspicuous in the North and West. Horne blende is seen to enclose a narrow stripe of chlorite schist in the centre of Muthodi range.

THREATS AND CONSERVATION ISSUES

BWLS is subject to several pressures, both from the surrounding areas as well as from within its boundaries. One of the serious threats to the Sanctuary is the frequent forest fire. Sometimes, the local people deliberately set fire to the grasslands, in order to facilitate new undergrowth for their grazing cattle and also for encroachment of the forest land.

Due to the promotion of eco tourism, the visitors discarding plastic waste and glass bottles and other non biodegradable waste inside the Sanctuary has become yet another threat. Earlier, mining of Iron ore in Bababudangiri and Kemmanugundi was in practice, however, stopped now.

During summer, coffee estates surrounding BWLS releases coffee pulp from pulping units into the water sources of the Sanctuary, which makes the water non- potable for animals. The effluence has a high organic load, high BOD and COD levels, low pH and high polyphenols. These factors affect the animals within the Sanctuary, which depend on these streams for their water needs. Aquatic fauna are greatly being affected by the effluents.

Growing human population in the 26 villages that are adjacent to the Sanctuary having livestock population is a serious threat to BWLS in terms of cattle grazing and

spread of disease to wild animals. During the 1989-1999 livestock carried foot and mouth disease to the herbivores in the Sanctuary; rinderpest wiped out most of the Gaur population, which numbered more than a thousand to a few hundreds. With the proactive programs of inoculating the local cattle, population of Gaur is again on the rise.

Residents of the villages extract several forest products such as *Acacia sinuata* pods, honey, firewood and bamboo from the reserve. Timber poaching is another serious problem, and is intense in the areas adjacent to villages.

The relocation and resettlement of people from protected areas is still a controversial issue. These problems continue despite the concerted efforts of the Forest Department and conservation oriented NGO's. Successful conservation resettlement requires financial support to meet people's socio-economic needs, active consultation of the people involved, and partnerships of committed non-governmental and governmental organizations. The State Forest Department has recently initiated a relocation program for the villages within the reserve, with the active and enthusiastic participation of the residents. The relocation programme of residents of BWLS is considered as one of the best compared to the other relocation programmes of protected areas in India.

FAUNAL EXPLORATIONS

The fauna of the Sanctuary is not well studied. Information available on the fauna of BWLS is restricted to the major wildlife. Karanth (1981) first initiated the documentation of fauna with a focus on endangered ecosystem of BWLS. Population estimation for large herbivores was carried out by Ahrestani (1999) and Karanth and Nichols (2000). In 2006 Hegde and Ramakrishna documented the faunal diversity of BWLS based on the published literature. There are unpublished works done by Wildlife Institute of India (WII), Botany and Zoology departments of Kuvempu University and data accumulated by naturalists in internet based 'blogspots'

Zoological Survey of India (ZSI), Western Ghat Regional Centre (WGRC), Calicut, under the Action Plan programmes (2006-2009) concerning the explorations/surveys of Conservation areas for the purpose of inventorying, monitoring and documentation of the faunal wealth of the protected areas, conducted faunistic survey programmes in Bhadra Wildlife Sanctuary. Accordingly, major field explorations were conducted from 4th November to 16th November 2006; 14th November to 22nd November 2007; 25th February to 5th March 2009. Quite a few seasonal amphibian explorations were also conducted in the Sanctuary during 2006 to 2009.

The survey team explored varied stretches of habitats representing forested, non-forested, grasslands, sholas, modified and degraded areas covering representative areas of the BWLS (Fig.1 and Table 4).

Table 4: Names of the localities surveyed in BWLS

Date	Place of visit	Forest range
041106	Sukhalhatti guest house	Lakkavalli
051106	Saavae camp	Lakkavalli
061106	Aldaru/Chavadikattae	Lakkavalli
071106	Bhadra dam site area	Lakkavalli
081106	Kesaruhalla	Thanigebyle
091106	Kemmannugundi/Dattatreya Peeta	Thanigebyle/Muthodi
111106	Seeghekan guest house/Tadabe halla	Muthodi
121106	Hebbae halla/Hipla camp/Hebbae camp	Thanigebyle/Muthodi
131106	Kadubailu/Hebbae falls/Sirgola road	Thanigebyle
141106	Halasinakhan/Sethallayanagiri/Mullayyanagiri	Muthodi
151106	Kesavae camp/Madla	Muthodi/Thanigebyle
161106	Raashigudda	Muthodi
141107	Kelakunthi	Muthodi
151107	Valepura	Muthodi
161107	Talabidri	Muthodi
171107	Shirgola forest	Hebbae/Muthodi
181107	Kodhi	Hebbae/Muthodi
191107	Thegadagudda	Hebbae/Muthodi
201107	Kavalapura	Lakkavalli
211107	Kundur	Lakkavalli
221107	Virupakshikhan	Thanigebyle
250209	Avathi/Mallandur	Muthodi
260209	Singanamane/Lakkavalli	Lakkavalli
270209	Mavinahalla/Hosahalli	Lakkavalli
280209	Mosalaekavu/Mathikerae/Centralgudda	Lakkavalli
010309	Mosalaekavu (Boating	Lakkavalli
020309	Holaerayanahalla/Lalbaghkathri	Thanigebyle
030309	Kabbinnasethuvahalla/Kemmanugundi	Thanigebyle

PLATE – I



Bhadra Dam at Lakkavalli



Mullayanagiri Hills



Hebbae Water falls



Moist deciduous forest
patch at Kesave



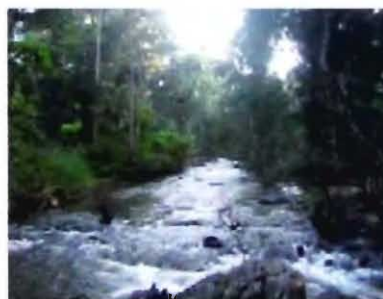
Evergreen patch
at Kemmanagundi



Shola forests at
Bababudangiri Hills



A distant view of
Muthodi forest range



Somavahini river
at Muthodi



Kudirae Abbae falls



A forest Pond at Kelakunthi



Bhadra reservoir



A panoramic view of
Bhadra reservoir

Major Habitat Types in Bhadra Wildlife Sanctuary & Tiger Reserve

PLATE – II



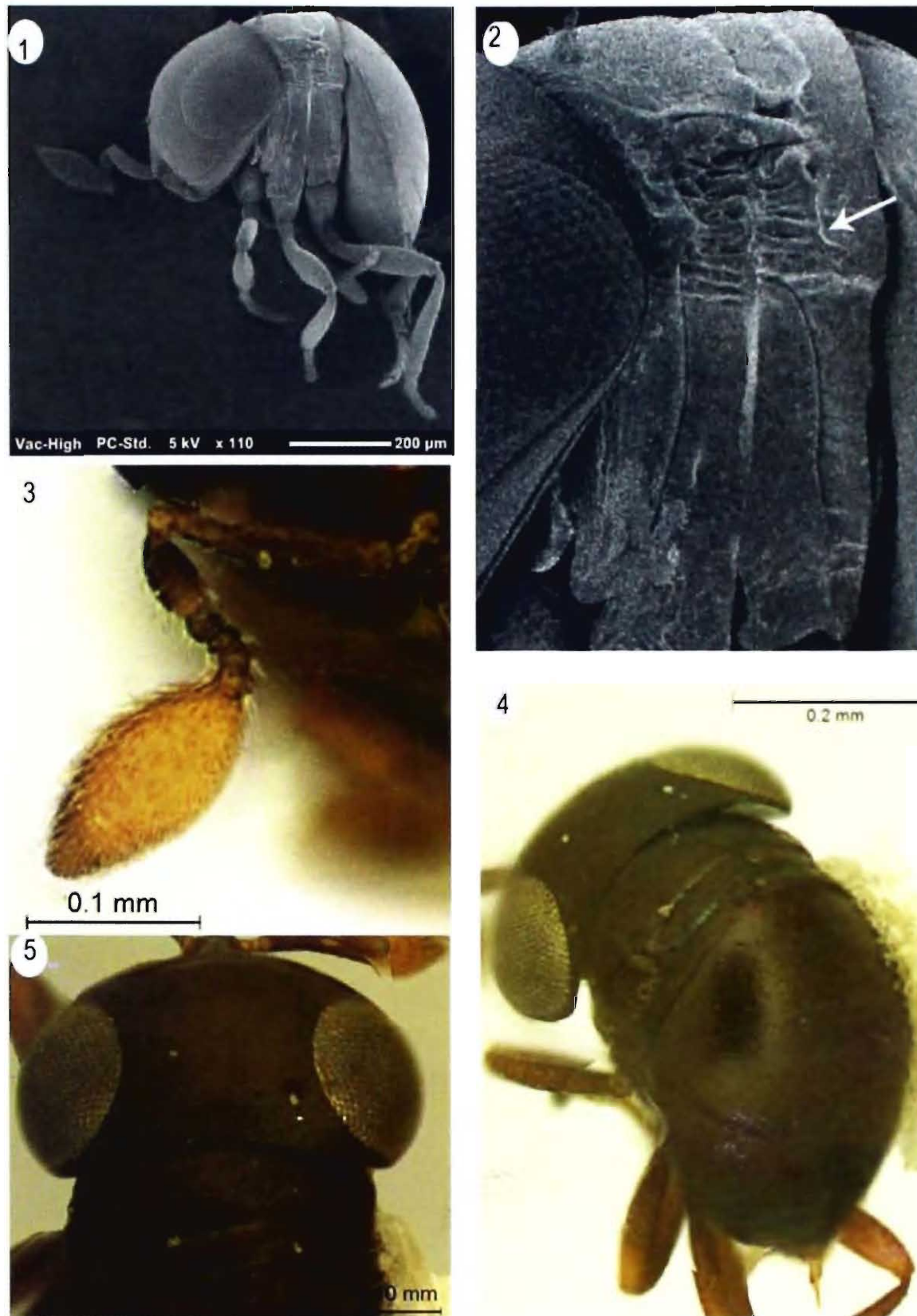
Cattle grazing at Lakkavalli area



Forest fire at Kemmanagundi

Major Threats to Bhadra Wildlife Sanctuary & Tiger Reserve

PLATE – III

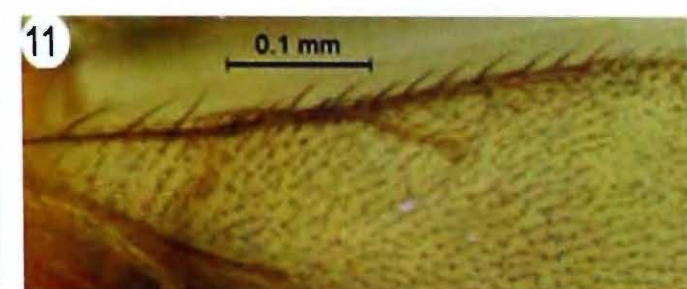
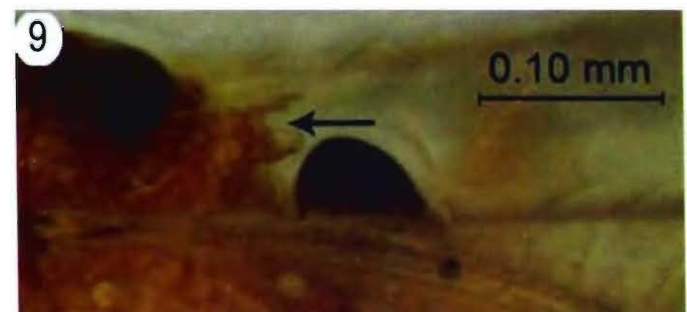
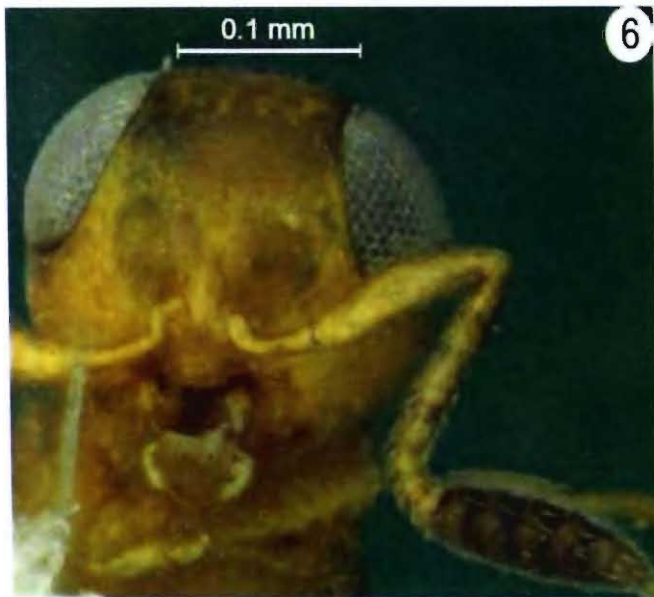


1. Body (profile); 2. Mesosoma (profile); Crescent shaped carina (arrowed);

3. Antenna; 4. Body (dorsal view); 5. Head (dorsal view)

Platygastridae (Hymenoptera) of Bhadra Wildlife Sanctuary & Tiger Reserve
Figs. *Baeus primitus* sp. nov. Female.

PLATE – IV



6. Head (Front view) and Antenna; 7. Body (dorsal view); 8. Head and Mesosoma;
9. Metascutellar lamina and T1 dorsal horn; Metascutellar lamina (arrowed);
10. Metasoma; 11. Forewing veins

Platygastridae (Hymenoptera) of Bhadra Wildlife Sanctuary & Tiger Reserve
Figs. *Calotelea laminaris* sp. nov. Female.

PLATE – V



12. *Calliscelio indicus*



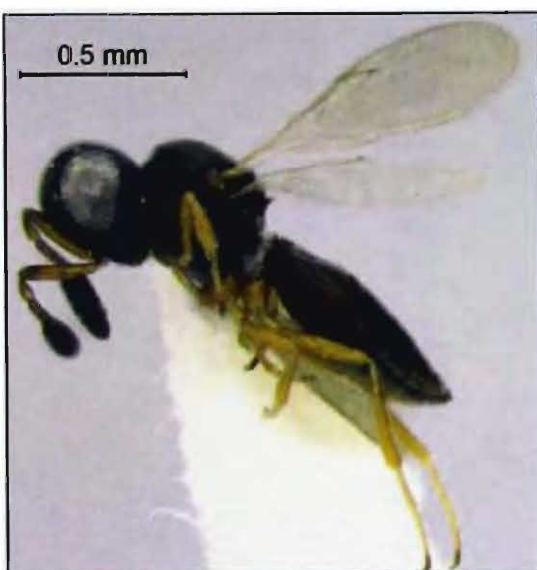
13. *Ceratobaeus longituberculata*



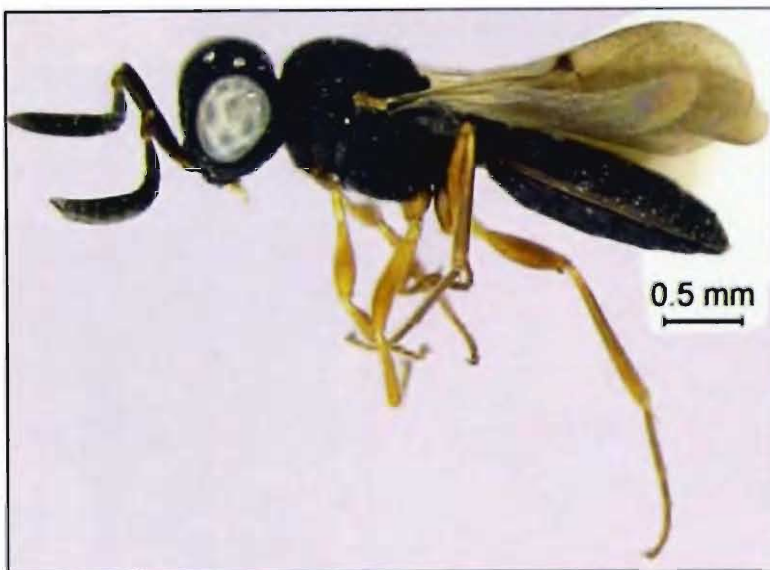
14. *Duta indica*



15. *Palpoteleia indica*



16. *Psilanteris coricea*



17. *Scelio spinifera*

Platygastridae (Hymenoptera) of Bhadra Wildlife Sanctuary & Tiger Reserve

PLATE – VI



18. *Trimorus lamachus*



19. *Trimorus dubarensis*



20. *Trimorus nilamburensis* (Male)



21. *Trimorus nilamburensis* (Female)



22. *Paratelenomus saccharalis*

PLATE – VII



1. *Basalys karnatakensis*



2. *Basalys nilgiriensis*



3. *Captera curvata*



4. *Entamacis keralensis*



5. *Entomacis linealis*



6. *Entamacis spinosus*



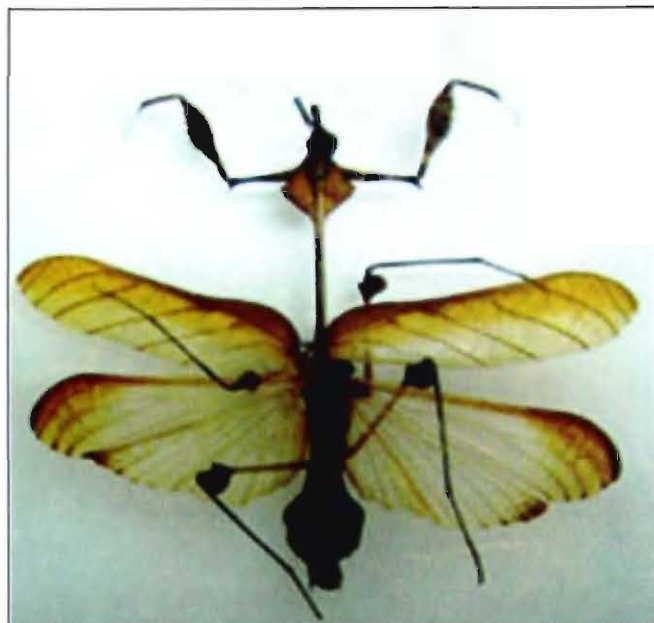
7. *Spilomicrus manii*

Diapriidae (Hymenoptera) of Bhadra Wildlife Sanctuary & Tiger Reserve

PLATE – VIII



Deiphobella laticeps



Gongylus gongylodes



Leptomantella (L) parva



Hierodula membranacea

PLATE – IX



Euphaea fraseri



Trithemis festiva



Neurobasis chinensis



Agriocnemis pygmaea



Vestalis gracilis



Trithemis pallidinervis



Trithemis aurora



Pantala flavescens



Orthetrum sabina



Neurothemis tullia



Neurothemis fulvia



Crocothemis servilia

PLATE – X



Toothed Sunbeam *Curetis acuta*



Pointed Ciliate Blue *Anthene lycaenina*



Common Hedge Blue *Acytolepis puspa*



Plain Hedge Blue *Celastrina lavendularis*



Transparent 6 Line blue *Nacaduba kurava*



Tailless Line blue *Prosotas dubiosa*



Indian Cupid *Everes lacturnus*



Forget-me-not *Catochrysops strabo*



Plum Judy *Abisara echerius*



Nilgiri Tiger *Parantica nilgiriensis*



Madras Ace *Halpe honorie*



Pygmy Scrub Hopper *Aeromachus pygmaeus*



Tamil Yeoman *Cirrichora thais*



Common Leopard *Phalanta phalantha*



Common Nawab *Polyura athamas*

Some Butterfly Fauna of Bhadra Wildlife Sanctuary & Tiger Reserve

PLATE – XI



Cormocephalus dentipes



Rhysida lithobioides paucidens



Rhysida lithobioides trispinosus

PLATE – XII



Barilius canarensis



Barilius bakeri



Garra mullya



Devario malabaricus



Pseudambassis ranga



Bhavana australis



Ompok bimaculatus



Channa gachua

PLATE – XIII



Duttaphrynus melanostictus



Euphlyctis cyanophlyctis



Fejervarya caperata



Minervarya sahyadris



Micrixalus saxicola



Nyctibatrachus dattatreyaensis



Hylarana temporalis



Indirana beddomii



Raorchestes chromasynchysi



Raorchestes luteolus



Raorchestes tuberochumerus



Rhacophorus lateralis

PLATE – XIV



Malabar Pit Viper, *Trimeresurus malabaricus*



Shield Tail, *Uropeltis* spp.



Russel's Viper, *Daboia russelii*



Indian Monitor Lizard,
Varanus bengalensis



Roux's Forest Lizard,
Calotes rouxi

PLATE – XV



Indian Grey Hornbill, *Ocyeros birostris*



Brahminy Kite, *Haliastur indus*



Dusky Crag Martin, *Hirundo concolor*



Grey-headed Flycatcher, *Culicipa ceylonensis*



Small Pratincole, *Glareola lactea*



Great Stone Plover, *Esacus magnirostris*



Large Pied Wagtail, *Motacilla maderaspatensis*



Indian Peafowl, *Pavo cristatus*



River Tern, *Sterna aurantia*



White-browed Bulbul, *Pycnonotus luteolus*

Some Birds of Bhadra Wildlife Sanctuary & Tiger Reserve

PLATE – XVI



Stripe-necked Mongoose, *Herpestes vitticollis*



Indian Wild Dog, *Cuon alpinus*



Spotted Deer, *Axis axis*



Elephant, *Elephas maximus*



Bonnet Macaque, *Macaca radiata*



Common Langur, *Semnopithecus entellus*



Three-striped Palm Squirrel, *Funambulus palmarum*



Malabar Giant Squirrel, *Ratufa indica*

Some Mammals of Bhadra Wildlife Sanctuary & Tiger Reserve

Altogether 11 faunal groups were studied. The study brought out information on 642 species under 439 genera. Of these, 2 species turned out to be new to science, 171 new records for the Sanctuary and 16 new records for the Karnataka State (Table 6). During the surveys, a new species of Amphibia (*Nyctibatrachus dattatreyaensis*) was also discovered and the description published elsewhere (Dinesh *et al.*, 2008)

The faunal exploration made in the Bhadra Wildlife Sanctuary (BWLS) is not exhaustive. The studies made may constitute only a portion of its faunal wealth and diversity. Even so, the findings present an overall picture of the faunal composition of the area, also adding much to the existing knowledge.

Table 6: Number of families, genera and species identified

Sl. No	Faunal groups	No. of families	No. of Genera	No. of species	Remarks
1	Insecta: Hymenoptera: Platygastridae	1	10	13	2 sp., new to science; 13 spp., new records for BWLS & 5spp. new records for Karnataka State
2	Insecta: Hymenoptera: Diapriidae	1	4	7	7 spp., new records for BWLS & 5spp. new records for Karnataka State
3	Insecta:Mantodea	4	5	5	5 spp.,new records to BWLS and 3 spp., new records to Karnataka State
4	Insecta:Odonata	10	27	37	All the 37 spp, new records for BWLS
5	Insecta:Lepidoptera: Rhopalocera	5	109	165	66 spp., new records for BWLS
6	Chilopoda:	1	2	4	4 spp., new records to BWLS and 2 spp., new records to Karnataka State
7	Pisces	7	23	28	
8	Amphibia	8	16	30	20 spp., new records for BWLS
9	Reptilia	14	32	39	6 spp., new records for BWLS
10	Aves	55	176	273	21 spp., new records for BWLS
11	Mammalia	21	35	41	4 spp., new records for BWLS
Total		128	439	642	2 species new to Science; 171 new records for BWLS and 16 new records for Karnataka.

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INSECTA: PLATYGASTRIDAE (HYMENOPTERA : PLATYGASTROIDEA)

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INTRODUCTION

The superfamily Platygastroidea is the third largest of the super families of parasitic Hymenoptera after Chalcidoidea and Ichneumonoidea (Rajmohana, 2007a) in India. The superfamily Platygastroidea comprises of four subfamilies namely Scelioninae, Teleasinae, Telenominae and Platygastriinae (Sharkey, 2007). As per the known host records, the first three are exclusively egg parasitoids attacking a wide range of hosts including various insect orders (Lepidoptera, Hemiptera, Diptera, Neuroptera, Coleoptera, Odonata, Mantodea etc.) and also the araneid group of spiders. Platygastriinae are egg-larval parasitoids of mainly egg/early stages of cecidomyiid diptera and also the immature stages of Homoptera.

A taxonomic treatment of Platygastroidea of Bhadra Tiger reserve (Karnataka) is presented here based on a collection made by net sweeping, malaise trapping as well as by setting up yellow pan traps. A total of 13 species under 10 genera have been identified (9 Scelioninae, 3 Teleasinae and 1 Telenominae), of which two species in Scelioninae, viz. *Baeus primitus* and *Calotelea laminaris* have been described as new to science. 5 species are reported for the first time from Karnataka. All the 13 species are first reports from Bhadra WLS and TR. This study also reports for the first time the female of *Trimorus nilamburensis* Mukerjee of the subfamily Telaeasinae. Species analysis of a few large genera like *Telenomus* Ashmead, *Gryon* Haliday and *Macroteleia* Westwood which were also represented in the collections will be dealt separately elsewhere.

Morphological terminology follows Masner (1979, 1980), Johnson (1996), Mikó et al. (2007), Stevens and Austin (2007). Digital imaging was carried out using Leica M205A stereomicroscope and Leica DFC-500 digital camera. SEM imaging was done with 2 micron gold coating, in Jeol JCM-5000 NeoScope Bench-top SEM.

The material studied has been deposited in the National Zoological Collection, at Zoological Survey of India, Calicut.

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[As per the ICZN norms, the designated Type specimens have to be given a unique Identification number (ID no) and that information should be included in the publication. Accordingly the Reg nos, also serving as the ID no of the holotypes of a few Scelioninae described earlier by the same author that were not included in their respective literature (Rajmohana, 2007a and 2007b), are hereby provided.

Duta polita Rajmohana: ZSI/WGRS/I.R-INV.1990, *Paridris armigera* Rajmohana: ZSI/WGRS/I.R-INV.1991, *Psilanteris coriacea* Rajmohana: ZSI/WGRS/I.R-INV.1992, *Psilanteris ferruginus* Rajmohana: ZSI/WGRS/I.R-INV.1993, *Psilanteris orbitus* Rajmohana: ZSI/WGRS/I.R-INV.1994 (in Rajmohana 2007a) and *Duta tuberculata* Rajmohana, ZSI/INV/G/20 (in Rajmohana, 2007b].

Geographical coordinates of collection localities:

Kesaruhalla: Muthodi Forest Range (Lat.13°36.42'N and Long. 75°40.40'E), Saavae (Lat.13°34'.60 N and Long.75°35' 70 E), Hipla (Lat.13°30.69'N and Long. 75°36.97'E), Bhadra Dam site (Lat.13°42.54'N and Long. 75°37.97'E), Malda (Lat.13°29.52'N and Long. 75°36.75'E).

Abbreviations: HL-Head Length; HW-Head Width; F1 to F10- Flagellar segments 1 to 10; Length-L, Width-W; OOL-Ocellocular length; OD-Ocellar Diameter; POL-Post Ocellar length; T1 to T7 - Metasomal tergites 1 to 7.

SYSTEMATIC ACCOUNT

Order HYMENOPTERA
Superfamily PLATYGASTROIDEA
Family PLATYGASTRIDAE
Subfamily SCELIONINAE

***Baeus primitus* sp. nov.**

Plate III, (Figs.1-5)

Holotype: Female. Length =0.94mm.

Head and body dark reddish brown, propodeum paler than rest of body; posterior margin of mesoscutum, mesoscutellum and metasomal tergite 2 with a brownish black band; legs and antennae yellow with dark colouration dorsally.

Head: In dorsal view (L:W=30:61), 2x as wide as long, 2.8x as wide as inter-ocular distance and 1.35x wider than mesosoma; lateral ocellus nearly touching posterior margin of eye; posterior ocellar line 1.2x inter-ocular distance; vertex finely coriaceous; pilosity sparse; hyperoccipital carina distinct along dorsal-posterior margin of vertex; posterior eye margin touching hyperoccipital carina on lower corner, frons rounded; antenna 7-segmented, with 4 funicular segments, F1 longest among F1-F4 and nearly 2x F2 length.; F2-4 minute, subequal and transverse; claval segmentation not distinct, densely pilose, scape not reaching to median ocellus; frontal carina incomplete, not reaching to 0.5 distance to median ocellus; antenna inserted well below ventral margin of eyes, between ventral margin of frons and dorsal margin of clypeus; mandibles tridentate; dorsally frons coriaceous; eyes large, eye height about 3x the distance between upper and lower carinae on gena (in lateral view); malar sulcus indicated; malar region with cristulations emanating from anterior tentorial pits, not extending more than level of lower eye margin; also extending less than one third on genal area; in posterolateral view, anterior and posterior genal margins parallel medially; anterior genal margin in contact with 0.55 of ventral eye margin length.

Mesosoma: In dorsal view, (L:W= 25:45), compact and transverse; length 0.55x its width; mesoscutum length 0.5x its width, 0.7x mesosoma length and >2x mesoscutellar length; mesoscutellum 1.4x propodeum length; mesoscutum and mesoscutellum coriaceous, latter with a paler sculpture than former; both with a nearly smooth band on posterior margins; mesoscutellum transverse, with 2 rows of sparse setae separated by more than their length, metascutellum not visible; posterior surface of propodeum vertical, dorsal surface forming thin transverse band and without much sculpture; its posterior margin extending over anterior margin of T2; pronotum visible only laterodorsally and with a minute protuberance on dorsoposterior corner; sculpturing on dorsal mesopleuron distinctly scrobiculate, sculpturing of propodeum anterior to spiracle scrobiculate, region posterior to spiracle smooth, but faintly carinulate; dorsolateral propodeum bearing distinct, but incomplete crescent-shaped ridge running from ventral margin of propodeal spiracle and extending on lateral propodeum; area in front of ridge with fine carinae; propodeal spiracle small; posterior margin of metapleuron curving dorsomedially, dorsal extent of suture equal to level of anterolateral margin of T2; both fore and hindwings reduced to minute sclerotized plates, a little larger than tegula; coxae large, anterior surface densely covered with stout bristles; legs longer than mesosoma and metasoma combined, hind leg longest; hind femoral spine not distinct.

Metasoma: In dorsal view (L:W=57:37); short, broadly abutted against vertical posterior surface of propodeum; T1 not visible dorsally; T2 largest tergite, 1.2x as long as wide and occupying 0.8 of dorsal surface of metasoma, with a tinge of a broad band posteriorly, band as long as length of T3; T2 with coriaceous sculpturing not as distinct

as that on vertex and anterior mesosoma, sculpture gradually disappearing and becoming smooth towards posterior; T3 with 2 rows of setae with same arrangement as on mesoscutellum; T3 nearly 3x T4 length; T3 and T4 appearing smooth; T5 broadly triangular, with rich and fine pilosity as on antennal clava; laterotergites wide, ventral margins free, not incised into a submarginal groove.

Male: Unknown.

Variation: The level of development of crescent shaped ridge is variable. The ridge extends to posterior margin of lateral propodeum in the paratype, while it extends only till midpoint of lateral propodeum in the holotype.

Etymology: Being the first species to be described under *Baeus* from India, the species is named '*primitus*' ('*primitus*' in Latin = for the first time).

Material examined: Holotype Female: (Reg. no). ZSI/INV/BH/2, from Lakhavalli: Muthodi Forest range, collected in Yellow pan trap, on 7.xi.2006, by Rajmohana K.

1 Paratype (female) Reg no. ZSI/INV/BH/3 with same data as that of the Holotype.

Remarks: Though *Baeus* Haliday, (egg parasitoids of spiders) has been reported earlier from India, no species has formally been described. *B. primitus* sp. nov. is the first species to be described from India under *Baeus*.

Discussion: *Baeus senus* Kozlov & Lê (1988) is the only species described from Oriental Region. *B. senus* is based on a male, while *B. primitus* sp. nov. described here is based on a female. Since the taxon exhibits a very high degree of sexual dimorphism, a detailed comparison of both the species is not possible. However as per the original description, the vertex of *B. senus* is carinate, while that of *B. primitus* is non carinate. *B. primitus* is much similar to the Australian species, *B. leai* Dodd, in the presence of a crescent shaped ridge on lateral propodeum, in posterior eye margin touching hyperoccipital carina, and in the reduction/absence of femoral spine (Stevens & Austin, 2007). Both the species differ in many characters as follows:

Mesoscutellum and T3 dorsally with 2 rows of setae in *B. primitus*, (only one row in *B. leai*), gena is much narrow in *B. primitus* than in *B. leai*. Dorsal head width is nearly 3 xs inter ocellar distance in *B. primitus*, while it is only 2x in *B. leai*. Both the species also differ in general sculpturing of metasoma and in comparative proportions of tergites.

2. *Calotelea laminaris* sp. nov.

Plate IV, (Figs. 6-11)

Holotype. Female. Length= 1.3mm; xanthic species, predominantly honey yellow, except as follows; tips of mandibles brown; eyes silvery; area surrounding ocelli with a

black tinge; vertex in front of anterior ocellus with dark irregular patches; scutellar plate with a black tinge medially; two parallel longitudinal brown streaks on notaular area of mesoscutum, on area of humeral sulcus and a similar one medially; dorsal median horn on T1, lateral T2 and T7 blackish brown, rest of metasoma pale whitish yellow to brownish yellow; antennal radicle, scape, pedicel, flagellar segments and basal claval segments pale whitish brown; rest of claval segments deep honey brown, legs including coxae whitish yellow; forewings slightly infusate with a pale transverse colouration in area of basal vein.

Head (HL: HW= 15:35); wider than long, frons and vertex with delicate coriaceous microsculpture; pubescence on head extremely sparse, except a few long ones on lower clypeus; frons hardly with any smooth area medially, central keel distinct, extending to a level midpoint to level of orbits; eyes glabrous, placed high in (lateral view) eye length : malar length (in lateral view)= 9:7; gena with faint radiating striae, clypeus narrow, basal border feebly convex; minimal distance between inner orbits a little less than eye length (18:21); malar sulcus distinct and of uniform width throughout; mandibles tridentate, teeth almost equal; ocelli situated high on vertex; lateral ocelli nearly contiguous with inner orbits; OOL: OD: POL= 1:2:13; occipital carina complete and crenulate; temples bulging laterally in dorsal view ; antenna 12 segmented, with a distinct 6 segmented club; radicle very long, nearly 0.5x length of scape; scape as long as length of following 3 segments combined; F1 longer than F2 but smaller than pedicel; antennal segments in relative proportions (length: width): (23:7); (11:5), (8:5), (6:4), (2:4), (2:4), (3:5), (4:7), (5:8), (5:8), (5:8), (7:7).

Mesosoma: In Dorsal view L:W=29:25, subequal to width of head; mesoscutum and mesoscutellum with coriaceous microsculpture as on vertex; skaphion not distinct; humeral sulcus foveolate; with a very few long setae on mesoscutum (<10pairs) and (<3 pairs) on mesoscutellum; scutoscuteellar sulcus extremely narrow medially and much wider and costate laterally; lower margin of mesoscutellum foveolate and protruding out; metascutellum finely striate longitudinally; metascutellar lamina almost upright, transparent, deeply excavate medially, lateral corners transformed into transparent lobes; propodeum medially emarginate; lateral triangular area with fine rugulose punctae; anterior margin of pronotum between fore coxa and cervix without foveae; netrion prominent with foveolate anterior border; mesopleural carina absent; meso and metapleuron with much sparse pubescence; with much reduced sculpture; a row of prominent fovea bordering mesepimeral sulcus separating mesepisternum with mesepimeron; course of metapleural carina indicated by a row of fovea. Forewing narrow (L: W= 31:9); postmarginal vein (*pm*) a little more than 2x length of marginal vein (*m*); stigmal (*stg*) vein longer than marginal (*m*: *stg*: *pm* = 8:11:21).

Metasoma (L: W= 74:21); In dorsal view, 1.76x as long as head and mesosoma combined; T1 with perfectly smooth and shiny small horn anteriorly on its dorsomedian,

rest of T1 with strong longitudinal striations; T2 transverse, longitudinally striate only medially at its base half; striae merging gradually to fine reticulations laterally and towards lower margin; T3 transverse, with net-like even reticulations, with no longitudinal elements; T4 transverse, reticulated as on T3; T5 with much finer reticulation than T4; T6 also transverse, but with even finer reticulations; T7 narrow elongate; T3-T7 with dense fine pubescence compared to that on basal tergites extremely sparse; relative proportions (L:W) of metasomal tergites T1 to T7 being (17:21), (23:29), (30:32), (20:30), (12:20), (8:11), (8:7).

Male: Unknown.

Etymology: The species is named '*laminaris*' due to the well developed lamina on metascutellum.

Material examined: Holotype. Female (Reg. no). ZSI/INV/BH/1. Kesaruhalla: Muthodi Forest Range. Malaise trap, collected by Rajmohana on 10.x.2006.

Discussion: 4 species of *Calotelea* namely *C. auriventria* Sharma, *C. immaculata* Sharma, *C. indica* Mani and *C. tanugatra* Narendran have been known from India (Johnson, 2010). *C. laminaris* sp. nov. keys to couplet no 4 in the key to Oriental species of *Calotelea* by Narendran (1998) and to couplet no 3 in key to Indian species by Rajmohana (2006). The species is close to *C. indica* Mani. But *C. indica* does not have any banding pattern on mesoscutum, T3-T7 is smooth and post marginal is absent in the forewing, unlike the new species described here.

C. laminaris sp. nov. is distinct from all the known Oriental species by a combination of characters - xanthic colouration of the habitus, faint radiating striae on cheeks, finely coriaceous frons, vertex, mesoscutum and mesoscutellum, distinct banding pattern on mesoscutum, a prominent medially excavated transparent vertical metascutellar lamina, $pm > 2x$ length of m , T1 anteriorly with a small dorsal hump, T1 and T2 with longitudinal striated, striae on T2 prominent only on anterior half and T3-T7 with fine reticulations.

3. *Calliscelio indicus* Narendran and Ramesh Babu, 1999

Plate V, (Fig.12)

Calliscelio indicus Narendran & Ramesh Babu, 1999: 2, 6. Original description.

Female. Length= 1.8mm. Head black; rest of body honey brown, brownish black towards metasomal tip; wings faintly infuscated; basalis present; eyes with scanty pubescence, visible only in $> 50X$ magnification.; malar sulcus distinct; lateral ocelli close to inner orbital margin; antenna 12 segmented with a 5 segmented clava; F1 longest among flagellar segments; notauli complete; metascutellum and propodeum unarmed;

T1 with a dorsal horn, smooth antero dorsally, longitudinally striate to lower area; T2 longest among metasomal tergites; longitudinal striae on T2 extending almost to its half medially, but receding laterally.

Male: Unknown.

Material examined: 2 females Saavae, 5.xi. 2006, collected by Rajmohana.

Distribution in India: Kerala and Karnataka.

Remarks: The species is reported here for the first time from Karnataka.

4. *Ceratobaeus longituberculata* Mukerjee, 1981

Plate V, (Fig.13)

Ceratobaeus longituberculata Mukerjee, 1981: 30. Original description.

Female. Length= 1.6mm

Head and body honey brown; mesonotum medially with a black tinge; ocelli black; wings hyaline; metasomal horn black towards tip; gena with fine striae radiating from mandibles; eyes with very fine pubescence; lateral ocelli almost touching orbital margin; occipital carina complete; antenna 7 segmented; clava large, unsegmented; pedicel distinctly longer than any of funicular segments; notauli absent; T1 and T2 longitudinally striate; rest of tergites with matt sculpture; horn on T1 long, a bit tapering towards tip, slender, extending upto lower border of medially emarginate scutellum. T2 longest among tergites.

Male: Unknown.

Material examined: 2 females. 12. xi. 2006. Hipla: Hebbae camp, collected by K.G Emiliyamma.

Distribution in India: Karnataka.

Remarks: Members of *Ceratobaeus* Ashmead are parasitic on eggs of araneid spiders.

5. *Duta indica* Mukerjee, 1994

Plate V, (Fig. 14)

Duta indica Mukerjee, 1994: 19. Original description.

Female. Length=1.2mm.

Body honey brown except T1 and basal T2 being brownish black; head and body smooth and shiny; coriaceous sculpture close to anterior ocellus; eyes with fine pubescence; lateral ocelli close to orbital margin; malar sulcus narrow; antenna 12 segmented;

F1 and F2 elongated and subequal to pedicel; skaphion distinct; notauli complete; diverging in front; metascutellum and propodeum unarmed; No dorsal horn on T1; longitudinal striae on T1 complete, while extending only to half length on T2; wings uniformly infuscated light brown; post marginal nearly 3x stigmal; basalis also indicated.

Material examined: 2 females. Lakhavalli: Bhadra Dam site: 5.xi.2006, collected by Rajmohana in Yellow pan trap.

Distribution in India: Uttaranchal and Karnataka.

Remarks: This species is reported here for the first time from Karnataka.

6. *Palpoteleia indica* Mukerjee, 1994

Plate V, (Fig. 15)

Palpoteleia indica Mukerjee, 1994: 12. Original description.

Length= Female 1.2mm. Male: 1.18mm.

Head and body brownish black to black, T1 yellowish brown; wings sub hyaline; with dense pubescence; blisters silvery ; head, mesosoma except scutellum and T3-T6 with fine reticulate sculpture throughout; head and mesosoma with semi erect setae; malar sulcus distinct; a pair of small transparent blister like structures of unknown function distinct on either sides of mandibles on gena; eyes with long pubescence; lateral ocelli not very close to orbits; antenna 12 segmented, club 5 segmented; F1 longer than rest of flagellar segments, but shorter than pedicel; notauli complete and deep, highly diverging in front; metapleuron laterally with dense fine whitish hairs; longitudinal striae on T1 and T2 extending throughout; post marginal of forewing nearly 2x stigmal vein.

Material examined: 2 females and 1 male; 2 females on 5.11.2006, Saavae and 1 male on 7.xi.2006, from Lakhavalli: Bhadra Dam site by Rajmohana.

Distribution in India: Uttaranchal, Karnataka

Remarks: Though originally described from Uttaranchal, this is a commonly encountered species both in forest as well as in agroecosystems in South India. The species is reported here for the first time from Karnataka.

7. *Psilanteris coriacea* Rajmohana, 2007a

Plate V, (Fig. 16)

Psilanteris coriacea Rajmohana .K, 2007a: 57, 64. Original description.

Length: Female= 1.4mm. Male=1.4mm.

Body robust head and body; brownish black to black. Head and mesosoma with fine coriaceous sculpture; eyes large with fine minute pubescence, visible at >50x only; vertex with dense and finely coriaceous than on dorsal mesoscutum; posterior ocelli nearly contiguous to lateral orbital margin, hardly separated by half its diameter; antenna 12 segmented with a massive 6 segmented clava; F1 longest among flagellar segments, but smaller than pedicel; skaphion distinct, with coriaceous sculpture as on mesoscutum; notauli complete, though faintly represented at times; metascutellum with a triangular spine medially; T1 and T2 with longitudinal striae, extending throughout; T3-T6, finely coriaceous.

Material examined: 3 females and 1 male.

1 Male. Lakhavalli: Bhadra Dam site 7.xi.2006. Yellow pan trap, ; 2 Females in Malaise trap from the same area and 1 Female in sweep net, Saavae, 5.xi.2006, by Rajmohana. K.

Distribution in India: Kerala and Karnataka.

Remarks: This is one of the most commonly encountered species and is seen in both forests as well agroecosystems.

8. *Psilanteris ferruginus* Rajmohana, 2007a

Psilanteris ferruginus Rajmohana K., 2007a: 60, 64. Original description.

Male. Length= 1.7mm. Head black; dorsal mesosoma and metasoma ferruginous; body brownish black to black; head and mesosoma with fine coriaceous sculpture; eyes large with fine minute pubescence, visible >50X only; vertex with dense and finely coriaceous than on dorsal mesosoma; posterior ocelli separated from lateral orbital margin separated by nearly its diameter; skaphion smooth and shiny, not coriaceous; antenna 12 segmented; flagellar segments globular, except terminal one; notauli complete, though faintly represented at times; metascutellum with a triangular spine medially; T1 and T2 with longitudinal striae, extending throughout; T3-T6, finely coriaceous.

Material examined: 1 male. Saavae, 5.xi.2006, in sweep net by Rajmohana K.

Distribution in India: Karnataka.

9. *Scelio spinifera* Mukerjee, 1979

Plate V, (Fig. 17)

Scelio spinifera Mukerjee, 1979: 111. Original description.

Female. Length= 3.6mm. Body black; wings faintly infuscated throughout; vertex and frons with closely reticulate punctae; gena with three or four radiating carinae from

mandibular corner towards lower eye margin; eyes bare; pronotal corners acute; antenna 12 segmented; mesoscutum, and mesocutellum reticulate punctuate; mesocutellum with a minute spine on either side towards lateromedian; metasomal tergites with longitudinal rugulae

Material examined: 3 females. Kesavae camp/Madla on 15.xi.2006 by K.G. Emiliyamma.

Distribution in India: Kerala and Karnataka.

Remarks: This species is widely distributed in South India (Personal observation).

Subfamily TELEASINAE

10. *Trimorus anamalaianus* Mukerjee, 1981

Plate V, (Fig.18)

Trimorus anamalaianus Mukerjee, 1981: 5, 27. Original description

Length: Female=1.6mm. Head and body brownish black, basal metasoma pale; wings infuscated light brown; head smooth and shiny; eyes silvery; OOL: OD: POL= 1.5:1:3 malar sulcus distinct; gena with radiating fan like carinae; vertex and gena setose; eyes with dense, fine pubescence; antenna with 12 segments; 6 segmented clava distinct; F1, F2 and pedicel almost subequal; F4 and F5 smallest of antennal segments and subequal; notauli present, complete and diverging in front; metascutellum with a short medial spine; mesopleural carina distinct; metasoma ovate; T1, T2 and T3 with longitudinal striae; striations on T3 restricted at base, extending nearly to its one-third; T3 nearly 3x length of T2.

Material examined: 1 female. 1 from Kesaruhalla: Muthodi Forest range: Malaise trap, on 10.x.2006.

Distribution in India: Kerala, Tamilnadu and Karnataka.

Remarks: The species is reported here for the first time from Karnataka.

11. *Trimorus dubarensis*, Mukerjee 1981

Plate V, (Fig. 19)

Trimorus dubarensis Mukerjee, 1981: 14, 27. Original description

Length: Female= 1.07mm. Head and body brownish-black, basal metasoma yellowish brown; wings hyaline; smooth and shiny; eyes with fine pubescence; OOL:OD: POL= ocellocular space nearly 1.5x ocellar diameter; metasoma elliptic-ovate, antenna with 12 segments; clava distinct; 6 segmented; basal flagellar segments not elongated; F1 and F2 subequal, length a little more than 0.5x length of pedicel; F2 longest of all segments; mesoscutum laterally costate; notauli present, deep, diverging and complete; medial

spine on metascutellum short; T1 and T2 with longitudinal striae; striations on T1 complete, but that on T2 restricted at its base.

Material examined: 1 Female. Lakhavalli: Bhadra Dam site: on 7.xi.2006, in Yellow pan trap, collected by Rajmohana.

Distribution in India: Karnataka.

Remarks: In Mukerjee (1981) the description of the species is not tallying with the figure illustrated in page 14. It is presumed that the illustration of some other species has been labelled as *T. dubarensis* by error.

The present species is identified in accordance with the verbal description.

12. *Trimorus nilamburensis* Mukerjee, 1994

Plate V, (Figs.20, 21)

Trimorus nilamburensis Mukerjee, 1981: 22, 27. Original description.

Length: Male=1.6mm (Fig. 15). Robust species; head and body black, basal metasoma yellowish brown; smooth and shiny; wings hyaline; eyes with fine pubescence; vertex and gena setose; gena with radiating fan like carinae; OOL:OD: POL= 3: 2 :5; antenna with 12 segments; flagellar segments greatly elongated; F3 sexually modified, with a lateral projection, F4 longest of all segments; mesoscutum laterally costate; notauli present, deep, diverging and complete; mesoscutum as well as mesoscutellum finely punctuate and with dense pubescence; medial spine on metascutellum pointed and prominent; with equidistant small denticular projection laterally; lateral propodeum clothed fine white pubescence; mesopleural carina distinct, incomplete; T1, T2 and T3 with longitudinal striae; striations on T2 reaching to its three-fourth length and that on T3 restricted at its base.

Female: Length= 1.6mm (Fig. 21). Resembling the male in general colour, habitus and sculpture, except in nature of antenna; antenna with 12 segments; clava distinct; 6 segmented; F1 and F2 elongate; F1 longer than pedicel, shorter than F2; F2 longest of all flagellar; F3 and F4 subequal, a little more than 0.5x F2; clava elongate. Rest of characters as in male.

Material examined: 1 male and 1 female. 1 Female. Kesaruhalla: Muthodi. Forest Range; Malaise trap, collected by Rajmohana on 10.x.2006 and 1 male from Lakhavalli: Bhadra Dam site: on 7.xi.2006 in sweep net.

Distribution in India: Kerala and Karnataka

Remarks: This species is reported here for the first time from Karnataka and the female described here forms the first report of a female of *T. nilamburensis*.

Subfamily TELENOMINAE

13. *Paratelenomus saccharalis* (Dodd, 1914)

Plate V, (Fig.22)

Telenomus saccharalis Dodd, 1914: 293. Original description.

Length=0.7mm. Female. Head and mesosoma dark brown to black, base of metasoma xanthic, rest of metasoma dark brown; central keel on frons distinct; submedian carina distinct, exceeding more than mid point of eye length; notauli present, distinct and complete; clypeus much wider than long, terminating in two small teeth; transcutal sulcus narrowed medially; disc of mesoscutellum abutting mesoscutum; mesopleural carina absent; mesopleural scrobe without a row of fovea bordering anteriorly; T1 with nearly 4 lateral setae.

Material examined: 3 females. 1 from Muthodi. Malaise trap, on 10.x.2006 and 2 from Lakhavalli: Bhadra Dam site: on 7.xi.2006, in Yellow pan trap, collected by Rajmohana

Distribution in India: Kerala, Karnataka, Tamilnadu, New Delhi.

Remarks: This species is of worldwide distribution (Johnson 1996), as egg parasitoids of Plataspidae (Hemiptera).

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INSECTA: HYMENOPTERA: DIAPRIIDAE

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INTRODUCTION

Members of superfamily Diaprioidea (Hymenoptera) are predominantly solitary endoparasitoids of various Diptera (Masner 1993). In India, among Diaprioidea, among family Diapriidae the most commonly encountered and the most speciose is the sub-family Diapriinae (Sharma 1979, Rajmohana 2006).

A taxonomic treatment of Diapriinae of Bhadra Tiger reserve (Karnataka) is presented here based on a collection made by net sweeping, malaise trapping as well as by setting up Yellow pan traps. A total of 7 species have been identified, of which 5 species are reported for the first time from Karnataka. All the 7 species reported here are new records for the Bhadra W.L.S & T. R.

Morphological terminology follows Masner (1991), and Rajmohana (2006).

Digital imaging was carried out using Leica M205A stereomicroscope and Leica DFC-500 digital camera.

The material studied has been deposited in the National Zoological Collection, at Zoological Survey of India (ZSI), Calicut.

Geographical coordinates of collection localities: Muthodi Forest Range (Lat.13°36.42'N and Long.75°40.40'E), Bhadra Dam site (Lat.13°42.54'N and Long. 75°37.97'E), Malda (Lat.13°29.52'N and Long. 75°36.75'E).

Abbreviations. F1 to F10- Flagellar segments 1 to 10; T1 to T7 - Metasomal tergites 1 to 7.

SYSTEMATIC ACCOUNT

Order HYMENOPTERA

Superfamily DIAPRIOIDEA

Family DIAPRIIDAE

Subfamily DIAPRIINAE

1. *Basalys karnatakensis* (Sharma, 1979)

Plate VII, (Fig.1)

1979. *Spilomicrus karnatakensis* Sharma, :44, 49. Original description.

2006. *Basalys karnatakensis* (Sharma): Rajmohana K., :29, 32. Generic transfer.

Female: Length= 1.5mm. Head black to brownish black, body paler than head, petiole reddish brown; scape and funicular segments honey brown, antennal club pale or brownish black; head and body smooth and shiny, vertex without any spines; ocelli arranged in a close triangle; OOL 2x ocellar diameter; eyes with sparse pubescence; lower margin of gena hairy; postgenal cushion of hairs distinct; antenna with 12 segments; club 3 segmented and enlarged; mesosoma wider than head; pronotal collar of hairs dense; notauli absent; scutellum with a rounded median groove; median keel absent on scutellar shield; petiole with faint parallel longitudinal striations, 2x as long as thick, second tergite without any median furrows anteriorly, forewing with a distinct basalis vein.

Material examined: 4 females. 2 from Lakhavalli: Bhadra Dam site, in Yellow pan trap, on 5.xi.2006, another from the same location, but in Malaise trap on 7.xi.2006 collected by Rajmohana, and 1 from Kesavae camp / Malda: Muthodi Forest Range, on 15.xi.2006, by K.G. Emiliyamma. (ZSI, Calicut).

Distribution in India: Kerala, Karnataka.

Remarks: This is one of the most widely distributed species of *Basalys* Westwood.

2. *Basalys nilgiriensis* Sharma, 1979

Plate VII, (Fig.2)

1979. *Spilomicrus nilgiriensis* Sharma, : 44, 55. Original description.

2006. *Basalys nilgiriensis* (Sharma): Rajmohana K., : 29. Generic transfer.

Female: Length= 2mm. Head black; body brownish black; scape and funicular segments honey brown; club black; head and body smooth and shiny; vertex medially with a small pointed spine; ocellocular space 2x ocellar diameter; eyes with fine pubescence; notauli absent; scutellum with a rounded median groove anteriorly; petiole almost 2x as long as wide; with longitudinal striations; second tergite without any median furrows anteriorly; forewing with a faint basalis vein.

Material examined: 2 females. 1 from Lakhavalli: Bhadra Dam site, in Yellow pan trap, on 5.xi.2006 and another from Muthodi. Malaise trap, on 10.x.2006, collected by

Rajmohana K.

Distribution in India: Kerala, Karnataka.

Remarks: Compared to other species, this is one of the robust species of *Basalys* Westwood.

3. *Coptera curvata* Rajmohana & Narendran, 2006

Plate VII, (Fig. 3)

2006. *Coptera curvata* Rajmohana & Narendran, : 40, 43. Original description.

Female: Length= 3.5mm. Head and body black; when viewed dorsally slightly transverse; vertex with 5 conspicuous teeth; eyes with sparse pubescence, adorbital carina originating from vertex extending downwards and encircling lower margin of eyes; notauli deep and complete, placed close to each other, separated at base by less than their diameter; scutellum with 2 'U' shaped grooves, sheath with lateral foveae, and distally with a pair of rounded foveae; petiole a little more than 1.5x as long as wide; dorsal median longitudinal furrow on T2 extending to 0.8 of length dorsally.

Male: Unknown.

Material examined: 5 Females. 2 from Lakhavalli: Bhadra Dam site, in Yellow pan trap, on 5.xi.2006 and 1 on 7.xi.2006. 1 from the same location, in Malaise trap on the same date, 1 from Muthodi, in Malaise trap, on 10.x.2006, collected by Rajmohana K.

Distribution in India: Kerala.

Remarks: This is the first report of *C. curvata* from Karnataka.

4. *Entomacis keralensis* Rajmohana & Narendran, 2006

Plate VII, (Fig.4)

2006. *Entomacis keralensis* Rajmohana & Narendran, : 51, 53. Original description.

Female: Length=1.3mm. Head and body brownish black to brownish yellow; head transverse dorsally; ocelli placed high towards vertex; eyes large and bare; antenna 13 segmented; flagellar segments gradually thickened towards apex; basal flagellar segments elongate; notauli distinct; scutellum with one large transverse groove; metanotum and propodeum medially with a lamella or a tooth and not a pointed spine; distal margin of forewing with a distinct notch medially; petiole less than 2x as long as thick, with parallel longitudinal striations; T2 basally with a small median longitudinal furrow.

Male: unknown.

Material examined: 1 female, from Lakhavalli: Bhadra Dam site, collected in Yellow

pan trap, on 7.xi.2006, by Rajmohana K.

Distribution in India: Kerala and Karnataka

Remarks: This forms the first report of *E. keralensis* from Karnataka.

5. *Entomacis linealis* Rajmohana & Narendran, 2006

Plate VII, (Fig.5)

2006. *Entomacis linealis* Rajmohana & Narendran, : 51, 54. Original description.

Female: Length=1.3mm. Head and body brownish black; head transverse dorsally; ocelli placed high on vertex; eyes large and bare; antenna 13 segmented; flagellar segments gradually thickened towards apex, apical 4-5 segments enlarged; basal flagellar segments not elongate; pedicel longer than F1; F2 subequal to F3 or even a bit small; notauli absent; scutellum with one large transverse groove; metanotum and propodeum medially with a keel; distal margin of forewing entire, not notched; petiole as long as wide, with parallel longitudinal striations; T2 basally with a small median longitudinal furrow.

Male: Unknown

Material examined: 2 Females. 1 from, Muthodi, coll. in Malaise trap, on 10.x.2006 by Rajmohana and another from Kesavae camp / Malda: Muthodi Forest Range, on 15.xi.2006, by K.G. Emiliyamma.

Distribution in India: Kerala and Karnataka

Remarks: This forms the first report of *E. linealis* from Karnataka.

6. *Entomacis spinosus* Rajmohana & Narendran, 2006

Plate VII, (Fig.6)

2006. *Entomacis spinosus* Rajmohana & Narendran, : 50, 56. Original description.

Female: Length= 1.66mm. Head and body honey brown to brownish black; head transverse dorsally; ocelli placed high on vertex; eyes large and bare; antenna 13 segmented; flagellar segments gradually thickened towards apex, apical 5-6 segments enlarged; basal flagellar segments much elongated; F1 longer than pedicel; F2 subequal to F3; notauli absent; scutellum with one large transverse groove; metanotum and propodeum medially with lamella, ending in a spine anteriorly; distal margin of forewing with a shallow median notch; petiole twice as long as thick, with parallel longitudinal striations; T2 basally without a small median longitudinal furrow.

Male: unknown.

Material examined: 2 Females from, Muthodi, in Malaise trap, on 10.x.2006, collected by Rajmohana. K

Distribution in India: Kerala.

Remarks: This forms the first report of *E. spinosus* from Karnataka.

7. *Spilomicrus manii* Rajmohana & Narendran, 2006

Plate VII, (Fig.7)

1979. *Paramesius nilamburensis* Sharma,: 28, 31. Original description, keyed.

1999. *Spilomicrus manii* Rajmohana & Narendran: Rajmohana K. & Narendran,: 75. Replacement name, generic transfer

Female: Length=3.2mm. Head and body black; scape and funicular segments concolorous with body; club dark; head as wide as thorax; eyes with long conspicuous pubescence; antenna with 13 segments; cylindrical; F1 a little less than 2x length of pedicel; F2 longest; notauli incomplete, extending only in posterior one third of mesoscutum; scutellum with two large rounded anterior grooves; two lateral fovea also present; forewing with a faint basalis; petiole 2x as long as wide, with longitudinal striations;

Female unknown.

Material examined: 2 Males from Kesavae camp / Madla: Muthodi Forest Range, on 15.xi.2006, by K.G. Emiliyamma.

Distribution in India: Kerala and Karnataka

Remarks: This forms the first report of *S. manii* from Karnataka.

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INSECTA : MANTODEA

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INTRODUCTION

The present account is based on a small collection of Praying mantids (Insecta: Mantodea) obtained from the Bhadra Wildlife Sanctuary, Karnataka. When compared to the other parts of the country, Mantid fauna of Karnataka state is fairly well known. About 26 species of mantids under 22 genera are reported from Karnataka against 168 species under 71 genera known from the country (Mukherjee *et al.*, 1995, Ehrmann 2002, Vyjayandi, 2007, Sureshan, 2009). In the present account 5 species of mantids belonging to 5 genera and 4 families are reported from Bhadra Wildlife Sanctuary. The specimens were identified following Mukherjee *et al.* (1995) and the recent classification proposed by Ehrmann (2002) is followed. All the measurements are in millimeter and body length measured from anterior margin of head to the tip of abdomen. The specimens are deposited in the collections of Zoological Survey of India, Western Ghat Regional Centre, Calicut, Kerala.

SYSTEMATIC ACCOUNT

Class INSECTA
Order MANTODEA
Family MANTIDAE
Subfamily PARAMANTINAE
Tribe *Paramantini*

1. *Hierodula membranacea* (Burmeister, 1838)

1838. *Mantis (Hierodula) membranacea* Burmeister. *Handb. Entomol.*, 2: 536.

1870. *Stagmatoptera veneratoria* Saussure. *Mitt. Schweiz. Entomol. Ges.*, 3: 232.

1871. *Hierodula membranacea*: Saussure. *Mem. Phys. Hist. nat. Soc. Geneva*, 21: 84.

1995. *Hierodula (H) membranacea* : Mukherjee et al. *Oriental ins.* 29: 293.

2002. *Hierodula membranacea* : Ehrmann. *Mantodea Gatt.und.Art.* 179.

Diagnostic characters: Color green. Frontal sclerite wider than high, upper margin curved. Fore wing green, longer than abdomen with opaque discoidal area. Pronotum long, gradually narrowed posteriorly and coxal dilation not much pronounced ; prozona with median longitudinal groove; metazona with distinct median carina In fore legs, coxae with 18-19 spines; internal apical lobes convergent; femora with 4 discoidal and 4 external spines, spines of femora black at tips only.

Measurements: Pronotum : Female 33 , Metazona 26 , Forecoxa 21, Femur 24 , Tibia 12 , tarsus 13 , Forewing 52.

Material examined: 1 Female (broken) India: Karnataka, Bhadra Wild life sanctuary, Kesarahalla road, N 13° 36' 42", E 75° 40 '40 " , Alt. 767 Metre, 8.xi.2006, coll. K.G.Emiliyamma , Reg.No.13995.

Distribution: India: Kerala, Orissa, Tamil Nadu, Karnataka (current study).

Elsewhere : Nepal, Java; China, Thailand and Sri Lanka.

Remarks: The species is distinct from other species of *Hierodula* by its semicircular upper margin of frontal sclerite, spines of fore coxa and long metazona. (Mukerjee et al, 1995).

Subfamily MANTINAE

Tribe Miomantini

2. *Deiphobella laticeps* (Wood-Mason, 1876)

1876. *Fisheria laticeps* Wood-Mason. *Ann. Mag. nat. Hist.*, (4) 18: 337.

1878. *Deiphobe laticeps* : Wood-Mason. *Proc. zool. Soc. London.*, 38: 580.

1904. *Eremoplana laticeps* : Kirby. *Cat. Orth. Brit. Mus.*, 1: 266.

1927. *Deiphobella laticeps*: Giglio-Tos. *Das Tierreich*, 50: 490.

1995. *Deiphobella laticeps* : Mukherjee et al, *Oriental Ins.*, 29: 284.

Diagnostic characters: Body brown. Head much wider than long, ocelli small; frontal sclerite brown; outer margin of pronotum denticulate; prozona dorsally and ventrally prominently granulate ; prozona with a weak median carina in the distal half; metazona with a distinct median carina in the fore half Fore coxa internally finely granulate without any blackish band; femora with 4 external, 4 discoidal and 16 internal spines; tibia with 16 internal and 8-9 external spines, all spines black at tip only; basal tarsal

segment equal to rest of segments together. Forewing very short, costal area brownish yellow, discoidal area brown with a large oval brown blotch bordered on either side by dark brown bands; hind wing small, costal area brown with an anterior apical brown blotch, longitudinal veins black, transverse veins whitish; spura anal plate carinate, pointed; cerci long, flattened.

Measurements: Body length : Female 113, Pronotum : 40, Metazona 30, Forecoxa 20, Femur 26, Tibia 10, tarsus 10, Forewing 21.

Material examined: 1 Female, India: Karnataka : Bhadra Wild life sanctuary, Hebbar falls, N 13° 30' 69", E 75° 36' 97", Alt. 733 Metre, 4.iii.2009, coll. Jafer Palot & party, Reg.No.18,646; 1 Female (broken), Kummanagundi, N13° 25' 48", E 75° 46' 16", Alt. 1842 Metre, 3.iii.2009, Reg.No. 18647, other data same as above.

Distribution: India: Kerala, Karnataka, Maharashtra (H.V.Ghate Per.comm.).

Elsewhere: Sri Lanka.

Remarks: Vyjayandi (2007) reported this species from Kerala.

Family HYMENOPODIDAE

Subfamily ACROMANTINAE

Tribe Acromantini

3. *Hestiasula brunneriana* Saussure.

871. *Hestiasula brunneriana* Saussure. *Mem. Soc. Phys. Hist. nat. Geneva*, 21: 330.

1927. *Hestiasula brunneriana*: Giglio-Tos. *Das Tierreich*, 50: 545.

1995. *Hestiasula brunneriana* : Mukherjee *et al. Oriental Ins.*, 29: 220.

Diagnostic Character: Body brownish. Frontal sclerite with the superior margin produced into a blunt angle; superior angle in female with a conical projection and the middle with a long protuberance, bilobed at apex and dotted black. Fore femora (Fig.19) brown, foliaceous oval, superior edge arched, outer face brown with few black spots, internally three black spots on the superior arch and one on the middle, a little above the spines; four discoidal spines, third one larger; 12 internal spines, entire black, 4 external spines black at tips only. Tibia and tarsi blackish internally.

Material examined: 1 nymph. : Karnataka, Bhadra Wild life sanctuary, Thegadagudda, N 13° 30' 00", E 75° 32' 39", Alt. 689 Metre, 19.xi.2007, coll. Jafer Palot & party. Reg.No.18235.

Distribution: India: Andhra Pradesh, Kerala, Karnataka (current study); Orissa, Meghalaya and West Bengal.

Elsewhere: Bangladesh , Pakistan and Sri Lanka.

Family TARACHODIDAE

Subfamily CALIRIDINAE

4. *Leptomantella (Leptomantella) parva* (Werner, 1933).

1933. *Leptomantis parva* Werner. *Proc. zool. Soc. London.*, 899.

1995. *Leptomantis parva* : Mukherjee et al. *Oriental Ins.*, 29 : 249.

2002. *Leptomantella (Leptomantella) [Leptomantis] parva* : Ehrmann. *Mantodea Gattungen und Arten*: 201.

Diagnostic characters: Body very thin, pale green yellow. Vertex with superior edge nearly straight; frontal sclerite widely arched; ocelli not bulging. Pronotum with outer margin finely denticulate; metazona with a very fine median carina. Fore trochanter externally with a very small blackish brown spot ; fore femur with 4 external, 4 discoidal and 14 internal spines all spines blackish brown at tip only; fore tibiae with 10 internal and 7 external spines. Costal area of forewing opaque with parallel veinlets.

Measurements: Body length : Female 21, PN: 10.5, Metazona 8, Forecoxa 6, Femur 7, Tibia 4, tarsus 4, Forewing 19.5.

Material examined: 1 Female, India: Karnataka, Bhadra Wild life sanctuary, Kolakunth, N 13° 18' 45", E 75° 39'43", Alt. 1300 Metre, 14.xi.2007, coll. Jafer Palot & party, Reg.No.18, 201.

Distribution: India: Kerala, Karnataka (current study) and Uttar Pradesh.

Remarks: Vyjayandi (2007) reported this species from Kerala.

Family EMPUSIDAE

Subfamily EMPUSINAE

Tribe *Empusini*

5. *Gongylus gongylodes* (Linnaeus, 1758)

1758. *Gryllus (Mantis) gongylodes* Linnaeus. *Syst. Nat.*, 10: 426.

1767. *Mantis gongylodes*: Linnaeus. *Syst. Nat.*, 2(10): 690.

1793. *Mantis flabellicornis* Fabricius. *Entomol. Syst.*, 2: 16.

1927. *Gongylus gongylodes*: Giglio-Tos. *Das Tierreich*, 50: 635.

1995. *Gongylus gongylodes* : Mukherjee et al. *Oriental Ins.* 29: 331.

Diagnostic Characters: Body brown. Forewing extending beyond abdomen, wide; costal area abruptly widened at base and brownish opaque; discoidal area hyaline. Hind

wing almost as long as fore wing, hyaline and brownish near apex. Vertex extended. Pronotum long, with rhomboidal expansion. In fore legs, coxae externally with brown bands, internally black, spinules are present externally; spine present near the trochanter. Femora with brown bands, dilated, 5 external spines, 4 discoidal spines, all spines black at tip only. In mid and hind legs femora has lobes at the distal end ventral one is rounded and dorsal lobe is triangular and two in number. Mid abdominal segments laterally foliaceous with ventrally transversed black mark.

Measurements: Body length: Male (excluding protuberance of vertex) 79; Forewing 53; Pronotum : 35. Metazona 31, Fore coxa 16; Femura 19, Tibia 9, Tarsus 10.

Material Examined: 1 Male. India: Karnataka, Bhadra Wild life sanctuary, Kavalappara, N 13°37' 85", E 75°41'66", Alt. 740 Metre, 20 .xi.2007, coll. Md.Jafer Palot, Reg.No.18240.

Distribution: India: Andhra Pradesh, Kerala, Karnataka, Tamil Nadu, West Bengal.

Elsewhere: Indonesia (Java), Myanmar, Thailand and Sri Lanka.

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INSECTA : ODONATA

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INTRODUCTION

The Order Odonata is one of the best known and documented among insects. Taxonomically they are well studied and are widely distributed all over the world. The odonate fauna of Karnataka State in India is well studied by Fraser (1933-1936). Subsequently, Subramanian et. al. (2002, 2005) and Subramanian (2005, 2007) studied the ecology and conservation of Odonata of Karnataka State. Recently, Emiliyamma and Radhakrishnan (2006, 2007 a & b) documented the odonate fauna of three protected areas of Karnataka. However, the Odonata fauna of Bhadra Wildlife Sanctuary and Tiger Reserve was not documented so far in scientific literature. Therefore, the present account forms the first report of Odonata fauna from this Sanctuary.

The present study deals with 37 species under 27 genera and 10 families (21 species of Anisoptera and 16 species of Zygoptera). The specimens studied are deposited in the faunal depository of the Western Ghat Regional Centre, Zoological Survey of India, Calicut (Kozhikode).

SYSTEMATIC ACCOUNT

Order ODONATA

Suborder ANISOPTERA

Family AESHNIDAE

1. *Gynacantha bayadera* Selys, 1891

Family GOMPHIDAE

2. *Paragomphus lineatus* (Selys, 1850)

Family LIBELLULIDAE

3. *Brachydiplax sobrina* (Rambur, 1842)

4. *Cratilla lineata* Foerster, 1903
5. *Crocothemis servilia* (Drury, 1770)
6. *Diplacodes trivialis* (Rambur, 1842)
7. *Lathrecista asiatica* (Fabricius, 1798)
8. *Neurothemis fulvia* (Drury, 1773)
9. *Neurothemis tullia* (Drury, 1773)
10. *Orthetrum glaucum* (Brauer, 1865)
11. *Orthetrum sabina* (Drury, 1770)
12. *Palpopleura sexmaculata* (Fabricius, 1787)
13. *Pantala flavescens* (Fabricius, 1798)
14. *Potamarcha congener* (Rambur, 1842)
15. *Tholymis tillarga* (Fabricius, 1798)
16. *Tamea basilaris* (Palisot de Beauvois, 1805)
17. *Tamea limbata* (Desjardins, 1832)
18. *Trithemis aurora* (Burmeister, 1839)
19. *Trithemis festiva* (Rambur, 1842)
20. *Trithemis kirbyi* Selys, 1891
21. *Trithemis pallidinervis* (Kirby, 1889)

Suborder ZYGOPTERA

Family CALOPTERYGIDAE

22. *Neurobasis chinensis* (Linnaeus, 1758)
23. *Vestalis gracilis* (Rambur, 1842)

Family CHLOROCYPHIDAE

24. *Rhinocypha bisignata* Hagen in Selys, 1853

Family COENAGRIONIDAE

25. *Aciagrion occidentale* Laidlaw, 1919
26. *Agriocnemis pieris* Laidlaw, 1919
27. *Agriocnemis pygmaea* (Rambur, 1842)
28. *Ceriagrion coromandelianum* (Fabricius, 1798)
29. *Ceriagrion olivaceum* Laidlaw, 1914
30. *Ischnura aurora* (Brauer, 1865)
31. *Ischnura senegalensis* (Rambur, 1842)

32. *Pseudagrion rubriceps* Selys, 1876

Family EUPHAEIDAE

33. *Euphaea fraseri* (Laidlaw, 1920)

Family LESTIDAE

34. *Lestes elatus* Hagen in Selys, 1862

Family PLATYCENIDIDAE

35. *Copera marginipes* (Rambur, 1842)

36. *Copera vittata* Selys, 1863

Family PROTONEURIDAE

37. *Caconeura ramburi* (Fraser, 1922)

Key to the suborders of the Order ODONATA

1. The forewings and hindwings are of the same shape and breadth, petiolate; eyes well separated; slender body, male with two superior and two inferior anal appendages Zygoptera
- The forewings and hindwings are of variable shape and hindwing usually broad at base, not petiolate; eyes are usually confluent across the middle line or separated (as in Gomphidae); stout body, male with two superior and one inferior anal appendage Anisoptera

Key to the Families of Suborder ANISOPTERA

1. Discoidal cell in fore and hind wings more or less identical in shape 2
- Discoidal cell in fore and hind wings different in shape Libellulidae
2. Eyes broadly confluent Aeshnidae
- Eyes widely separated Gomphidae

Family Aeshnidae

Diagnostic characters of the genus *Gynacantha* Rambur

Dragonflies of large size, characterized by uniform color of dull brown and green, and by their crepuscular habits. Eyes very broadly confluent; wings long and broad, very closely reticulated; tornus angulated in male, rounded in the female; anal loop oval, made up of numerous cells; 6 to 10 cubital nervures in all wings; abdomen more or less constricted at segment 3 in male, not constricted in the female; anal appendages very long

and narrow, covered with long hairs on the inner side; female with very long lanceolate shaped anal appendages.

***Gynacantha bayadera* Selys, 1891**

Gynacantha bayadera Selys, 1891, *Ann. Mus. Civ. Genova*, vol.30, p.47; Fraser, 1936, *Fauna Brit. India Odon.* 3: 103-104

Material examined: 1male, Lalbaghkathri, 2-iii-2009, Jafer Palot & party.

Diagnosis: Male: Eyes green, pale below; thorax bright green, unmarked; wings transparent, pale yellow at bases, especially in subcostal and cubital spaces; abdomen reddish brown, moderately swollen at base, markedly constricted at segment 3, segments 1 to 3 bright grass green.

Female: Very similar to the male.

Habitat: Crepuscular habits, during daytime, usually hidden among thick growth of foliages near the forest.

Distribution: Oriental Region.

Family GOMPHIDAE

***Paragomphus lineatus* (Selys, 1850)**

Gomphus lineatus Selys, 1850, *Rev. Odon.* p. 386.

Onychogomphus lineatus Selys, 1854, *Bull. Acad. Belg.* 21: 36; Williamson, 1907, *Proc. U.S. Nat. Mus.* 33: 309 310.

Mesogomphus lineatus Fraser, 1924, *Rec. Indian Mus.* 26: 427 & 477; Fraser, 1934, *Fauna, Brit. India Odon.* 2: 230 234.

Material examined: 1male, Madla, 15-xi-2006, K.G.Emiliyamma & party.

Diagnosis: Male: Eyes bluish green in colour; thorax sandy yellow coloured, marked with dark brown or blackish brown (according to age of specimens); abdomen black, marked with yellow, or yellow marked with black; in old specimens the yellow reduced to basal rings, in young specimens, the black present as apical rings; segment 8 and 9 with broad lateral wing like projection.

Female: Closely resembles the male except for shape of abdomen; colour much paler than in male and less marked with brown or black; wings with pale saffron coloured at the base and very pale along the costal margin.

Habitat: Occasionally settled on the sandy shore or on plants near the water and make short flight backwards and forwards over the shallow water. This species will be always alert and very difficult to catch.

Distribution: Throughout India.

Key to the genera of Family LIBELLULIDAE

1. Anal loop open; hind wings with golden brown fascia and an opalescent white spot
Tholymis Hagen [sp. *tillarga* (Fabricius)]
- Anal loop closed; wings without golden brown fascia and opalescent white spot .. 2
2. Posterior lobe of prothorax large and fringed with long hairs 3
- Posterior lobe of prothorax small, without long hairs 6
3. Upper surface of frons metallic blue 4
- Upper surface of frons non-metallic 5
4. Wings coloured and marked with black and yellow bands; costal border of forewings curved near base; discoidal cell in forewing traversed
..... ***Palpopleura*** Rambur [sp. *sexmaculata* (Fabricius)]
- Wings uncoloured; costal border of forewings straight, without curve; discoidal cell in forewing entire ***Brachydiplax*** Brauer [sp. *sobrina* (Rambur)]
5. Small sized dragonflies, 6 ½ to 9 ½ antenodal nervures in forewings
..... ***Diplacodes*** Kirby [sp. *trivialis* (Rambur)]
- Large sized dragonflies, more than 10 antenodal nervures in forewings
..... ***Orthetrum*** Newman
6. Distal antenodal nervure in forewing complete; upper surface of frons metallic blue; frons angulated with a crest ***Cratilla*** Kirby (sp. *lineata* Brauer)
- Distal antenodal nervure in forewing incomplete; upper surface of frons non-metallic; frons not angulated, with or without crest 7
7. Pterostigma unequal in size, small in hindwing than that of forewing 8
- Pterostigma equal size in fore and hindwings 9
8. Wings with large black spots at base of hind wing; cells at base of hindwing arranged into straight rows of closely packed narrow cells; genitalia of male projecting outside ***Tramea*** Hagen
- Wings hyaline, without black spots; cells at base of hindwing not arranged into straight rows; genitalia of male not projected outside
..... ***Pantala*** Hagen [sp. *flavescens* (Fabricius)]
9. Wings marked at base only; only 1 cubital nervure in all wings 10

- Wings partly or wholly coloured; several cubital nervures in forewings, 1 or more in the hindwings ***Neurothemis*** Brauer
- 10. Thorax shining brown, laterally yellow with two black 'Y' shaped stripes
..... ***Lathrecista*** Kirby [sp. *asiatica* (Fabricius)]
- Thorax not shining brown; 'Y' shaped stripes absent 11
- 11. Frons without horseshoe shaped surface; variable in colour; beneath thorax marked with a black square with an angular black line crossing it ***Trithemis*** Brauer
- Frons with deep sulcus and horse shoe shaped surface; usually coloured uniform red; beneath thorax without marking ***Crocothemis*** Brauer [sp. *servilia* (Drury)]

***Brachydiplax sobrina* (Rambur, 1842)**

Libellula sobrina Rambur, 1842, *Ins. Neurop.* p. 114.

Brachydiplax sobrina Kirby, 1893, *J. Linn. Soc. Zool.*, **24**: 551; Fraser, 1936, *Fauna Brit. India Odon.* **3**: 325-327.

Material examined: 1female, Bhadra damsite, 7-xi-2006, K.G.Emiliyamma & party.

Diagnosis: Male: Frons above and vesicle metallic blue, a geminate yellow spot behind occiput; thorax olivaceous brown to greenish-yellow, with black or metallic markings; in subadult, markings metallic black on a pale yellow background; mid dorsal and humeral stripe confluent on dorsum and formed M-shaped marking; three stripes on each side; abdomen black, pruinosed blue in old adults, marked with yellow in subadults and tenerals.

Female: similar to the teneral male but ground colour of thorax bright yellow and the metallic black stripes broad; W-shaped black marking on each sides of thorax.

Habitat: Found on the vegetations near ponds or tanks.

Distribution: Throughout India and South East Asia.

***Cratilla lineata* Foerster, 1903**

Orthemis lineata Brauer, 1770, *Sitzungsber. Akad. Wien*, **77**: 9.

Cratilla lineata Forster, 1903, *Ann. Mus. Hunger* p.537; Fraser, 1936, *Fauna Brit.India Odon.* **3**: 286 288.

Material examined: 1male, Kesarahonda road, 8-xi-2006, K.G.Emiliyamma & party.

Diagnosis: Male: Eyes dark bluish black; upper surface of frons metallic blue or green; thorax bronzed black, marked with yellow; beneath thorax yellow; abdomen black, marked with bright brownish yellow as follows: segments 1 and 2 with broad lateral and mid dorsal stripes; segments 3 to 8 with fine stripes on mid dorsal carina and ventral borders; remaining segments black; pale beneath.

Female: closely similar to male, but abdomen relatively shorter and more robust; eyes reddish brown above, pale beneath; labrum with black border or with a large black spot.

Habitat: Usually found in forest areas, hanging on dead twigs with its wings sloped to the sides and body held close to and parallel with the twig.

Distribution: Oriental Region.

***Crocothemis servilia* (Drury, 1770)**

Libellula servilia Drury, 1770, *III. Ins.* 1: 112 113; Rambur, 1842, *Ins. Nevrop.* p.80.

Crocothemis servilia Brauer, 1868, *Verh.zool.-bot.Ges.Wien.* 18: 737.

Crocothemis servilia servilia Fraser, 1936, *Fauna Brit. India Odon.* 3: 345 347.

Material examined: 1male, Hipla/Hebbae, 12-xi-2006; 1male, Savae, (Lakkavalli range), 5-xi-2006, K.G.Emiliyamma & party; 1female, Hossali, 27-ii-2009, Jafer Palot & party.

Diagnosis: Male: Eyes blood red above, purple laterally and pale below; labrum, face, frons and vesicle bright blood-red; thorax bright reddish brown, often blood-red during life; bases of all wings marked with yellowish-brown; abdomen blood-red, a broad black mid dorsal stripe present along the whole length of abdomen. **Female:** Eyes brown above, olive green below; labrum, face, frons and vesicle deep yellowish green; thorax olivaceous brown; basal marking of wings paler and the neuration in this part bright yellow; abdomen brownish yellow, with black middorsal stripe.

Teneral males and females: pale straw yellow coloured; thorax with pale yellowish-white humeral stripe; abdomen with broad black mid dorsal stripe and light brown subdorsal stripe; basal marking of wings pale, the reticulation bright yellowish; pterostigma very pale yellow between black nervures.

Habitat: Very common red dragonfly, found everywhere, especially around ponds, small weedy tanks, slow running streams and ditches near human habitations.

Distribution: Widely distributed in Oriental and Australian Region.

***Diplacodes trivialis* (Rambur, 1842)**

Libellula trivialis Rambur, 1842, *Ins. Nevrop.* p.115.

Diplacodes trivialis Karsch, 1891, *Ent. Nachr.* 17: 246; Fraser, 1936, *Fauna Brit. India Odon.* 3: 336 338.

Material examined: 2female, Kadubailu, 13-xi-2006, K.G.Emiliyamma & party; 1male, Thaggadagudda, 19-xi-2007; 1male, 1female, Kundur, 21-xi-2007, 1female, Hossali, 27-ii-2009, Jafer Palot& party.

Diagnosis: Male: Adults: Eyes reddish brown above, pale bluish or yellowish below; labium, labrum and mandibles creamy yellow; face, frons and vesicle pale azure blue with a fine black line at the base of frons; the whole thorax pruinose blue; abdomen pruinose blue, except the segments 7 to 10 black; an oval shaped yellow spot present on the 8th segment; anal appendage, creamy white.

Female and sub adult Male: Head similar to the adult male; thorax greenish-yellow with black markings, the area between middorsal carina and humeral sutures brown, spotted with small black dots; abdomen greenish yellow with fine black stripes and broad mid dorsal and subdorsal stripes on segments 1 to 10; anal appendage cream yellow.

Habitat: One of the commonest dragonflies of India; usually it moves far from water and found on footpaths in open spaces, gardens, fields etc.

Distribution: Throughout Oriental Region and Pacific Islands.

***Lathrecista asiatica* (Fabricius, 1798)**

Libellula asiatica Fabricius, 1798, *Ent. Syst., Suppl.* p. 283.

Lathrecista asiatica asiatica Ris, 1909, *Cat. Coll. Selys, fasc.* 9: 129 - 132; Fraser, 1918, *J. Bombay nat. Hist. Soc.*, 26: 147 -149; Fraser, 1936, *Fauna Brit. India Odon.* 3: 281 - 284.

Material examined: 1male, Chowdikattae, 6-xi-2006, K.G.Emiliyamma & party.

Diagnosis: Male: Upper surface of frons metallic blue-black; eyes reddish brown above, bluish grey below; thorax dark coppery-brown above, bright yellow on sides; in subadults, bright coppery brown with a pair of narrow yellow stripes; on sides, two black 'Y' shaped markings; in old adults all these markings concealed by pruinescence; wing tips brownish; abdomen red, segments 1 and 2 with yellow stripes; segments 3 to 8 bright crimson red and black stripes; segments 9 and 10 black. **Female:** Resembles the male closely, except for the colour of abdomen, which is olivaceous-brown; mid dorsal greenish yellow stripe present on segments 1 to 8; in andromorph females, the abdomen is red as in male.

Habitat: This is shy insect usually found near ponds, tanks, marshes and seen flying over brackish water. In plains, usually sitting on the coir ropes used for drying clothes and when disturbed it flies very quickly.

Distribution: Oriental Region.

Key to the species of Genus *Neurothemis* Brauer

1. Bases of wings in male broadly black, is bordered with an opalescent white band; in female, the tips of wings black with sickle shaped stripe on basal half of wings
tullia (Drury)
- Wings dark reddish brown from base to about middle of pterostigma, tips of wings narrowly reddish brown to partly enclosing a clear and uncoloured area *fulvia* (Drury)

Neurothemis fulvia (Drury, 1773)

Libellula fulvia Drury, 1773, *III. Exot. Ins.* 2: 84 85.

Neurothemis fulvia Kirby, 1889, *Trans. Zool. Soc. Lond.* 12: 271; Fraser, 1936,

Fauna Brit. India Odon. 3: 353 354; Lieftinck, 1954, *Treubia* 22 (suppl.): 150.

Material examined: 1 male, Kesarahonda road, 8-xi-2006, K.G.Emiliyamma & party; 1 male, 2 female, Singola forest, 17-xi-2007, Jafer Palot & party.

Diagnosis: Male: Eyes dark reddish brown above, golden brown below; prothorax, thorax and abdomen uniform reddish brown; wings dark reddish-brown from base to about middle of pterostigma, with an irregular triangular transparent area at the tips of wings, extreme tips reddish brown; neurulation very close; the whole dark area very finely and closely reticulated by bright yellow nervures.

Female: many forms found, varying from complete isochrome to several kind of heterochromes: head, thorax and body generally much paler or ochreous, dark brown shade at segments 3 to 7; wings clear amber yellow with dark rays in the subcostal and costal areas near the node and form a nodal spot. Many other intermediate forms are also present.

Habitat: Usually found in the wet forest places, occurs in large colonies at the forest edges and in low-lying marshy areas; found near waterbodies, resting on dry branches of plants.

Distribution: Oriental Region.

Neurothemis tullia (Drury, 1773)

Libellula tullia Drury, 1773, *III. Exot. Ins.* 2: 85.

Neurothemis tullia Kirby, 1890, *Cat. Odon.* p.8

Material examined: not collected (observation) 1male, Hipla/Hebbae, 12-xi-2006, K.G.Emiliyamma & party.

Diagnosis: Male: Eyes blackish brown above, violaceous below; prothorax and thorax black with yellow mid dorsal stripe; bases of all wings bluish black, bordered with a milky white band; transparent at the tips; abdomen black, with a cream yellow stripe on segments 1 to 8; anal appendages creamy white.

Female: Differs significantly from the male both in colouration and markings; eyes pale brown above, pale olivaceous laterally and beneath; prothorax and thorax greenish yellow, with bright yellow stripe bordered with blackish brown running along the whole length; bases of all wings bright amber-yellow; subcostal space blackish brown, a large blackish-brown spot at node, tips of all wings blackish-brown; the area between these two opaque parts and costa with pale yellow neuration; abdomen bright yellow with a broad black lateral stripe extending from segment 1 to 10.

Habitat: Both male and female, always found near water, resting on plants; occurs in large colonies in heavily weeded tanks, ponds, irrigation canals of paddy fields and slow running streams. This species has a weak and slow flight; size of the specimens varies according to the habitat.

Distribution: Throughout the Oriental Region.

Key to the species of Genus *Orthetrum* Newman

1. Abdomen remarkably swollen at base and then abruptly slimmed and compressed laterally to the end; face and frons yellowish; abdomen black, marked with greenish yellow *sabina* (Drury)

Abdomen never swollen as in *sabina*, face and frons black; abdomen pruinose blue from segment 1 to apical end of segment 8 *glaucum* (Brauer)

Orthetrum glaucum (Brauer, 1865)

Libellula glauca Brauer, 1865, *Verh. zool.-bot. Ges. Wien*, 15: 1012.

Orthetrum glaucum Kirby, 1890, *Cat. Odon.* p.39; Fraser, 1936, *Fauna Brit. India Odon.* 3: 307-309.

Material examined: 1male, Hipla/Hebbae, 12-xi-2006, K.G.Emiliyamma & party; 1male, Thaggadagudda, 19 -xi-2007, Jafer Palot& party.

Diagnosis: Male: Adults: labium, labrum, face and frons glossy black; eyes dark green, capped with reddish brown; thorax pruinose dark blue or black with a very thin pruinescence; extreme base of wings dark yellowish brown; abdomen ventrodorsally dilated at segments 1 to 3, pruinose blue from segment 1 to 8, segments 9 and 10 black.

Subadult Male and Female: labium, labrum, and face pale olivaceous brown; thorax olivaceous on mid dorsum, bordered by reddish brown humeral stripe; laterally reddish

brown with two yellowish white narrow stripes; wings similar to the male; abdomen reddish brown with a broad greenish yellow stripe on mid dorsum extending from segments 1 to 7; segments 8, 9 and bases of 10 black.

Habitat: Usually found near small fresh water streams, ponds, canals etc. The species change significantly in colour according to the age, and in size according to the altitude. Large specimens collected from high altitudes.

Distribution: Oriental Region.

***Orthetrum sabina* (Drury, 1770)**

Libellula sabina Drury, 1770, *III. Exot. Ins.* 1: 114 - 115.

Orthetrum sabina Kirby, 1889, *Trans. Zool. soc. Lond.* 12: 302; Fraser, 1936, *Fauna Brit. India Odon.*, 3: 300 - 302.

Material examined: 1male, 2female, Bhadra damsite, 7-xi-2006; 1male, Hipla/Hebbae, 12-xi-2006; 1female, Chowdikattae, 6-xi-2006, K.G.Emiliyamma & party; 1male, Thaggadagudda, 19 -xi-2007, Jafer Palot& party.

Diagnosis: Male: Eyes greenish; thorax greenish yellow, marked with black stripes; abdomen greenish yellow, marked with black; segments 1 to 3 unusually swollen dorso ventrally as well as laterally; segments 4 to 6 very narrow, cylindrical, segments 7 to 9 dilated, compressed laterally and segment 10 very small; anal appendage creamy white.

Female: exactly similar to the male both in colour and the remarkable shape of abdomen.

Habitat: One of the common dragonfly found in all places and most predaceous dragonfly found in India; usually found near ponds, streams and tanks; occasionally far away from water and enters houses at night attracted by the light.

Distribution: Widely distributed in Oriental, Ethiopian and Australian Regions.

***Palpopleura sexmaculata* (Fabricius, 1787)**

Libellula sexmaculata Fabricius, 1787, *Mant. Ins.* 1 : 338.

Palpopleura sexmaculata Brauer, 1868, *Verh. zool.-bot. Ges. Wien*, 18 : 716.

Material examined: 1female, Kadubailu, 13-xi-2006, K.G.Emiliyamma & party.

Diagnosis: Male: Eyes olivaceous, capped with brown above; frons and vesicle metallic blue; wings with a black spot at node near the pterostigma in forewing; a black stripe in costal and sub costal space; another stripe between sectors of arc, and a third stripe in cubital space; hind wings tinted with yellow; stripes present only in the sub costal space; pterostigma black with center white in adults; abdomen pruinose blue, sides of segments 1, 2 and base of 3 yellow; beneath yellow with a median black stripe.

Teneral, subadult male and Female: Frons non-metallic; wings more broadly marked with black and more deeply tinted with amber yellow; neuration in dark areas golden yellow; pterostigma black for inner half and creamy yellow for outer part; abdomen bright ochreous, ventral borders and sutures finely black and with a mid dorsal black stripe, extending from segment 3 to 10.

Habitat: usually found near marshes, water channel, pond covered with aquatic plants; they resembles wasp in appearance and flight.

Distribution: Oriental Region

***Pantala flavescens* (Fabricius, 1798)**

Libellula flavescens Fabricius, 1798, *Ent. Syst. Suppl.*, p.285.

Pantala flavescens Hagen, 1861, *Syn. Neur. N.Amer.*, p.142; Fraser, 1936, *Fauna Brit. India Odon.* 3: 414 416.

Material examined: 2female, Chikmagalur, 3-xi-2006, K.G.Emiliyamma & party.

Diagnosis: Male: Eyes reddish brown above, lilaceous or bluish below; thorax rusty red on dorsum, pale bluish green or greenish white laterally, without markings; the base of hind-wing with yellowish brown spot; pterostigma of hindwing smaller than in forewing; membrane white; abdomen bright reddish brown, tinted with bright brick red dorsally, sides of segments 1 to 4 pale yellow; segments 3 to 10 with black mid dorsal pyriform spots.

Female: Similar to the male, but differs in the following characters: eyes olivaceous brown above; wings often evenly and more or less deeply smoky brown and with yellow spot at base; abdomen without red colour on dorsum.

Habitat: Most common dragonfly of the plains and submontane regions. They can be found in permanent and temporary ponds, pools and other water bodies, including brackish waters. Huge swarms can be observed just before and after the monsoon. They migrate in large numbers along with monsoon winds, through the seacoast, over railway tracks, open highways etc. It is observed that sometimes these species are following the running vehicle and frequently hit into and die on road.

Distribution: Throughout the tropics.

***Potamarcha congener* (Rambur, 1842)**

Libellula obscura Rambur, 1842, *Ins. Nevrop.* p.64.

Potamarcha obscura Karsch, 1890, *Berlin Ent. Zeit.* 33: 371; Fraser, 1936, *Fauna Brit. India Odon.* 3: 289 291.

Potamarcha congener Selys, 1891, *An. Soc. Espan.*, 20: 221.

Material examined: 1female, Bhadra damsite, 7-xi-2006, K.G.Emiliyamma & party.

Diagnosis: Male: Adults: Eyes reddish brown above, bluish gray below; frons in adults shining black or brown; thorax black, without marking or pruinose densely and appearing blackish blue; abdomen variable in colour according to age of individuals, completely pruinose in old adults.

Female and subadult Male: thorax and abdomen black with yellow marking or thorax reddish-brown dorsally, dull ochreous on the sides; laterally dark brown with two upright 'Y' shaped stripes; wing tips dark brown and the costal area of both wings tinted with deep yellow; abdomen black, marked with bright yellow; pale beneath.

Habitat: Large colonies are found in patches of jungle or scrub jungle forests near small slow running streams and around seasonal monsoon ponds.

Distribution: Oriental Region.

***Tholymis tillarga* (Fabricius, 1798)**

Libellula tillarga Fabricius, 1798, *Ent. Syst. Suppl.* p.285.

Tholymis tillarga Hagen, 1867, *Stett. Ent. Zeit.* 28: 220; Fraser, 1936, *Fauna Brit. India Odon.*, 3: 411 413.

Material examined: 1female, Chikmagalur, 3-xi-2006; 1male, Chowdikattae, 6-xi-2006, K.G.Emiliyamma & party.

Diagnosis: Male: Eyes brown capped with reddish, olivaceous below; thorax golden yellow or olivaceous with a bright reddish tint on upper surface; wings with a broad fan-shaped, smoky, golden-brown fascia or band extending from node to base of hind wing, bordered by a broad oval milky white spot; abdomen bright rusty red. **Female:** closely similar to male; the differences are: thorax olivaceous and without reddish tinge; wings without milky white spot and the golden brown band very pale and obscure; abdomen olivaceous brown.

Habitat: Crepuscular dragonfly, active soon before sunset, frequently come to the house attracted by light; commonly found in ponds and marshes.

Distribution: Throughout Oriental, Ethiopian and Australian Regions.

Key to the species of Genus *Tramea* Hagen

1. Two large black spots at base of hind wing surrounded by a golden yellow areola, neurulation in this dark area bright yellow *basilaris* (Palisot de Beauvois)

- Only a single black spot at base of hind wing, confined to the base, very narrow; not surrounded by golden yellow areola, neuration in this spot is reddish
..... *limbata* (Desjardins)

***Tramea basilaris* (Palisot de Beauvois, 1805)**

Libellula chinensis Burmeister, 1839, *Handb. Ent.*, 2: 852.

Tramea burmeisteri Kirby, 1889, *Trans. Zool. Soc. Lond.*, 12: 316.

Tramea basilaris burmeisteri Fraser, 1936, *Fauna Brit. India Odon.*, 3: 432 - 434.

Material examined: 1male, Chowdikattae, 6-xi-2006, K.G.Emiliyamma & party.

Diagnosis: Male: Eyes dark reddish brown above, lilaceous laterally and beneath; hindwing with two large black or reddish brown spots at base, surrounded by a golden yellow areola; the two spots narrowly connected near base of discoidal cell; venation in this area bright yellow, sometimes, this marking extend into the basal and subcostal spaces and up to the second antenodal nervure; pterostigma bright ochreous, that of hindwing shorter; abdomen bright brick red, marked with black; segment 8 black with triangular yellow spot; 9 and 10 black with medial lateral spot; below thorax black ringed with yellow. **Female:** Resembles the male very closely; wings often tinted with yellow; basal spots similar to male, surrounded by golden areola, but the two spots are well separated; abdomen olivaceous green or yellowish with similar black markings as in the male.

Habitat: Ponds, tanks and marshes.

Distribution: Oriental Region.

***Tramea limbata* (Desjardins, 1832)**

Libellula limbata Desjardins, 1832, *Rapport Soc. Maurice*, p.1

Tramea limbata Kirby, 1889, *Trans. Zool. Soc. Lond.* 12 : 318 ; Fraser, 1936, *Fauna Brit. India Odon.*, 3 : 436-438.

Material examined: 1male, Singola forest, 17-xi-2007, Jafer Palot & party.

Diagnosis: Male: Eyes dark brown above, olivaceous laterally and below; upper part of frons metallic violet; base of hindwing with a single black narrow spot; nervures in this area reddish; the spot is not surrounded by golden areola as in *T. basilaris*; abdomen blood red, marked with black on last three segments; genital hamules much longer and greatly overlapping lobe.

Female: Exactly similar to male; black markings of abdomen more broad; narrow black rings and ventral borders of segments 4 to 7 fine black.

Habitat: A very active dragonfly widely distributed on the plains and submontane regions; usually found hovering over the waterbodies.

Distribution: Oriental Region.

Key to the species of Genus *Trithemis* Brauer

1. Pterostigma bicoloured, black with creamy white ends; body yellow marked with black *pallidinervis* (Kirby)
- Pterostigma unicolorous; body colour variable 2
2. Thorax and abdomen violaceous crimson; base of wings with a broad amber yellow mark, with dark yellowish brown rays in subcostal and cubital spaces; neuration crimson *aurora* (Burmeister)
- Thorax and abdomen violaceous black; base of hindwing with a dark brown spot with dark rays in subcostal and cubital spaces; neuration black *festiva* (Rambur)
- Thorax olivaceous to golden brown tinted with rose red; abdomen bright coral red with black spots on segment 8 and 9; base of wings, costal and subcostal spaces with bright reddish yellow markings; neuration bright red *kirbyi* Selys

Trithemis aurora (Burmeister, 1839)

Libellula aurora Burmeister, 1839, *Handb. Ent.*, 2: 859.

Trithemis aurora Brauer, 1868, *Verh. zool.-bot. Ges. Wien.*, 18: 177, 735; Fraser, 1936, *Fauna Brit. India Odon.*, 3: 383 385.

Material examined: 2male, 1female, Helegikere, 15-xi-2007; 1male, Hebbae falls/Hebbagiri, 4-iii-2009, Jafer Palot & party.

Diagnosis: **Male:** Eyes crimson above, brown on sides, and lilaceous underneath; vesicle and upper surface of frons metallic violet; thorax red, looks dull purple due to pruinescence; wings with crimson reticulation and a broad amber yellow spot at base of wings, with darker brown rays in subcostal and cubital spaces; abdomen crimson violet with black mark on the base of 10. **Female:** eyes purple brown above, lilaceous or gray below; thorax pale olivaceous on sides, darker on dorsum with black stripes; wings tipped with brown; reticulation bright yellow to brown, basal marking pale and without dark rays in subcostal and cubital spaces; abdomen brownish yellow with dorsal, median and lateral black markings. **Teneral:** abdomen narrow, bright ochreous in colour; wings with yellow neuration and the basal marking small; thorax yellow or olivaceous and with distinct black markings.

Habitat: A common dragonfly of the plains and submontane regions; commonly seen

on vegetation near ponds, tanks, canals, streams etc.; making short flights up and down, but always return to the initial resting place.

Distribution: Widely distribute in Oriental Region.

***Trithemis festiva* (Rambur, 1842)**

Libellula festiva Rambur, 1842, *Ins. Nevrop.* p.92.

Trithemis festiva Brauer, 1868, *Verh. zool.-bot. Ges. Wien*, 18: 736; Fraser, 1936, *Fauna Brit. India Odon.*, 3: 387 389.

Material examined: 1male, Helegikere, 15-xi-2007, Jafer Palot & party.

Diagnosis: Male: Eyes dark brown above with purple shining, bluish gray laterally and beneath; upper surface of frons and vesicle metallic violet; thorax and abdomen violaceous or bluish black; base of hind wing with a dark brown spot, subcostal and cubital spaces with dark rays, neuration black; abdomen black, segments 1 to 3 with bluish pruinescence.

Female and teneral male: eyes dark brown above, lilaceous below; frons and vesicle non-metallic; thorax greenish-yellow or olivaceous with blackish brown humeral stripe, an inverted Y-shaped stripe on mesepimeron; beneath olivaceous; wings similar to the male; abdomen bright yellow, with subdorsal, mid dorsal and ventral black stripes and wedge shaped yellow spots.

Habitat: Always found near streams, ponds, etc.; usually seen on rocks in mid-stream or on twigs overhanging water.

Distribution: Widely distribute in Oriental Region.

***Trithemis kirbyi* Selys, 1891**

Trithemis aurora Kirby (pars), 1868, *Proc. Zool. Soc. Lond.*, p.327.

Trithemis kirbyi Selys, 1891, *Ann. Mus. Civ. Genova*, 30: 465.

Material examined: 1male, Chowdikattae, 6-xi-2006, K.G.Emiliyamma & party.

Diagnosis: Male: Eyes bright red above, lilaceous below; thorax olivaceous to golden brown, tinted with rose red on dorsal, humeral and metepimeral areas, the mesepimeron bluish or greenish white; neuration of wings including costa bright red; bases of all wings with bright reddish yellow mark and dark rays; pterostigma black, with a narrow red stripe at its middle or pale yellow beneath; abdomen vermilion red with small black spots on segments 8 and 9. *Female:* Pale with distinct black markings; thorax pale greenish

white, with or without rose red tint; olivaceous brown antehumeral stripe and black markings distinct; wings variable, in one form exactly similar to the male, in another form the basal marking restricted to the extreme base of forewing and present only as two rays in the subcostal and cubital spaces; abdomen reddish brown dorsally, pale olivaceous laterally, marked with black spots.

Habitat: Males have a habit of settling flat on rock, very quick in taking off and on the wing; this species is seasonal, appear suddenly during summer and disappearing with the advent of S.W.monsoon.

Distribution: Oriental Region.

***Trithemis pallidinervis* (Kirby, 1889)**

Sympetrum pallidinervis Kirby, 1889, *Trans. Zool. Soc. Lond.*, 12: 327.

Trithemis pallidinervis Morton, 1907, *Trans. Ent. Soc. Lond.*, p.304; Fraser, 1936, *Fauna Brit. India Odon.*, 3: 389 - 391.

Material examined: 2male, Hossali, 27-ii-2009, Jafer Palot & party.

Diagnosis: *Male:* Eyes reddish brown above, brown laterally and bluish gray below; frons and vesicle metallic purple; thorax olivaceous brown, bright olivaceous on lower part of sides, legs very long, that of spider like; wings with reddish reticulation; bright amber-yellow spot at extreme base; pterostigma black with creamy white ends; abdomen black, marked with bright yellow; long wedge shaped spots on segments 4 to 7; a small spot on segment 8 and remaining segments black. *Female:* frons with upper surface ochreous, marked at basal half with metallic or bronzed golden-green; wings similar to male, but tinted with yellow or reddish-brown towards the tips; extensor surfaces of all femora yellow; segment 10 of abdomen yellow, with base broadly black.

Habitat: This dragonfly is generally found on the top of tall aquatic plants or shrubs.

Distribution: Oriental Region.

Suborder Zygoptera

Key to the Families of Suborder ZYGOPTERA

1. Wings with two antenodal nervures 2
- Wings with more than two antenodal nervures 5
2. Wings with intercalated cells at the tips; sectors of arc arising from the middle of arc Lestidae
- Wings without intercalated cells at the tips; sectors of arc arising from the lower end of arc 3

3. Anal vein (IA) and anal bridge (ab) always present, and complete 4
 - Anal vein absent or rudimentary, anal bridge vestigial or incomplete and reduced or absent Protoneuridae
4. Discoidal cell elongate, anterior side slightly shorter than the basal side, the distal end subacute Platycnemididae
 - Discoidal cell short, anterior side very much shorter than basal, the distal end acute and pointed Coenagrionidae
5. Wings petiolated, ending near to *ac*; epistome tumid and projecting like nose in front of face; abdomen shorter than wings Chlorocyphidae
 - Wings not petiolated, epistome normal, abdomen longer than wings 6
6. Sectors of arc arising from the middle or above the middle of arc; basal space (median space) entire, discoidal cell straight and shorter than median space... Euphaeidae
 Sectors of arc arising from lower third of arc; basal space traversed or entire; discoidal cell convex costal wards and as long as median space Calopterygidae

Key to the Genera of Family Calopterygidae

1. Arc angulated; basal space traversed; sectors of arc separated at origin, main sectors not forked; forewings of both sexes hyaline, hindwings opaque; pterostigma absent in male, false or absent in female **Neurobasis** Selys
 - Arc oblique, not angulated; basal space entire; sectors of arc arising from a single point, most main sectors forked; pterostigma absent **Vestalis** Selys

Neurobasis chinensis (Linnaeus, 1758)

Libellula chinensis Linnaeus, 1758, *Syst. Nat.* 1: 545; Edwards, 1750, *Nat. Hist. Birds*, 3: 112.

Calopteryx chinensis Rambur, 1842, *Ins. Neurop.* p. 226.

Neurobasis chinensis Kirby, 1890, *Cat. Odon.* p. 102; Fraser, 1924, *Rec. Indian Mus.*, 26: 428, 479.

Material examined: 1male, Chowdikattae, 6-xi-2006, K.G.Emiliyamma & party.

Diagnosis: Male: A big sized, metallic green damselfly; thorax metallic green with stripes and sutures black or brown; forewings longer than hindwings, tinted with pale yellowish green, especially along costa and at tips, neuration brilliant emerald green, node thickened and clouded with brown; hindwings opaque, basal two thirds appearing metallic green or peacock blue, apical third blackish brown with violaceous reflections and green metallic nervures; pterostigma absent in all wings; abdomen narrow and cylindrical, much longer than wings, metallic bronze green above and at sides, beneath black.

Female: thorax as in male, all sutures and stripes pale yellow or white; thorax beneath grayish white, unmarked; wings tinted with yellow, all wings with an opaque creamy yellow patch at node; a creamy white pterostigma in hindwings, reduced or entirely absent in forewings, the nervures traversing it often incomplete and missing in places; abdomen dull metallic green, with golden reflections on dorsum, black beneath, segment 10 ends with a distinct keel and a fine apical spine.

Habitat: Usually found near hill streams, males are commonly seen moving up and down over the stream, very close to the surface of the water by displaying emerald green and peacock blue hindwing; commonly they rest on a rock with closed wings in the mid stream or overhanging plants near the stream.

Distribution: Throughout Oriental Region.

***Vestalis gracilis* (Rambur, 1842)**

Calopteryx gracilis Rambur, 1842, *Ins. Nevrop.* p. 224.

Vestalis gracilis Selys & Hagen 1854, *Mem. Soc. Sci. Liege* 9: 84.

Material examined: 1male, 3female, Singola forest, 17-xi-2007, Jafer Palot & party.

Diagnosis: Male: Big sized, metallic green damselfly; upper two thirds of eyes dark brown, the rest greenish yellow; thorax metallic green above, yellowish beneath; wings transparent, iridescent with colours of mother of pearl or blue in some lights, especially in the central part of forewings; the whole of hindwings tinted with greenish yellow; abdomen metallic green or blue, usually peacock-blue in teneral specimens, emerald green when mature, marked with yellow.

Female: exactly similar to male in colour and markings, abdomen more dull metallic and segment 8-10 yellow laterally.

Habitat: Commonly found in hill streams; seen in open spaces of forests, and along shaded pathways, occupying almost every twig in the vicinity of water or well away from water.

Distribution: Throughout Oriental Region.

Family CHLOROCYPHIDAE

***Rhinocypha bisignata* Hagen in Selys, 1853**

Rhinocypha bisignata Selys, 1855, *Syn. Cal.* 62; Kirby, 1890, *Cat. Odon.*, p. 113; Laidlaw, 1917, *Rec. Indian Mus.*, 13: 38; Fraser, 1934, *Fauna Brit. India Odon.*, 2: 49 - 52.

Material examined: 1male, Hipla/Hebbae, 12-xi-2006, K.G.Emiliyamma & party; 1male, Helegikere, 15-xi-2007, Jafer Palot & party.

Diagnosis: Male: Eyes brown; thorax black, mesothoracic triangle large and pink coloured; a large spot of the same colour in between humeral suture and mesothoracic triangle; antehumeral spot yellow; golden yellow laterally; beneath three pairs of yellow spots; legs black, the two posterior pairs of tibiae and femora pruinose white; bases of all wings tinted with yellow, opaque blackish brown in apical area only; fore wings with outer fourth opaque with brilliant coppery colouration; hind wing with tips opaque black, and marked with two series of coppery or violaceous vitreous spots; pterostigma black; abdomen black, marked with yellow from segments 1 to 5, 6 to 10 unmarked.

Female: thorax as in male, but the antehumeral spot replaced by a thin line; the mesothoracic triangle black, finely outlined in yellow, as also the mid dorsal carina; legs not pruinose; wings entirely transparent, tinted palely with yellow; pterostigma black, with pale creamy center; abdomen black, with broad yellow marking.

Habitat: Commonly seen on the twigs and leaves of plants near hill streams or on rocks in the midstream; sometimes, the females found far away from water, inside the forest.

Distribution: Peninsular India.

Family Coenagrionidae

Key to the genera of Family Coenagrionidae

1. Arc situated at the level of the distal antenodal nervure; small species, with abdomen more than or at least 20mm 2
- Arc situated away from the distal antenodal nervure; small species, with abdomen not more than 20mm. **Agriocnemis** Selys
2. A prominent ridge on the frons; postocular spots absent **Ceriagrion** Selys
- No ridge on the frons; postocular spot present 3
3. Pterostigma in forewing larger than that in the hindwing 4
- Pterostigma in forewing and hindwing equal in size, diamond shaped, oblique at both ends **Pseudagrion** Selys
4. *ab* arising well proximal to the level of *ac*; segment 10 with two prominent tubercles on apical border **Ischnura** Charpentier
- *ab* arising at the same level of *ac*; segment 10 without tubercles **Aciagrion** Selys

***Aciagrion occidentale* Laidlaw, 1919**

Aciagrion hisopa Selys, race *occidentalis* Laidlaw, 1919, *Rec. Indian Mus.*, 26: 186.

Aciagrion occidentalis Fraser, 1923, *J. Bombay nat. Hist. Soc.*, **29**: 749.

Aciagrion occidentale, Fraser, 1933, *Fauna Brit. India Odon.*, **1**: 335-337.

Material examined: 1female, Kemmangundi, 4-xi-2006, K.G.Emiliyamma & party.

Diagnosis: Male: Eyes bottle green above, with a small black cap, pale blue beneath, thorax pale azure blue, dorsum black with a narrow greenish yellow antehumeral stripe; beneath white; pterostigma of forewing nearly double the size of that of hindwing, coloured blackish gray; abdomen slender and long, pale azure blue at sides of segments 1 to 3 and 8 to 10; pale yellow from 4 to 7, marked with black on segments 1 to 8; segment 9 entirely blue; 10 with X-shaped black spot, blue on the sides.

Female: somewhat similar to the male, but much more robust and with a stouter abdomen; eyes olivaceous, pale yellow beneath, with a cap of black ringed outwardly with pale brown; marking on segment 8 broader and of almost even width throughout; 10 entirely blue or with a black spot on each side.

Habitat: Usually seen near hill streams and plain areas. Rests on open grass, weedy ponds and herbage.

Distribution: Throughout the Oriental Region.

Key to the species of genus *Agriocnemis* Selys

1. Labrum metallic blue; thorax with pale green antehumeral stripes; abdomen greenish yellow, marked with black *pygmaea* (Rambur)
2. Labrum non-metallic; thorax with pink antehumeral stripes; abdomen pale blue, marked with black *pieris* Laidlaw

***Agriocnemis pieris* Laidlaw, 1919**

Agriocnemis pieris Laidlaw, 1919, *Rec. Indian Mus.*, **16**: 179 -180; Fraser, 1923, *J. Bombay nat. Hist. Soc.*, **29**: 747; Fraser, 1933, *Fauna Brit. India Odon.*, **1**: 384 -385.

Material examined: 1male, Hipla/Hebbae, 12-xi-2006; 5male, 3female, Kadubailu, 13-xi-2006, K.G.Emiliyamma & party; 2male, Thaggadagudda, 19-xi-2007, Jafer Palot & party.

Diagnosis: Male: Upper surface of eyes black, pale blue at sides and below; thorax black, marked with pink antehumeral stripe; laterally blue with black spot; beneath white; pterostigma pale yellow or pink with the center black or gray; abdomen pale blue, deep blue on the last four segments, marked with black; segment 2 with an anchor shaped dorsal mark, sometimes the flukes of anchor enclosed two blue spots; segments 2 to 6 with apical annules; 3 and 4 with triangular spots; 4 to 6 with arrow head like spots, segment 7 with a dorsal stripe, and 8 to 10 unmarked.

Female: More robust than male, black markings on abdomen more broad; pterostigma golden yellow, gray at the center; abdomen black.

Habitat: Found among grass near weedy ponds, streams and canals; sometimes far away from water, resting on the blades of grasses.

Distribution: Throughout India.

***Agriocnemis pygmaea* (Rambur, 1842)**

Agrion pygmaeum Rambur, 1842, *Ins. Nevrop.*, p.278.

Agriocnemis pygmaea Selys, 1877, *Syn. Agr. 5me Legion: Agrion (suite fin)*, p.52: Fraser, 1933, *Fauna Brit. India Odon.*, 1: 398 401; Lieftinck, 1954, *Treubia*, 22 (suppl.) 73.

Material examined: 1male, 1female, Kadubailu, 13-xi-2006; 1male, 3female, Chowdikattae, 6-xi-2006, K.G.Emiliyamma & party; 2male, 1female, Thaggadagudda, 19-xi-2007; 1male, 1female, Mathikere, 28-ii-2009; 2male, 1female, Hebbae falls/Hebbagiri, 4-iii-2009, Jafer Palot & party.

Diagnosis: Male: Labrum metallic blue; eyes black above, pale apple green on the sides and beneath; thorax black, with apple-green ante humeral stripes, laterally apple green, pale yellow below; pterostigma pale yellow on the fore wings and black on the hind wings; abdominal segments 1 to 7 with the ground colour pale greenish yellow marked with shining black; segment 2 with a broad thistle shaped mark; anal appendages brick red.

Female: more robust than male, and exhibiting a number of forms. *Red form:* Head, prothorax, thorax and abdominal segments 1 to 7 dark salmon pink colour, a black stripe across vertex. *Subadult form:* Eyes same as in male; blue post ocular spots connected by a narrow green stripe across occiput; thorax with black stripe on mid dorsum and pale blue antehumeral stripe; laterally pale green; pterostigma yellow framed in black nervures; abdomen pale apple green, yellow on segments 8 to 10 with black stripes and markings.

Habitat: Most common damselfly, always found near the waterbodies like ponds, tanks and streams among vegetation.

Distribution: Throughout the Oriental, Australian Regions and Pacific Islands.

Key to the species of *Ceriagrion* Selys

1. Abdomen bright citron yellow, without markings
..... *coromandelianum* (Fabricius)
- Abdomen uniform dull olivaceous in both sexes *olivaceum* Laidlaw

***Ceriagrion coromandelianum* (Fabricius, 1798)**

Agrion coromandelianum Fabricius, 1798, Ent. Syst. Suppl., p.287.

Ceriagrion coromandelianum Selys, 1876, *Bull. Acad. Belg.* (2) 42: 528; Fraser, 1933, *Fauna Brit. India odon.*, 1: 315 - 316.

Material examined: 1male, Bhadra damsite, 7-xi-2006; 1male, Kesarahonda road, 8-xi-2006; 2female, Suklahatti, 4-xi-2006, K.G.Emiliyamma & party.

Diagnosis: Male: Eyes olivaceous above, pale greenish-yellow below; prothorax and thorax uniform olive-green, tinted with ochreous, citron-yellow on sides, pruinose white beneath; abdomen bright citron yellow, without markings.

Female: more robust and dull coloured than male; head as in male; prothorax and thorax golden olivaceous brown, pale at the sides and beneath, finely pruinose; abdomen olivaceous, with golden brown tint on dorsum, which deepens on the last segments.

Habitat: Commonly found near ponds, tanks and streams; also found in scrub jungles far away from the water bodies.

Distribution: Throughout the Oriental Region.

***Ceriagrion olivaceum* Laidlaw, 1914**

Ceriagrion olivaceum Laidlaw, 1914, *Rec. Indian Mus.*, 8: 345-346; Fraser, 1933, *Fauna Brit. India Odon.*, 1: 324 - 325.

Material examined: 1male, Kundur, 21-xi-2007, Jafer Palot & party.

Diagnosis: Male: Eyes olivaceous brown, dark above; beneath head pale brown; prothorax and thorax pale olivaceous, pale on the sides and white beneath; abdomen uniform olivaceous brown, pale yellow beneath.

Female: exactly similar to the male, nodal index slightly shorter; pterostigma paler; anal appendages brownish red.

Habitat: Found near the streams inside the jungle.

Distribution: Western Ghats, North East India and West Bengal.

Key to the species of genus *Ischnura* Charpentier

1. Abdominal segments 1 to 7 citron yellow, 8 to 10 azure blue; pterostigma in forewing rose red, that in hindwing uniform pale grey *aurora* (Brauer)
Abdomen black, marked with yellow and blue, pterostigma in forewing black, that in hindwing dull white *senegalensis* (Rambur)

***Ischnura aurora* (Brauer, 1865)**

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

Agrion aurora Brauer, 1865, *Verh. Zool.- bot. Ges. Wien*, 15: 510.

Ischnura delicata Selys, 1876, *Bull.Acad. Belg.*, (2) 41: 281; Fraser, 1933, *Fauna Brit. India Odon.*, 1: 360 362.

Ischnura aurora Ris, 1915, *Nova Caledonia, Zool.* 2: 67.

Material examined: 2male, Madla, 15-xi-2006, K.G.Emiliyamma & party; 1male, Kundur, 21-xi-2007; 3female, Virupakshikhas/Muthodi, 5-iii-2009, Jafer Palot& party.

Diagnosis: Male: Eyes in both sexes olive-green, dark olive above, pale olive beneath; postocular spots deep azure blue; thorax shining black, with grass-green ante humeral stripes; laterally grass green with a narrow black stripe; pterostigma in the fore and hind wings are different shaped and coloured; rose red in forewing and uniform pale grey in hindwings; abdomen citron yellow, except segments 8 to 10, which are azure blue; segment 1 with a large dorsal black mark; segment 7 broadly black and segment 10 with a quadrate black spot.

Female: stouter than male; thorax pale yellow on the sides, white beneath; antehumeral stripe citron yellow; pterostigma pale pink, shape and size similar to that of the male; abdomen with broad black dorsal stripe and yellow rings extending the whole length, the sides yellow, pale greenish beneath.

Habitat: Found among vegetations near banks of ponds, streams, canals and temporary monsoon pools.

Distribution: Oriental and Australian Regions.

***Ischnura senegalensis* (Rambur, 1842)**

Agrion senegalensis Rambur, 1842, *Ins. Nevrop.*, p.276.

Ischnura senegalensis Selys, 1876, *Bull. Acad.Belg.*, (2) 41: 273; Fraser, 1933, *Fauna Brit. India odon.*, 1: 348 351; Lieftinck, 1954, *Treubia* (suppl.): 74.

Material examined: 1male, 1female, Chowdikattae, 6-xi-2006; 1female, Suklahatti, 4-xi-2006, K.G.Emiliyamma & party.

Diagnosis: Male: Eyes black on the upper side, pale green to yellow on the lower side; thorax shining black with yellow or pale green antehumeral stripes, sides pale green, pale yellow beneath; pterostigma diamond shaped, that of hindwing smaller than forewing, black in forewing, dull white in hindwing; abdomen black on dorsum, marked

with yellow and blue: segments 1, 2 and 9 azure blue laterally; segments 3 to 7 and 10 yellow laterally and two tubercles on segment 10; segment 8 azure blue.

Female: Eyes olivaceous on the lower half, traversed by a black equatorial ring; thorax black on dorsum, with or without antehumeral brown stripe; the sides pale brown; abdomen black from segments 1 to 10, apical borders of 1, 8, 9 and 10 pale blue, the sides of all gray coloured.

Habitat: Found among the vegetation near pond, marshes etc.

Distribution: Ethiopian and Oriental Region.

***Pseudagrion rubriceps* Selys, 1876**

Pseudagrion rubriceps Selys, 1876, *Bull. Acad. Belg.* (2) 42: 510; Fraser, 1933,

Fauna Brit. India Odon., 1: 296 299.

Material examined: 2female, Savae (Lakkavalli range), 5-xi-2006; 1male, Hipla/Hebbae, 12-xi-2006; 1female, Chowdikattae, 6-xi-2006; 3male, 1female, Suklahatti, 4-xi-2006, K.G.Emiliyamma & party.

Diagnosis: Male: Eyes olivaceous green above, bright orange below and bluish beneath; labrum, face, clypeus and frons bright reddish-orange; a pair of blue post ocular spots at vertex; thorax golden green on dorsum and azure blue on sides, a thin black mid dorsal carina with two thick black parallel stripes; abdomen marked with black; segments 1 and 2 olivaceous green above, azure blue laterally, with a quadrate black spot on segment 1; segment 2 with a goblet marking; segments 3 to 7 black, bronzed green on dorsum, pale greenish laterally; segment 8 with a black cone shaped mark; segments 9 and 10 azure blue.

Female: Differs in colour and markings from the male: eyes dark blue above, pale azure blue below; labrum, face, vertex and occiput dark olivaceous; markings of thorax similar to the male, ground colour dull bluish green; posterior lobe of prothorax with two short spines; abdomen with dorsal markings broader, segment 8 with a broad band and segment 9 with a basal bifid dorsal marking.

Habitat: Found in a small group of 5-6 individuals near streams, ponds, lakes and marshes. Adults fly low down, amidst the vegetation.

Distribution: Oriental Region.

Family EUPHAEIDAE

***Euphaea fraseri* (Laidlaw, 1920)**

Pseudophaea fraseri Laidlaw, 1920, *Rec. Indian Mus.*, 21: 23-27;

Indophaea fraseri Fraser, 1929, *J. Bombay nat. Hist. Soc.*, **33**: 296 - 298; Fraser, 1934, *Fauna Brit. India Odon.*, **2**: 110 112.

Material examined: 1male, Thaggadagudda, 19-xi-2007, Jafer Palot & party.

Diagnosis: Male: Labrum pale azure blue, its anterior border black; mediobasal black tongue absent; eyes dark brown; thorax black, antehumeral stripe bright azure blue; humeral stripe yellow, laterally bright reddish yellow and with large oval black spot; beneath bright reddish ochreous; legs bright red; hindwing markedly shorter than forewing and with outer part opaque black, with coppery reflection above and bluish violet below; abdomen bright coral red from segments 1 to 6; segment 7 dark reddish brown to black; rest of abdomen black, with a prominent carinal spine on segment 10.

Female: similar to male, the azure blue and red area of thorax and abdomen in male replaced by yellow; labrum as in male; thorax black on dorsum, bright yellow on the sides; legs yellow; abdomen black, marked with bright greenish yellow, longitudinal stripe on sides of segments 3 to 6; apical lateral spot on 8; a large lateral spot on 9 and sides of 10 entirely yellow with a spot.

Habitat: They can be seen near the hill streams at lower and higher elevation; sometimes females seen far away from water inside the forest on the top of trees.

Distribution: Western Ghats and Eastern Ghats.

Family LESTIDAE

Lestes elatus Hagen in Selys, 1862

Lestes elata Hagen, 1858, *verh. zool. - bot. Ges. Wien*, **8**: 478; Fraser, 1933, *Fauna Brit. India Odon.*, **1**: 37 40.

Lestes elatus Kirby, 1890, *Cat. Odon.*, p. 162.

Material examined: 1male, Chowdikattae, 6-xi-2006, K.G.Emiliyamma & party; 2 female, Thaggadagudda, 19-xi-2007; 4male, Kundur, 21-xi-2007; 1female, Singola forest, 17-xi-2007, Jafer Palot & party.

Diagnosis: Male: Eyes turquoise blue; thorax in teneral warm brown, pale olivaceous and yellow on the sides, white beneath; in adults, dark reddish brown to almost black, heavily pruinose at the sides and chalky white beneath; dorsum with a pair of antehumeral metallic green stripes expanded outwardly abruptly above; pterostigma black in adults, pale brown in teneral; abdomen pale yellow at the sides in teneral, pale bluish green in adults, marked with metallic green, black on the 10 segment; anal segments creamy yellow, tipped with black in teneral, black in adults with yellow hairs.

Female: similar to the male, but always less coloured, the markings distinct and the ground colour pale brown.

Habitat: Found near ponds, canals, tanks and streams.

Distribution: Peninsular India and Sri Lanka.

Family PLATYCNEMIDIDAE

Key to the species of genus *Copera* Kirby

1. The two hind pairs of tibiae moderately dilated, bright orange to dull reddish; superior anal appendage only one fourth the length of inferiors; female with posterior lobe of prothorax without spines *marginipes* Rambur

The two hind pairs of tibiae very slightly dilated, bright citron yellow; superior anal appendages at least half the length of inferiors; posterior lobe of prothorax of female with a pair of spines *vittata* (Selys)

Copera marginipes (Rambur, 1842)

Platycnemis marginipes Rambur, 1842, *Ins. Nevrop.* p. 240.

Copera marginipes Kirby, 1890, *Cat. Odon.* p.129; Fraser, 1933, *Fauna Brit. India Odon.*, 1: 192 - 197; Lieftinck, 1954, *Treubia* 22 (suppl.): 51 - 52.

Material examined: 1male, Bhadra dam site, 7-xi-2006, K.G.Emiliyamma & party.

Diagnosis: Male: Eyes black above, greenish at sides and beneath with a black equatorial band; frons and vertex with a black band, followed by a greenish white stripe; thorax bronzed black, with pale greenish yellow humeral stripes; the sides and below thorax with yellow spots and black stripe; legs bright yellowish orange, the posterior two pairs of tibiae moderately dilated; abdomen bronzed black, 8 to 10 pale bluish white; segments 1 to 6 with pale greenish white rings. Anal appendages pale yellow to white; the length of superior anal appendages only one-fourth the length of inferiors.

Female: differs from the male in several aspect; beneath head dull white; vertex with a broken black line; thorax violaceous brown with black spots or lines; a black band on the mid dorsum, pale brown laterally; legs pale brown, tibiae not dilated; abdomen brown, apical rings on segments 3 to 7; 1 to 7 similar to the male; the apical half of segment 8 to 10 pale brown or creamy white.

Habitat: Usually found near slow running streams, ponds and canals, overhanging the blades of grasses or leaves.

Distribution: Oriental Region.

Copera vittata Selys, 1863

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

Copera vittata Kirby, 1890, *Cat. Odon.* p.129; Fraser, 1933, *Fauna Brit. India Odon.*, 1: 198 - 201.

Material examined: 4males, Savae, (Lakkavalli range), 5-xi-2006; 2male, Hipla/

Hebbae, 12-xi-2006; 2male, Madla, 15-xi-2006; 1male, Chowdikattae, 6-xi-2006; K.G.Emiliyamma & party; 3male, 1female, Thaggadagudda, 19-xi-2007; 2male, Kodhi, 18-xi-2007, Jafer Palot & party.

Diagnosis: Male: Eyes capped with black above, olivaceous green below, with a black equatorial belt; vertex with a pale bluish green stripe; thorax bronzed black, antehumeral stripe pale blue, sides bright greenish yellow, beneath thorax yellow; legs bright citron yellow, the two posterior pairs of tibiae very slightly dilated; abdomen black on dorsum and sides pale blue; segment 1 and 2 reddish brown; segments 3 to 7 with pale blue rings; segment 9 and 10 pale blue; anal appendages pale blue or creamy white; superior anal appendages half the length of inferiors.

Female: vertex with a broad black band; post ocular stripe present; posterior lobe of prothorax with a pair of spines; thorax pale brown, marked similarly to the male, beneath pale brown marked with three black spots; legs yellow, all femora with the speckled beaded band; abdomen dark purple brown, black on segments 7 to 10; segments 3 to 7 with pale yellow rings; segment 9 with a T-shaped mark, segment 10 brownish white.

Habitat: Usually found near the slow running hill streams and marshes.

Distribution: Oriental Region.

Family PROTONEURIDAE

Caconeura ramburi (Fraser, 1922)

Indoneura gomphoides Laidlaw, 1917, (*ramburi*, nec. *Gomphoides*) *Rec. Indian Mus.*, 13: 347-348; Fraser, 1933, *Fauna Brit. India Odon.*, 1: 252-254.

Indoneura ramburi Fraser, 1922, *Rec. Indian Mus.*, 24: 2-3.

Material examined: 2male, Kemmangundi, 4-xi-2006, K.G.Emiliyamma & party.

Diagnosis: Male: Eyes deep blue capped with black; under surface of head black; thorax velvet black, with azure blue antehumeral stripes; sides azure blue with black stripe; beneath pale blue; pterostigma black, diamond shaped; abdomen black, segments 1 to 7 with blue markings and segments 8 to 10 blue. Anal appendage with superiors has no basal tooth.

Female: Closely similar to the male; the markings greenish blue or yellow, except in old specimens, where the colour similar to that of male; pterostigma ochreous; markings of head and thorax similar to the male, those of abdomen differing; segment 8 with a blue triangular spot; segment 9 with a T-shaped mark and segment 10 with a small saddle shaped mark.

Habitat: Gregarious in habits, large number of specimens perches on overhanging vegetations on the banks of small hill streams, flight short and weak.

Distribution: South India.

DISCUSSION

37 species of Odonata belonging to 27 genera and 10 families are reported for the first time from Bhadra Wildlife Sanctuary and Tiger Reserve, Karnataka, India. The Family Libellulidae is represented with the highest number of species (19) in the Sanctuary.

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INSECTA: LEPIDOPTERA: RHOPALOCERA

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INTRODUCTION

Amongst the insects, butterflies are well studied. Their diversity studies are used for general biodiversity conservation and planning in some parts of the tropics as a representative insect group (Thomas, 1992). About 1501 species of butterflies have been recorded from India (Gaonkar, 1996). In the most recent compilation of butterfly species known from Western Ghats (Krishnamegh Kunte, 2006), 332 species are enlisted which includes 316 from Karnataka.

The study of the butterfly fauna of Karnataka was initiated more than a century ago by British naturalists (Aitken, 1887; Davidson & Aitken, 1890; Watson, 1890; Davidson *et al*, 1896; Bell 1909-1927). The first and significant work pertains to that of Watson (1890). He published a comprehensive list of butterflies recorded from the Mysore State (the present day Karnataka State), covering the districts of Shimoga, Hassan, Chickmagalore and Mysore. Subsequently, T. R. Bell (1909-1927) published a series of articles on the butterflies of northern Western Ghats and Kanara region of the central Western Ghats. He listed 290 species, mainly from the north Kanara district of Karnataka and some part of Maharashtra. The Coorg area of the Western Ghats was thoroughly explored by many workers (Hannington, 1916 & 1918; Winchworth, 1928; Yates, 1929, 1931, 1932 & 1933; Home, 1934). They listed around 250 butterfly species from the Coorg and adjoining Brahmagiri mountains. In the recent past, many studies (Larsen, 1987-88; Geetha *et al*, 2000; Radhakrishnan and Lakshminarayana, 2001, Mohandas, 2004; Radhakrishnan and Palot, 2006 & 2007 and Ali *et al*. 2007) on the butterfly fauna of the Karnataka have been published.

The only information available on the butterfly fauna of Bhadra Tiger Reserve pertains to a recent checklist by Hegde & Ramakrishna (2006). They listed 99 species from the Reserve.

In the present study, 165 species of butterflies belonging to 109 genera under 5 families are recorded from the Bhadra Tiger Reserve. The family Nymphalidae dominated with 61 species followed by Lycaenidae (38 species), Hesperidae (33 species), Pieridae (18 species) and Papilionidae (15 species). Of these, nine species are endemic to the Western Ghats viz. the Malabar Raven, Southern Birdwing, Lesser Albatross, Glad-eye Bush Brown, Tami Cat's eye, Nilgiri Tiger, Malabar Tree Nymph, Shiva Sunbeam and the Madras Ace. 66 species in the present study turned out to be new records for the Bhadra Tiger Reserve.

Many mud- puddling sites were observed during the survey in summer. On a rocky stream bed at Madalagodu (Muthodi range) was observed a mud-puddling congregation of 15 Common Map butterflies, 6 Common Grass Yellows, 5 Blue Banded Pierrots, 5 Tiny Grass Blues, 3 Common Nawabs and a few Club Beak butterflies. On another occasion, a large aggregation of 20 species of butterflies was observed on an elephant wallowing point at Holaerayanahalla (Thanigebyle range). The species such as the Lemon Pansy (4 exs.), Yellow Pansy (3 exs.), Commander (2 exs.), Common Sailer (3 exs), Tawny Coster (6 exs), Common Crow (2 exs), Zebra Blue (5 exs), Common Tinsel (3 exs), Indian Cupid (6 exs), Tiny Grass Blue (8 exs), Angled Pierrot (4 exs), Blue banded Pierrot (5 exs), Malayan (3 exs), Pea Blue (4 exs), Transparent 6 Lineblue (2 exs), Tailless Lineblue (3 exs), Forget-me- Not (8 exs), Common Hedge Blue (3 exs), Shiva Sunbeam (3 exs) and the Moore's Ace (2 exs) were seen puddling, apparently attracted by the mineral rich soils supplemented by the fresh urine and dung of elephants. Besides butterflies, large number of Rock bees, wasps, calliphorid flies and xylocopids were found attending the puddling site.

Flowering plants such as *Vernonia shevaroyensis*, *Adenostemma laeviana*, *Ageratum conyzoides*, *Acacia instia*, *Cassia* sp., *Hygrophila auriculata*, *Helicteres isora*, *Lea indica*, *Lantana camara*, *Urena lobata*, etc contributed good nectar sources for many species of butterflies in the Park. Large aggregation of Nilgiri Tiger, Dark Blue Tiger, Lesser Gull, Common Albatross, Tricolour Pied Flat, Water Snow Flat and Fourrings was noticed on the flowers of *Vernonia shevaroyensis* at Kabbinnasethuehalla, near Kemmanagundi on 3rd March 2009.

14 species recorded in this study falls under the various protected categories as per the Indian Wildlife (Protection) Act of 1972. Among them, the Crimson Rose and the Danaid Egfly are placed under Schedule -I of the Act.

A detailed systematic account of the species recorded (observed and collected) from the Bhadra Tiger Reserve with their status and distribution in the park along with their known larval plants is given below. The nomenclature followed in this account is after Gaonkar (1996) and the English Common Names adopted from Wynter- Blyth (1957).

SYSTEMATIC ACCOUNT

Family PAPILIONIDAE

1. *Troides minos* Cramer

Southern Birdwing

Larval Food Plants: *Aristolochia indica*, *A. tagala*, *Thottea siliquosa*.

Remarks: Uncommon. It is the largest butterfly of India, endemic to southern India. Also sighted at the high ranges of Kemmanagundi area of the Reserve.

2. *Pachliopta aristolochiae* (Fabricius)

Common Rose

Larval Food Plants: *Aristolochia indica*, *A. tagala*, *A. bracteolata*, *Thottea siliquosa*.

Remarks: Uncommon. Small numbers were observed during the survey.

3. *P. hector* (Linnaeus)

Crimson Rose

Larval Food Plants: *Aristolochia indica*, *Thottea siliquosa*.

Remarks: Fairly Common. Mating pairs were noticed at Lakkavalli area. The species is placed under Schedule-I of Indian Wildlife (Protection) Act, 1972.

4. *Graphium sarpedon teredon* (Felder &Felder)

Common Blue Bottle

Larval Food Plants: *Cinamomum malabattrum*, *C. camphora*, *C. macrocarpum*, *C. verum*, *Litsea chinensis*, *Persea macrantha*, *Milusa tomentosum*, *Polyalthia longifolia*.

Remarks: Uncommon. Frequently observed involved in mud-puddling, activity along with a few other butterflies.

5. *G. doson eleius* Fruhstorfer

Common Jay

Larval Food Plants: *Annona lawii*, *Cinnamomum macrocarpum*, *C. malabattrum*, *Magnolia grandiflora*, *Michaelia champaca*, *Milusa tomentosum*, *Polyalthia longifolia*.

Remarks: Fairly common in the Park. Frequently found settling on the damp patches along with other mud-puddling butterflies.

6. *G. agamemnon menides* (Felder &Felder)

Tailed Jay

Larval Food Plants: *Annona reticulata*, *A. squamosa*, *Cinnamomum* spp., *Michelia champaca*, *Polyalthia longifolia*.

Remarks: Uncommon in the areas surveyed.

7. *Papilio clytia clytia* (Linnaeus)

Common Mime

Larval Food Plants: *Aleodaphne semicarpifolia*, *Cinnamomum camphora*, *C. macocarpum*, *C. zeylanicum*, *Litsea chinensis*, *L. deccanensis*, *Persea macrantha*.

Remarks: Uncommon. Of the two forms reported from Peninsular India, the form, *clytia* was observed in the Park.

8. *P. demoleus demoleus* Linnaeus

Lime Butterfly

Larval Food Plants: *Aegle marmelos*, *Citrus* spp., *Glycosmis arborea*, *Murraya koenigii*, *Ruta graveolens*.

Remarks: Uncommon in the Park during the survey period. Also seen with other mud-puddling butterflies

9. *P. helenus* (Hampson)

Red Helen

Larval Food Plants: *Citrus* sp., *Evodia* sp., *Glycosmis arborea*, *Toddalia asiatica*, *Zanthoxylum rhetsa*, *Phellodendron* sp.

Remarks: Uncommon. A fast flier, observed frequently performing criss-cross flights on the forest roads during morning hours. On a fresh Otter regurgitation point, 5 Red Helen butterflies and many Tiny Grass Blues and Banded Blue Pierrots were seen feeding at Hebbaegiri area.

10. *P. polytes polytes* (Linnaeus)

Common Mormon

Larval Food Plants: *Aegle marmelos*, *Citrus* spp., *Glycosmis arborea*, *Murraya koenigii*, *Zanthoxylum rhetsa*, *Atalantia racemosa*, *Tripahsia* sp.

Remarks: Fairly common in the Park. The female form (*romulus*) mimicking the Crimson Rose butterfly was noticed at Muthodi area.

11. *P. p. polymnestor* Cramer

Blue Mormon

Larval Food Plants: *Glycosmis arborea*, *Atalantia racemosa*, *A. wightii*, *Citrus* spp.

Remarks: Uncommon. Blue Mormon is the second largest of the south Indian butterflies and it is restricted to Peninsular India and Sri Lanka.

12. *P. paris tamilana* Moore

Paris Peacock

Larval Food Plants: *Citrus* sp., *Evodia roxburghiana*, *Toddalia asiatica*, *Zanthoxylum ovalifolium*.

Remarks: Uncommon. A pair was sighted at Kemmangundi area of the Park

13 *P. dravidarum* Wood-Mason

Malabar Raven

Larval Food Plants: Glycosmis arborea.

Remarks: Uncommon in the Park. The species is endemic to the Western Ghats

14. *Pathysa nomius* (Esper)

Spot Swordtail

Larval Food Plants: Milusa tomentosum, M. velutina, Polyalthia longifolia.

Remarks: Not seen during the survey. Only earlier records available.

15. *P. antiphates* (Cramer)

Five-bar Swordtail

Larval Food Plants: Annona elegance, A. lawii, A. zeylanica, Milusa sp., Uvaria sp.

Remarks: Rare. A single record from the Kabbinnasethuvahalla area of the Park

FAMILY: PIERIDAE

16. *Catopsilia pomona* (Fabricius)

Common Emigrant

Larval Food Plants: Bauhinia racemosa, Buteo monosperma, Cassia fistula, C. tora, C. alata.

Remarks: Common. Observed visiting the flowers of *Lantana camara* and *Cassia* sp.

17. *C. pyranthe* (Linnaeus)

Mottled Emigrant

Larval Food Plants: Cassia auriculata, C. fistula, C. tora, C. alata, Sesbania bispinosa.

Remarks: Uncommon. Found laying eggs on the *Cassia fistula* plant.

18. *Eurema brigitta rubella* (Wallace)

Small Yellow

Larval Food Plants: Cassia spp.

Remarks: Rare. Very few records from the localities surveyed.

19. *E. hecabe simulata* (Moore)

Common Grass Yellow

Larval Food Plants: Acacia spp., Albizzia sp., Caesalpinia spp., Cassia fistula, C. tora, Moulluva spicata, Pithecelobium dulce, Sesbania bispinosa

Remarks: Common in the Park.

20. *E. blanda silhetana* (Wallace)

Three-spot Grass Yellow

Larval Food Plants: *Albizia* spp., *Cassia fistula*, *Delonix regia*, *Moulluva spicata*, *Pithecelobium dulce*.

Remarks: Fairly common in the areas surveyed.

21. *E. laeta laeta* Boisduval

Spotless Grass Yellow

Larval Food Plants: Leguminous plants.

Remarks: Not seen during the survey. Only earlier records available

22. *Delias eucharis* (Drury)

Common Jezebel

Larval Food Plants: *Dendrophthoe falcata*, *Helicanthes elastica*, *Scurrula parasitica*, *Viscum* spp.

Remarks: Found scarcely in the Park.

23. *Leptosia nina nina* (Fabricius)

Psyche

Larval Food Plants: *Capparis* spp., *Cleome viscosa*, *Crateva adansonii*.

Remarks: Fairly common in the Park.

24. *Cepora nerissa phryne* (Fabricius)

Common Gull

Larval Food Plants: *Cadaba fruticosa*, *Capparis* spp.

Remarks: Uncommon in the areas of the Park surveyed.

25. *C. nadina* (Lucas)

Lesser Gull

Larval Food Plants: *Capparis cleghornii*, *C. moonii*, *C. rheedii*.

Remarks: Rare. Found attracted to the flowers of *Vernonia shevaroyensis* at Kemmanagundi area of the Park. The species is protected under Schedule-II of Indian Wildlife (Protection) Act, 1972.

26. *Appias lyncida latifasciata* Moore

Chocolate Albatross

Larval Food Plants: *Capparis cleghornii*, *Crateva adansonii*.

Remarks: Rare. A single observation from the Muthodi area of the Parak. The species is placed under Schedule-II of Indian Wildlife (Protection) Act, 1972.

27. *A. albina* (Boisduval)

Common Albatross

Larval Food Plants: Drypetes oblongifolia, D. roxbughii, D. venusta.

Remarks: Fairly common. The species is protected under Schedule-II of Indian Wildlife (Protection) Act, 1972. The more yellowish form *flava* represented at the Kemmanagundi area of the Park. Found attracted to the flowers of *Vernonia shevaroyensis* along with other butterflies

28. *Appias wardii* (Moore)

Lesser Albatross

Larval Food Plants: Drypetes venusta, Capparis rheedii

Remarks: Rare. Observed at Katteshollae stream along with a small number of Common Jay and Lime Butterfly species. Endemic to Western Ghats, known only from Goa southwards. Protected under Schedule-II of Indian Wildlife (Protection) Act, 1972.

29. *A. indra* (Moore)

Plain Puffin

Larval Food Plants: Drypetes oblongifolia, D. roxbughii.

Remarks: Uncommon. Most of the observations were from high ranges of the Park at Kemmangundi and Hebbaegiri areas.

30. *Pareronia valeria hippia* (Fabricius)

Common Wanderer

Larval Food Plants: Capparis spp.

Remarks: Rare. A single sight record from the Muthodi area. The species is placed under Schedule-II of Indian Wildlife (Protection) Act, 1972.

31. *Hebomoia glaucippe australis* Butler

Giant Orange Tip

Larval Food Plants: Capparis moonii, C. spinosa, Crateva adansonii.

Remarks: Uncommon in the areas surveyed.

32. *Prioneris sita* (C. & R. Felder)

Painted Sawtooth

Larval Food Plants: Capparis tenera, C. zeylanica, C. horrida.

Remarks: Uncommon in the sites surveyed.

33. *Ixias pyrene sesia* Fabricius

Yellow Orange Tip

Larval Food Plants: Capparis sepiaria.

Remarks: Uncommon in the areas surveyed.

Family NYMPHALIDAE

Subfamily SATYRINAE

34. *Melanitis leda leda* (Drury)

Common Evening Brown

Larval Food Plants: *Cyrtococcum* spp., *Oryza sativa*, *Oplismenus compositus*, *Panicum* spp.

Remarks: Fairly common.

35. *Melanitis phedima* (Cramer)

Dark Evening Brown

Larval Food Plants: *Microstegium ciliatum*, *Setaria palmifolia*

Remarks: Rare. A single observation from the Muthodi area of the Park in November 2007.

36. *Melanitis zitenius* (Herbst)

Great Evening Brown

Larval Food Plants: Grass species

Remarks: Common. Many observations from the foothills of Kemmanagundi among the edges of shola forest grasslands. Protected under Schedule-II of Indian Wildlife (Protection) Act, 1972.

37. *Elymnias hypermnestra caudata* Butler

Common Palmfly

Larval Food Plants: *Areca catechu*, *Arenga wightii*, *Calamus* spp., *Zea* spp., *Cocos nucifera* and Ornamental Palms.

Remarks: Uncommon. A few records from the Muthodi area of the Park.

38. *Lethe europa ragalva* Fruhstorfer

Bamboo Treebrown

Larval Food Plants: Bamboos.

Remarks: Rare in the areas surveyed.

39. *Lethe rohria neelgheriensis* Guerin- Meneville

Common Treebrown

Larval Food Plants: *Apluda* sp., *Capillipedium* sp., *Microstegium* sp.

Remarks: Rare. A few sight records from Muthodi area during the November survey.

40. *Lethe drypetis* (Hewitson)

Tamil Treebrown

Larval Food Plants: Bambusa arudinacea

Remarks: Many individuals were sighted at Muthodi area during the survey in November 2007. Upt 6 butterflies were seen on a single day. Also found laying eggs on bamboos, nearby.

41. *Mycalesis perseus typhlus* Fruhstorfer

Common Bushbrown

Larval Food Plants: Oryza spp., Oplismenus compositus.

Remarks: Fairly good population was noted from the Reserve.

42. *M. patina junonia* Butler

Glad-eye Bushbrown

Larval Food Plants: Oryza spp., other Grasses.

Remarks: Fairly common. It is restricted to South India and Sri Lanka.

43. *Mycalesis anaxias* Hewitson

White-bar Bushbrown

Larval Food Plants: Grasses.

Remarks: Fairly common. Common during the November survey. All the observations were from the Muthodi range of the Reserve. Protected under Schedule-II of Indian Wildlife (Protection) Act, 1972.

44. *Orsotrioena medus mandata* (Moore)

Nigger

Larval Food Plants: Imperata sp., Oryza sativa.

Remarks: Uncommon in the Park. The genus is monotypic and the species is found from Sri Lanka to Australia.

45. *Zipoetis saitisi* Hewitson

Tamil Cat's eye

Larval Food Plants: Ochlandra sp.

Remarks: Uncommon. The species is restricted to South India.

46. *Ypthima huebneri huebneri* Kirby

Common Fourring

Larval Food Plants: Grasses.

Remarks: Common. Also sighted from the higher reaches of Kemmanagundi and Hebbaegiri area of the Park.

47. *Ypthima asterope* (Klug)

Common Threering

Larval Food Plants: *Cynodon* sps and other Grasses.*Remarks:* Fairly common. Mostly seen in the lower reaches of the Reserve**48. *Ypthima ceylonica* Hewitson**

White Fourring

Larval Food Plants: Grasses.*Remarks:* Rare. A single observation from the Muthodi range during November 2007.**49. *Ypthima baldus* Fabricius**

Common Fivering

Larval Food Plants: Grasses.*Remarks:* A few sightings from the Park.

Subfamily CHARAXINAE

50. *Charaxes bernardus imna* Butler

Tawny Rajah

Larval Food Plants: *Milusa tomentosa*, *Agalaia roxburghiana*, *Tamarindus indicus**Remarks:* Not seen during the survey. Only earlier records available.**51. *Charaxes solon* (Fabricius)**

Black Rajah

Larval Food Plants: *Bauhinia racemosa*, *Moullava spicata*, *Tamarindus indicus**Remarks:* Not seen during the survey. Only earlier records available.**52. *Polyura athamas athamas* Drury**

Common Nawab

Larval Food Plants: *Albizia lebbek*, *A. julibrisin*, *A. molluccana*, *Adenanthera pavoina*, *Grewia* sp., *Pithecelobium* sp., *Delonyx regia*, *Caesalpinia sappan*, *C. nuga*, *C. bonducella*, *Acacia pennata*, *A. concina*, *A. catechu*.*Remarks:* Fairly common. Many a time observed attracted to birds and Otter droppings.

Subfamily ACRAEINAE

53. *Acraea violae* (Fabricius)

Tawny Coster

Larval Food Plants: *Adenia hondala*, *Passiflora edulis*, *P. foetida*, *P. subpeltata*.

Remarks: Uncommon. It is the only south Indian representative of the subfamily *Acraeinae*. The species is restricted to the Indian subcontinent and Sri Lanka. Found attracted to fresh urine and dung of elephants at Holaerayanahalla along with other butterflies.

Subfamily *HELICONIINAE*

54. *Cupha erymanthis maja* Fruhstorfer
Southern Rustic

Larval Food Plants: *Flacourtia* spp.

Remarks: Fairly well distributed in the Park

55. *Phalanta phalantha phalantha* (Drury)
Common Leopard

Larval Food Plants: *Flacourtia* spp., *Salix* sp., *Smilax* sp.

Remarks: Uncommon in the Park. An avid nectar feeder found attracted to flowers of *Ageratum* and other wild flowers at Kemmanagundi.

56. *Cirrochora thais thais* Fabricius
Tamil Yeoman

Larval Food Plants: *Hydnocarpus alpina*, *H. pentandra*.

Remarks: Fairly common. Restricted to South India and Sri Lanka. Found attracted to bird and otter droppings near stream bed.

57. *Vindula erota saloma* Swinhoe
Southern Cruiser

Larval Food Plants: *Adenia hondala*, *Pasiflora edulis*, *P. subpetala*.

Remarks: Rare. A few observations from the Reserve.

Subfamily *LIMENITIDINAE*

58. *Neptis jumbah jumbah* Moore
Chestnut streaked Sailer

Larval Food Plants: *Bombax ceiba*, *Hibiscus* sp., *Moulluva spicata*, *Pongamia pinnata*, *Thespesia populnea*, *Xylia xylocarpa*, *Dalbergia* sp., *Ziziphus* sp.

Remarks: Uncommon in the areas surveyed.

59. *Neptis hylas varmona* (Moore)
Common Sailer

Larval Food Plants: *Bombax ceiba*, *Canavalia gladiata*, *Corchorus* sp., *Flemingia* sp., *Helicteres isora*, *Vigna cylindrica*, *Triumfetta* sp., *Paracalyx scarioisa*, *Mucuna purpurea*, *Xylia xylocarpa*.

Remarks: One of the most common species of the Park. Found attracted to fresh elephant urine and dung along with other butterfly species

60. *Pantoporia hordonia hordonia* (Stoll)

Common Lascar

Larval Food Plants: *Acacia instia*.

Remarks: Uncommon in the surveyed localities

61. *Athyma ranga karwara* Fruhstorfer

Black Vein Sergeant

Larval Food Plants: *Chionanthus mala-elengi*, *Olea dioica*.

Remarks: Rare. A single observation from the Telabidri area of the Park.

62. *Athyma perius perius* Linnaeus

Common Sergeant

Larval Food Plants: *Glochidion lanceolarum*, *G. velutinum*, *Phyllanthus* sp.

Remarks: Uncommon

63. *Athyma nefte inara* Doubleday

Colour Sergeant

Larval Food Plants: *Glochidion velutinum*, *G. zeylanica*, *Mussaenda frondosa*.

Remarks: Not seen during the survey. Only earlier records available.

64. *Limenitis procris undifragus* Fruhstorfer

The Commander

Larval Food Plants: *Cadaba fruticosa*, , *Mussaenda frondosa*.

Remarks: Uncommon in the areas visited. Found attracted to elephant urine and dung along with other butterfly species.

65. *Kaniska canace viridis* Evans

Blue Admiral

Larval Food Plants: *Smilax* sp., *Dioscorea* sp.

Remarks: Rare. A single observation from the Kabbinnasethuvehalla area of the Park.

66. *Parthenos sylvia virens* Moore

Clipper

Larval Food Plants: *Adenia hondala*, *Tinospora cordifolia*.

Remarks: Fairly common. Many observations from the Park.

67. *Tanaecia lepidea miyana* Fruhstorfer

Grey Count

Larval Food Plants: Careya arborea, Melastoma malabathricum.

Remarks: Uncommon. Protected under Schedule-II of Indian Wildlife (Protection) Act, 1972.

68. *Euthalia aconthea meridionalis* Fruhstorfer

Common Baron

Larval Food Plants: Mangifera indica, Scurrula parasitica, Streblus asper, Anacardium occidentale.

Remarks: Uncommon. Protected under Schedule-II of Indian Wildlife (Protection) Act, 1972.

69. *Dolpha evelina laudabilis* Swinhoei

Red Spot Duke

Larval Food Plants: Anacardium occidentale, Diospyros spp.

Remarks: A single observation from Lalbaghkathri area in Thanigebyle range. Protected under Schedule-II of Indian Wildlife (Protection) Act, 1972.

Subfamily CYRESTINAE

70. *Cyrestis thyodamas indica* Evans

Map Butterfly

Larval Food Plants: Ficus religiosa, F. bengalensis, F. glomerata, F. nemoralis.

Remarks: Uncommon. Mainly found along the running streams and frequently resting on the animal droppings along with other butterflies. Large congregation of about 11 Map butterflies was noted at a stream near Madalagodu region of the Park along with other butterfly species.

Subfamily BIBLIDINAE

71. *Ariadne ariadne indica* (Moore)

Angled Castor

Larval Food Plants: Ricinus communis, Tragia involucrata.

Remarks: Uncommon in the areas surveyed.

72. *A. merione merione* Cramer

Common Castor

Larval Food Plants: Ricinus communis, Tragia involucrata.

Remarks: A few sightings from the Park.

Subfamily APATURINAE

73. *Rohana parisatis* (Westwood)

Black Prince

Larval Food Plants: *Celtis cinnamomea*, *C. lycodoxylon*, *C. tetrandra*.

Remarks: A female butterfly was sighted at Virupakshikhan (Kemmanagundi) area of the Park on 22nd Nov. 2007.

74. *Euripus consimilis* (Westwood)

Painted Courtesan

Larval Food Plants: *Trema orientalis*

Remarks: Not seen during the survey. Only earlier records available.

Subfamily NYMPHALINAE

75. *Junonia hierta hierta* Fabricius

Yellow Pansy

Larval Food Plants: *Barleria* spp., *Hygrophila auriculata*.

Remarks: Fairly common in the areas surveyed. Also observed at mud-puddling point at Holaerayanahalla along with other butterflies.

76. *Junonia orithya swinhoei* (Butler)

Blue Pansy

Larval Food Plants: *Acanthus* sp., *Barleria* sp., *Hygrophila auriculata*, *Justicia neesii*, *J. procumbens*, *Lepidagathis prostrata*.

Remarks: Uncommon. Uncommon. A few sightings from the Park.

77. *J. lemonias* (Linnaeus)

Lemon Pansy

Larval Food Plants: *Barleria* sp., *Hygrophila auriculata*, *Sida rhombifolia*.

Remarks: Fairly common in the Park. Also seen attracted to mud-puddling point (Holaerayanahalla) along with other butterfly species.

78. *J. almana almana* (Linnaeus)

Peacock Pansy

Larval Food Plants: *Acanthus* sp., *Barleria* sp., *Hygrophila auriculata*.

Remarks: Uncommon. A few sightings from the Park.

79. *J. atlites atlites* (Linnaeus)

Grey Pansy

Larval Food Plants: Barleria sp., *Hygrophila auriculata*.

Remarks: Uncommon in the areas surveyed.

80. *J. iphita pluvialis* Fruhstorfer

Chocolate Pansy

Larval Food Plants: Hygrophila auriculata, Justicia neesii, Carvia callosa.

Remarks: Fairly common in the areas surveyed.

81. *Cynthia cardui cardui* (Linnaeus)

Painted Lady

Larval Food Plants: Artemisia sp., *Blumea* sp, *Zornia gibbosa, Tricholepis* sp., *Gnaphalium* sp., *Debregeasia* sp.

Remarks: A few observations from the Park. Also sighted at the higher reaches of Kemmangundi. All the sightings were in November 2007.

82. *Hypolimnas bolina jacintha* Drury

Great Eggfly

Larval Food Plants: Laportea interrupta, Portulaca oleracea, Sida rhombifolia

Remarks: Fairly common in the Park.

83. *H. misippus* (Linnaeus)

Danaid Eggfly

Larval Food Plants: Abutilon sp., *Abelmoscus* sp., *Asystasia lawiana, Barleria cristata, Hibiscus* sp., *Portulaca oleracea*.

Remarks: Common. Most of the sightings were males. Listed in the Schedule - I of Indian Wildlife (Protection) Act of 1972.

84. *Vanessa indica* (Herbst)

Indian Red Admiral

Larval Food Plants: Boehmeria sp., *Girardinia diversifolia, Urtica dioica*

Remarks: A single observation from the higher reaches of Mullayangiri.

Subfamily DANAINAE

85. *Parantica aglea aglea* (Stoll)

Glassy Blue Tiger

Larval Food Plants: Calotropis gigantea, Cerpegia bulbosa, Cryptolepis buchanani, Tylophora indica, T. tenuis.

Remarks: Uncommon. A few observations from the Reserve.

86. *Tirumala limniace exoticus* Gmelin

Blue Tiger

Larval Food Plants: *Asclepias curassavica*, *Calotropis gigantea*, *Tylophora indica*, *Wattakaka volubilis*.

Remarks: A few observations from the Park

87. *Tirumala septentrionis* Butler

Dark Blue Tiger

Larval Food Plants: *Wattakaka volubilis*, *Vallaris heynei*.

Remarks: Fairly common in the surveyed localities

88. *Parantica nilgiriensis* (Moore)

Nilgiri Tiger

Larval Food Plants: Not known.

Remarks: Fairly common in the upper reaches of Kemmanagundi. Found attracted to the flowers of *Vernonia shevaroyensis*, *Ageratum conyzoides*, *Adenostemma laeviana*, etc. A large congregation of twelve butterflies was also noted on a *Ageratum conyzoides* plant at Virupakshikhan area.

89. *Danaus chrysippus chrysippus* (Linnaeus)

Plain or Common Tiger

Larval Food Plants: *Asclepias curassavica*, *Calotropis gigantea*, *Cryptolepis buehneri*.

Remarks: Uncommon. A few observations from the Park.

90. *D. genutia genutia* (Cramer)

Striped Tiger

Larval Food Plants: *Asclepias curassavica*, *Ceropegia intermedia*, *Tylophora tenuis*, *Stephanotis* sp.

Remarks: Uncommon in the areas surveyed.

91. *Euploea core core* (Cramer)

Common Crow

Larval Food Plants: *Ficus bengalensis*, *F. racemosa*, *F. religiosa*, *F. arnottiana*, *Hemidesmus indicus*, *Holarrhena pubescens*, *Ichnocarpus frutescens*, *Nerium odorum*, *N. oleander*, *Streblus asper*, *Tylophora indica*.

Remarks: Fairly common. Small swarms of 10-15 butterflies found along with Blue Tigers and Double-branded crows in the lower reaches of the Park in November 2007.

92. *E. Sylvester coreta* Godart

Double-branded Crow

Larval Food Plants: Ficus hispida, Streblus asper.

Remarks: Fairly common.

93. *Idea malabarica* Moore

Malabar Tree Nymph

Larval Food Plants: Aganosma cymosa, Parsonsia spiralis.

Remarks: Fairly common in the suitable habitats. Endemic to the wet evergreen forests of the Western Ghats.

Subfamily LIBYTHEINAE

94. *Libythea myrrha*(Godart)

Club Beak

Larval Food Plants: Celtis australis, C. tetrandra.

Remarks: Fairly common. Frequently found settling on the damp patches near streams and lake bed.

Family LYCAENIDAE

95. *Abisara echerius prunosa* (Moore)

Plum Judy

Larval Food Plants: Embelia robusta, Ardisia sp.

Remarks: Rare; a few observations from the Park.

96. *Spalgis epius epius* (Westwood)

Apefly

Larval Food: Mealy bugs.

Remarks: Rare in the Park. The larva is carnivorous; it feeds exclusively on mealy bugs (Coccidae).

97. *Castalius rosimon rosimon* (Fabricius)

Common Pierrot

Larval Food Plants: Ziziphus mauritiana, Z. rugosa.

Remarks: Fairly common in the Park.

98. *Caleta caleta decidia* (Hewitson)

Angled Pierrot

Larval Food Plants: Ziziphus rugosa.

Remarks: Common, but less common than Blue Banded Pierrot in the areas surveyed. Found attracted to mud-puddling points.

99. *Tarucus ananda* de Niceville

Dark Pierrot

Larval Food Plants: *Dendrophthoe falcata*, *Ziziphus xylopyrus*, *Loranthus* sp.

Remarks: Rare. A single observation from the Madalagodu area of the Park

100. *Discolampa ethion vavasanus* Fruhstorfer

Banded Blue Pierrot

Larval Food Plants: *Ziziphus mauritiana*, *Z. oenoplia*, *Z. xylopyrus*.

Remarks: Most common Pierrot species of the Park. Found attracted to bird and otter droppings along with a few other butterflies.

101. *Pseudozizeeria maha ossa* (Swinhoe)

Pale Grass Blue

Larval Food Plants: *Nelsonia canescens*, *Strobilanthes* spp., *Oxalis corniculata*, *Tephrosia pauciflora*.

Remarks: Uncommon.

102. *Zizula hylax* (Fabricius)

Tiny Grass Blue

Larval Food Plants: *Hygrophila auriculata*, *Nelsonia canescens*, *Phaulopsis dorsiflora*, *Strobilanthes* spp., *Vicia* spp., *Lantana camara*.

Remarks: One of the most common blue species found in the Park. Often found settling on the bird droppings and other mineral rich wet patches of soils.

103. *Euchrysops cnejus cnejus* (Fabricius)

Gram Blue

Larval Food Plants: *Acacia* spp., *Paracalyx scariosa*, *Ougeinia oojeinensis*, *Pisum sativum*, *Vigna cylindrica*, *V. trilobata*, various grams and beans.

Remarks: Uncommon in the areas surveyed.

104. *Lampides boeticus* (Linnaeus)

Pea Blue

Larval Food Plants: *Butea monosperma*, *Crotalaria* spp., *Pisum sativum*, *Vigna sinensis*, species of gram.

Remarks: Fairly common. Found attracted to mud-puddling points. The species is protected under Schedule-II of Indian Wildlife (Protection) Act, 1972.

105. *Anthene lycaenina* (C & R. Felder)

Pointed Ciliate Blue

Larval Food Plants: Not known

Remarks: Fairly common. Found attracted to mud-puddling points.

106. *Catochrysops strabo* (Fabricius)

Forget-me-not

Larval Food Plants: *Ougeinia dalbegiodes*, *Cylista scriosa*, *Desmodium elegans*, *Schleichera trijuga*.

Remarks: Fairly common. Found attracted to wet patches and mineral rich soils. Most common during the summer months.

107. *Jamides bochus bochus* (Cramer)

Dark Cerulean

Larval Food Plants: *Butea monosperma*, *Milettia peguensis*, *Tephrosia candida*, *Vigna cylindrica*, *Crotalaria* sp., *Pongamia pinnata*, *Xylia xylocarpa*.

Remarks: Rare. A few sightings from the Park.

108. *Jamides celeno aelianus* (Fabricius)

Common Cerulean

Larval Food Plants: *Butea monosperma*, *Abrus precatorius*, *Pongamia pinnata*, *Saraca asoca*, *Xylia xylocarpa*, *Trichilia cannaroides*, *Elettaria cardamomum*.

Remarks: Uncommon. A few sightings during the survey period.

109. *Jamides alecto* (Felder)

Metallic Cerulean

Larval Food Plants: *Elettaria cardamomum*

Remarks: Not observed during the survey. Only earlier records available.

110. *Prosotas nora nora* (Felder)

Common Line Blue

Larval Food Plants: *Acacia catechu*, *Pithecellobium dulce*, and a few unspecified plants from families Combretaceae, Myrtaceae and Sapindaceae.

Remarks: Uncommon. A few sightings from the surveyed localities.

111. *Nacaduba helicon* Felder

Pointed Lineblue

Larval Food Plants: Not known

Remarks: Not seen during the survey. Only earlier records available.

112. *Nacaduba kurava* (Moore)

Transparent 6-Lineblue

*Larval Food Plants: Ardisia humilis, Embelia robusta, Waltheria indica**Remarks:* Rare. A few observation from the Hebbae falls and Holaerayanahalla area during summer survey.**113. *Prosotas dubiosa* (Semper)**

Tailless Lineblue

*Larval Food Plants: Acacia spp., Mimosa pudica, Leucena spp.**Remarks:* Uncommon. Fairly well distributed during the Feb-March survey in the Park. Found attracted to mud-puddling sites along with other blues.**114. *Prosotas noreia* (Felder)**

White-tipped Lineblue

Larval Food Plants: Not known*Remarks:* Not seen during the survey. Only earlier records available.**115. *Talicauda nyseus nyseus* Gurin- Meneville**

Red Pierrot

*Larval Food Plants: Kalanchoe spp.**Remarks:* A few sightings from the Reserve.**116. *Everes lacturnus syntala* Cantlie**

Indian Cupid

*Larval Food Plants: Lotus corniculatus**Remarks:* Many observations from the Reserve during the Feb-March Survey. Often found settling on the mud-puddles along with other blues.**117. *Leptotes plinius* Fabricius**

Zebra Blue

*Larval Food Plants: Albizia lebbek, Dyreophytum indicum, Indigofera sp., Mimosa sp., Plumbago zeylanica, Sesbania bispinosa.**Remarks:* Fairly common. Found settling on the wet places along with other mud-puddling butterflies.**118. *Magisba malaya twaithesi* Moore**

Malayan

Larval Food Plants: Allophylus cobbe, Erioglossum sp., Hemigyrosa sp., Schleicheria oleosa.

Remarks: Uncommon. Avid mud-puddler. Often found near the stream bed.

119. *Acytolepis puspa* (Horsfield)

Common Hedge Blue

Larval Food Plants: *Paracalyx scariosa*, *Hiptage benghalensis*, *Schleichera oleosa*, *Xylia xylocarapa*

Remarks: Fairly common during the survey period.

120. *Celastrina lavendularis* (Moore)

Plain Hedge Blue

Larval Food Plants: Not known

Remarks: Rare. A single observation from the rocky boulders of a stream at Kabbinnasethuvehalla area of the Park

121. *Nepithecops zalmora dharmia* Moore

Quaker

Larval Food Plants: *Glycosmis arborea*.

Remarks: Fairly common in the lower reaches of the Park.

122. *Spindasis vulcanus vulcanus* (Fabricius)

Common Silverline

Larval Food Plants: *Cadaba fruticosa*, *Clerodendrum indicum*, *Allophylus cobbe*, *Canthium* sp., *Ziziphus mauritiana*, *Z. rugosa*.

Remarks: Uncommon in the areas surveyed.

123. *Loxura atymnus atymnus* (Cramer)

Yamfly

Larval Food Plants: *Dioscorea pentaphylla*, *Smilax* sp.

Remarks: Fairly common in the Park.

124. *Rathinda amor* (Fabricius)

Monkey Puzzle

Larval Food Plants: *Ixora coccinea*, *Loranthus* sp.

Remarks: Uncommon in the Park.

125. *Rapala manea schistacea* (Moore)

Slate Flash

Larval Food Plants: *Acacia* sp., *Antidesma acidum*, *Quisqualis indica*, *Ziziphus* sp.

Remarks: Uncommon. A few observations from the Reserve.

126. *Curetis thetis thetis* (Drury)

Indian Sunbeam

*Larval Food Plants: Abrus precatorius, Pongamia pinnata, Derris scandens.**Remarks:* Not seen during the survey. Only earlier records available.**127. *Curetis acuta* Moore**

Toothed Sunbeam

Larval Food Plants: Not known*Remarks:* A single observation at the mud-puddling site (Holarayanahalla) along with other butterflies.**128. *Curetis siva* Evans**

Shivas Sunbeam

*Larval Food Plants: Ougenia oojeiensis**Remarks:* Rare. A single observation from the Park. Endemic to southern Western Ghats from Goa southwards.**129. *Horsfieldia anita* Moore**

Leaf Blue

*Larval Food Plants: Olax imbricata, O. scandens**Remarks:* Not seen during the survey. Only earlier records available.**130. *Arhopala amantes* (Hewitson)**

Large Oakblue

*Larval Food Plants: Terminalia alata, T. catapa, T. paniculata, Lagrestoemia microcarpa, L. regia, Xylia xylocarpa.**Remarks:* Rare. A single observation from the damp patches near a stream at Hebbale falls area.**131. *Catapaecilma elegans* Druce**

Common Tinsel

*Larval Food Plants: Bambusa arundinacea.**Remarks:* Rare. A single observation from the Park. Found among the mixed mud-puddling butterflies sighted at the mass mud-puddling site of Holarayanahalla.**132. *Chliaria othona* (Hewitson)**

Orchid Tit

*Larval Food Plants: Epiphytic orchids.**Remarks:* Not seen during the survey. Only earlier records available.

Family HESPERIIDAE

133. *Matapa aria* Moore

Common Redeye

Larval Food Plants: Bambusa arundinacea.

Remarks: Rare. A single observation from Muthodi area during November 2007.

134. *Hasora taminatus taminatus* Hubner

White Banded Awl

Larval Food Plant: Brachypterum scandens.

Remarks: Rare. A single observation from Hebbae falls area.

135. *Hasora chromus chromus* (Cramer)

Common Banded Awl

Larval Food Plants: Pongamia pinnata, Ricinus communis, Trichilia cannaroides.

Remarks: Uncommon. Very few sightings from the localities visited.

136. *Badamia exclamationis* (Fabricius)

Brown Awl

Larval Food Plants: Terminalia bellirica, Cmbretum spp.

Remarks: Not seen during the present survey. Only earlier records available.

137. *Celaenorrhinus leucocera* (Kollar)

Common Spotted Flat

Larval Food Plants: Carvia callosa, Asystasia gangetica, Ecboium ligustrinum, Eranthemum roseum.

Remarks: Many observations from the Park. Found attracted to the flowers of *Urena lobata*.

138. *C. ambareesa* (Moore)

Malabar Spotted Flat

Larval Food Plants: Carvia callosa, Daedalacanthus purpurascens, Eranthemum roseum.

Remarks: Rare. A single observation from the Lakkavalli area. Found resting on the walls of Forest Range office in February 2009.

139. *Tagiades gana silvia* Evans

Suffused Snow Flat

Larval Food Plants: Dioscorea sp.

Remarks: Uncommon in the sites surveyed.

140. *T. litigiosa litigiosa* Moschler

Water Snow Flat

*Larval Food Plants: Dioscorea sp., Smilax spp.**Remarks:* Fairly common. Also observed at the higher reaches of Kabbinnasethuvehalla area frequently attending on the flowers of *Vernonia shevaroyensis***141. *Psedocoladenia dan dan* (Fabricius)**

Fulvous Pied Flat

*Larval Food Plants: Achyranthes aspera**Remarks:* Uncommon. A single sight record from Hebbaagiri area.**142. *Pseudocladenia indrana* (Moore)**

Tricolour Pied Flat

*Larval Food Plants: Xylia xylocarpa.**Remarks:* Uncommon in the sites surveyed. Sighted at Kabbinnasethuvehalla area on *Vernonia shevaroyensis* flowers.**143. *Sarangesa purendra pandra* Evans**

Spotted Small Flat

*Larval Food Plants: Asystasia spp.**Remarks:* Uncommon in the areas surveyed.**144. *Sipalia Galba galba* (Fabricius)**

Indian Grizzled Skipper

*Larval Food Plants: Hibiscus sp., Sida rhombifolia, Waltheruia indica.**Remarks:* Rare. A few sightings from the Park.**145. *Ampittia discorides* (Fabricius)**

Bush Hopper

*Larval Food Plants: Oryza sativa.**Remarks:* Fairly common in the surveyed localities.**146. *Iambrix salsala lutipennis* (Plotz)**

Chestnut Bob

*Larval Food Plants: Bambusa arundinacea and grasses.**Remarks:* Fairly well distributed during the survey.**147. *Psolos fuligo subfasciatus* Moore**

Coon

Larval Food Plants: Stachyphrynium spicatum, Zingiber sp.

Remarks: Fairly common in the Park.

148. *Notocrypta curvifascia curvifascia* (Felder & Felder)

Restricted Demon

Larval Food Plants: *Costus speciosus*, *Curcuma* sp., *Hedychium* spp., *Kempferia rotunda*, *Zingiber* sp.

Remarks: Uncommon in the areas surveyed.

149. *Udaspus folus* (Cramer)

Grass Demon

Larval Food Plants: *Curcuma* sp., *Hedychium* spp., *Zingiber* spp.

Remarks: A few sightings from the Park.

150. *Suastus gremius gremius* (Fabricius)

Indian Palm Bob

Larval Food Plants: *Caryota urens*, *Cocos nucifera*, *Phenix acaulis*, *P. loureirii*.

Remarks: Uncommon. Found attracted to flowers.

151. *Gangara thyrsis thyrsis* (Fabricius)

Giant Redeye

Larval Food Plants: *Calamus rotang*, *Caryota urens*, *Cocos nucifera*, *Phenix acaulis*, *P. loureirii*, ornamental palms.

Remarks: Not found during the present survey; only earlier records.

152. *Taractrocera maeivius sagara* Moore

Common Grass Dart

Larval Food Plants: Grasses.

Remarks: Not found during the present survey; only earlier records..

153. *T. ancilla bambusae* (Moore)

Dark Palm Dart

Larval Food Plants: *Oryza* spp., Bamboos.

Remarks: Uncommon during the survey period.

154. *Barbo cinnara* (Wallace)

Rice Swift

Larval Food Plants: *Cymbopogon* sp., *Eragrostis* sp., *Ischaemum* sp., *Oryza sativa*, *Pennisetum* sp.

Remarks: Uncommon in the areas surveyed.

155. *Caltoris kumara* (Moore)

Blank Swift

Larval Food Plants: Grasses*Remarks:* Not found during the present survey; only earlier records.**156. *Pelopidas mathias mathias* (Fabricius)**

Small Branded Swift

Larval Food Plants: Grasses*Remarks:* Uncommon in the Park.**157. *Halpe homolea* (Hewitson)**

Indian/Ceylon Ace

Larval Food Plants: Bamboos*Remarks:* A single observation from Muthodi area**158. *Halpe porus* (Mabille)**

Moore's Ace

Larval Food Plants: Bamboos*Remarks:* A single observation from Holarayanahalla (Thanigebyle range) area. Found attracted to fresh elephant urine and dung along with other butterflies.**159. *Halpe honorei* de Niceville**

Madras Ace

Larval Food Plants: Bamboos*Remarks:* Endemic to southern Western Ghats. A single observation from Virupakshikhan area of the Park.**160. *Taractrocera maeivius* (Fabricius)**

Common Grass Dart

Larval Food Plants: Grasses*Remarks:* A few observations from the Park.**161. *Telicota ancilla* (Herrich-Schäffer)**

Dark Palm Dart

Larval Food Plants: *Calamaus* spp., *Cocos nicifera*, *Imperata cylindrical*, *Oryza* spp., *Saccharum* spp.*Remarks:* Uncommon during the survey period.

162. *Aeromachus pygmaeus* (Fabricius)

Pygmy Grass/Scrub-Hopper

Larval Food Plants: Not known

Remarks: Rare. A single observation from the Park. Found attracted to the bird droppings at Virupakshikhan area of the Park on 22nd November 2007.

163. *Caprona ransonnetti* (Felder)

Golden Angle

Larval Food Plants: *Helicteres isora*.

Remarks: A single observation from Madalagodu area of the Park

164. *Odontoptilum angulata* (Felder)

Chestnut/Banded Angle

Larval Food Plants: *Hibiscus tiliaceus*, *Ceiba* sp., *Urena lobata*, *Alophylus cobbe*.

Remarks: Not found during the present survey; only earlier records.

165. *Spialia galba* (Fabricius)

Indian Grizzled/Indian Skipper

Larval Food Plants: *Hibiscus* sp., *Sida rhombifolia*, *Waltheria indica*

Remarks: Uncommon. Often found near the damp patches.

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CHILOPODA : SCOLOPENDROMORPHA

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INTRODUCTION

Centipedes are soil arthropods of economic importance, playing a major role as components of terrestrial food chains and also aid in the process of fragmentation and decomposition of leaf litter. Out of the 687 species, including subspecies, belonging to 17 valid genera known globally, 90 species, belonging to 8 genera of family Scolopendridae and 3 genera of the family Cryptopidae are known from India (Khanna, 2008). Centipede fauna of Deccan plateau and Himalayan ecosystems are taxonomically fairly well documented (Jangi & Dass, 1984, Khanna 2001, 2003, 2008, Yadav, 1993 a, b, 2009). Though southern Western Ghats provide rich habitats for the centipedes, little information is available on their diversity from the area (Khanna, 2010, Sureshan et al, 2006, Yadav, 2001). The present communication is based on the study of a small collection of Scolopendrid centipedes made from the Bhadra Wildlife Sanctuary, Karnataka, located in the southern Western Ghats. A total of 4 species belonging to 2 genera and 2 subfamilies are reported here from Bhadra Wildlife sanctuary. The specimens studied are deposited in Zoological Survey of India, Western Ghat Regional Centre, Calicut, Kerala.

SYSTEMATIC ACCOUNT

Phylum ARTHROPODA

Class CHILOPODA

Order SCOLOPENDROMORPHA

Family SCOLOPENDRIDAE

Subfamily SCOLOPENDRINAE

1. *Cormocephalus dentipes* Pocock, 1891

1891. *Cormocephalus dentipes* Pocock. *Ann.nat.Hist.Soc.*, 6.7.6

1984. *Cormocephalus pseudonudipes*, Jangi & Dass, *J.Scient.Indl.Res.*, 43(2):37

2001. *Cormocephalus dentipes* Pocock, Lewis, 2001. *Historia Naturalis Bulgarica*, 13:58

2009. *Cormocephalus dentipes* Pocock, Yadav. *Fauna of Bhimasankar Wildlife Sanctuary, Conservation area Series*, 42: 224

Diagnosis: Length 51mm (approx.). All legs without tarsal spurs. Dental plate of Maxillipedes with 4 teeth and a post-dental spur. 1-20th tergal segments with a pair of complete paramedian sutures; endtergite without longitudinal median sulcus; lateral tergal emargination present on segments 15-21. Sternites punctate and with 2 complete paramedian sutures on 2-20. Coxopleural process tipped with 2 spines.

Material examined: 1 ex. India: Karnataka: Bhadra WLS, Rashiguda, forest range - Muthhod, N 13° 25' 05", E 75° 39' 46", Alt. 1232 Metre, 16.xi.2006, Coll.K.G Emiliyamma (Reg no: ZSI/WGRC/I-R/INV-2065).

Distribution : India : Madhya Pradesh , Orissa, Karnataka , Kerala, W. Bengal, Andaman-Nicobar Islands, Uttar Pradesh, Bihar, Delhi, Himachal Pradesh, Meghalaya, Maharashtra, Mizoram, Uttarakhand

Remarks: The species is endemic to India and reported here for the first time from Karnataka. In the specimen studied an abnormality is observed on the right anal-leg prefemur. It appears to be incompletely two segmented and with varying distribution pattern of spines. Besides, the right coxopleuron lacks lateral spine.

Subfamily OTOSTIGMINAE

Tribe OTOSTIGMINI

2. *Rhysida lithobioides paucidens* Pocock, 1897

1897. *Rhysida paucidens* Pocock, D.Smith, Unknown African Countries, app.c, p.403.

1930. *Rhysida lithobioides paucidens*. Attems, *Das Tier., Scolopendromorpha*, 54(2):188.

2001. *Rhysida lithobioides paucidens* Pocock. Khanna. *Ann. For.*, 9 (2):211.

2008. *Rhysida lithobioides paucidens* Pocock. Khanna. *Biosystematica.*, 1(20):40

Diagnosis: Length 49mm (approx). 18 antennomeres with minute hairs. Sternites with anteriorly confined short suture, first 8 or more pair of legs with 2 tarsal spur. Coxopleural process without lateral spines and tipped with 2 spines, 21st Sternite hardly tapering posteriorly.

Material examined : 1 ex (anal leg broken) India: Karnataka, Bhadra WLS. Sukhlahatti Guest House, Lakkavalli, N 13° 36' 87" E 75° 39' 07", Alt. 734 Metre, 4.xi.2007. Coll.K.G Emiliyamma. (Reg no: ZSI/WGRC/I-R/INV-2068).

Distribution : India: Kerala, Tamil Nadu, Maharashtra, Uttarakhand Karnataka.

Remarks: This species occurs in Deccan peninsula and Uttarakhand and reported here for the first time from Karnataka

3. *Rhysida lithobiodes trispinosus* Jangi & Dass, 1984

1984. *Rhysida lithobiodes trispinosus* Jangi & Dass, .*Scient.Indl.Res.*, **43**(2):48

2001. *Rhysida lithobiodes trispinosus* Jangi & Dass.Khanna. *Ann.For.*, **9**(2):211

2008. *Rhysida lithobiodes trispinosus* Jangi & Dass.Khanna.*Biosystematica*, **1**(2):40

Diagnosis: Length. 62mm (approx). Antennae with 21 antennomeres, basal 3 glabrous. Cephalic plate smooth with a short median groove anteriorly. Tergites smooth, punctured and with a complete paramedian suture on tergites 4 - 20. 21st tergite without sulcus. Lateral emargination from 13th tergite onwards. Sternites with short paramedian sulci confined anteriorly. 21st Sternite tapering caudad and with prominent convex lateral margins and concave posterior margin. Dental plate with 4 teeth and a post-dental spur each; median prefemoral process quadridentate. Coxopleura with conical end and tipped with 3 spines.

Material examined: 1 ex. (anal legs broken) India: Karnataka: Bhadra WLS, Kodhi, Forest range- Hebbal, N 13° 28' 83" E 75° 32' 52", Alt. 754 Metre , 18.xi.07, Coll.Md.Jafer Palot. Reg No: ZSI/WGRC/I-R/INV-2067.

Distribution: India, Kerala, Tamil Nadu, Maharashtra, Karnataka, Uttar Pradesh.

Remarks: This species is endemic to Deccan.

4. *Rhysida* sp.

Diagnosis: Length 51mm (approx). Tergites except the anterior ones with complete paramedian sutures. Tergite preceding 21st leg bearing segments not marginate,

Material examined: 1 ex, India: Karnataka, Bhadra WLS Mathikere. Forest Range- Lakkavalli N 13° 42' 54" E 75° 37' 97", Alt. 652 Metre , 28.ii.2009. Coll.Md.Jaffer Palot. (Reg.No. ZSI/WGRC/I-R/INV-2069).

Remarks. The specimen comes closer to *Rhysida immarginata*, but not confirmed due to lack of anal legs.

SUMMARY

Four species of Scolopendrid centipedes belonging to two genera under two subfamilies have been recorded from Bhadra Wildlife Sanctuary, Karnataka, of which *Rhysida lithobioides paucidens* and *Cormocephalus dentipes* are first records from Karnataka. All species are reported for the first time from the Sanctuary.

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PISCES

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INTRODUCTION

Karnataka state is one among the states in the country having highly-rich ichthyofaunal diversity. Eminent ichthyologists/zoogeographers of the earlier period such as Jerdon (1849), Day (1878), Blanford (1901), etc. had made pioneering contributions to the knowledge on the ichthyofaunal diversity and richness of the State of Karnataka. Subsequent workers like Narayan Rao (1920), Narayan Rao and Sheshachar (1927), Hora (1937, 1942), Bhimachar (1942, 1945), Bhimachar and Subarao (1947), Chacko and Kurien (1948), etc., and, in the recent period, Menon (1987, 1999), Jayaram (1995, 1999, 2006) and Talwar and Jhingran (1991) further enriched the ichthyofaunal knowledge, documenting considerable wealth of information on diversity and distribution of fishes known from the region. Furthermore records of discoveries and descriptions of fish species new to science have also emanated from the state as a result of the augmented efforts on survey and monitoring-cum-inventorying works, under various biodiversity-documentation programmes (Arunachalam *et al*, 1997; Bhat, 2002; Chandrashekhariah *et al*, 2000; Sreekantha, *et al*, 2006; etc.).

Bhadra Wildlife Sanctuary (BWLS) is drained by the Bhadra River, a tributary of the river Tungabhadra. Its western border abuts the backwaters of the Bhadra Dam. The embankment areas of the reservoir and the vicinities further beyond have riparian forest cover that nurtures significant biodiversity of flora and fauna. The freshwater-habitat regime of the sanctuary constituted by the stream-tributaries and the dam-reservoir is the prime hydrological imprint of the sanctuary's ecosystem, veritably functioning as the life-support system for both terrestrial and aquatic flora and fauna.

An exclusive work on the ichthyofaunal diversity of the BWLS is not available, but for certain unauthenticated enumeration or listing of fish species. The Bhadra reservoir harbours rich fish life of diverse indigenous species, including aqua-culture species/varieties of food fishes. The introduction of culture fishery in the reservoir waters has

influenced local-community people living in the fringe and surrounding zones of the sanctuary ensuring them sustainable livelihoods.

The present account deals with the taxonomic study of the fish fauna of Bhadra Wildlife sanctuary, Karnataka, based on the collections made during the field surveys conducted in the sanctuary. The fish-samples collected altogether comprised of 28 species, including an exotic species, under 23 genera of 8 families and 4 orders. The identification of fishes is based on the works of Day (1875-78), Talwar and Jhingran (1991), Jayaram (1999; 2006) and Menon (1999). The classification followed is after Nelson (2006).

SYSTEMATIC LIST

Class	OSTEICHTHYES
Subclass	ACTINOPTERYGII
Infraclass	TELEOSTEI
Order	OSTEOGLOSSIFORMES
Family	NOTOPTERIDAE

1. *Notopterus notopterus* (Pallas)

Order	CYPRINIFORMES
Family	CYPRINIDAE
Subfamily	DANIONINAE

2. *Barilius bakeri* Day
3. *Barilius canarensis* (Jerdon)
4. *Salmophasia boopis* (Day)
5. *Devario malabaricus* Jerdon
6. *Rasbora daniconius* (Hamilton)

Subfamily	CYPRININAE
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7. *Cyprinus carpio* Linnaeus
8. *Tor khudree* (Sykes)
9. *Osteobrama vigorsii* (Sykes)
10. *Barbodes sarana subnasutus* (Valenciennes)
11. *Puntius amphibius* Valenciennes
12. *Puntius bimaculatus* (Bleeker)
13. *Puntius chola* (Hamilton)
14. *Puntius ticto* (Hamilton)

15. *Puntius vittatus* (Day)
16. *Osteochilichthys nashii* (Day)
17. *Catla catla* (Hamilton)
18. *Labeo rohita* (Hamilton)
19. *Garra mullya* (Sykes)

Family BALITORIDAE
Subfamily BALITORINAE

20. *Bhavana australis* (Jerdon)

Subfamily NOEMACHEILINAE

21. *Mesoemacheilus triangularis triangularis* Day

Order SILURIFORMES
Family BAGRIDAE

22. *Mystus cavasius* (Hamilton)

Family SILURIDAE

23. *Ompok bimaculatus* (Bloch)

Order PERCIFORMES
Family AMBASSIDAE

24. *Chanda nama* (Hamilton)

25. *Parambassis thomassi* (Day)

26. *Pseudambassis ranga* (Hamilton)

Family BELONTIDAE

27. *Pseudosphromenus cupanus* (Cuvier)

Family CHANNIDAE

28. *Channa gachua* Hamilton

SYSTEMATIC ACCOUNT

Order OSTEOGLOSSIFORMES
Family NOTOPTERIDAE

1. *Notopterus notopterus* (Pallas)

1762. *Gymnotus notopterus* Pallas, *Spicil. Zool.*, 7:40, pl.6, fig.2 (type-locality: ? Indian Ocean)

1991. *Notopterus notopterus*, Talwar and Jhingran, *Inland Fishes of Indian and Adjacent countries*, Vol. 1: 64-65.

1999. *Notopterus notopterus*, Jayaram, *The Freshwater Fishes of the Indian Region*: 19-20

Material examined: 1ex. 58 mm SL, V/F. 1752, Bhadra Reservoir, 12.xi.2006, K.G. Emiliyamma.

Disribution: India, Myanmar, Bangladesh, Indonesia, Malaysia, Nepal Pakistan, Thailand.

Order CYPRINIFORMES
Family CYPRINIDAE
Subfamily DANIONINAE

2. *Barilius bakeri* Day

1865. *Barilis bakeri* Day, Proc. zool. Soc. Lond., p. 305 (type-locality: Mundakayam, Kerala).

1991. *Barilius gatensis*, Talwar and Jhingran, *Inland Fishes of India and Adjacent countries*, 1: 343.

Material examined: 1ex. 93 mm SL, V/F. 2201, Theggada-gudda, 17.xi.2007, M. J. Palot; 1 ex., 38 mm SL, V/F. 2211, Madlakadu, 15.xi.2007, M. J. Palot.

Disribution: India: Western Ghats: Kerala and Karnataka.

Remarks: The identity of the specimen as *Barilius bakeri* Day was confirmed by the presence of a single row of large spots on the body, and maxilla extending to middle of orbit.

3. *Barilius canarensis* (Jerdon)

1849. *Opsarius canarensis* Jerdon, Madras J. Lit. Sci., 15p. 329 (type locality: Canra).

1870. *Barilius canarensis*, Day, Proc. zool. Soc. Lond., p. 374.

1991. *Barilius canarensis*, Talwar and Jhingran, *Inland Fishes of India and Adjacent countries*, Vol. 1: 1: 347.

Material examined: 1 ex., 85 mm SL, V/F. 2210, Madlakadu, 15.xi.'07, M. J. Palot.

Disribution: India: Western Ghats: Kerala and Karnataka.

Remarks: *Barilius canarensis* is easily distinguishable by the presence of two or more rows of large spots on the body, and maxilla extending to the anterior one-third of the orbit.

4. *Salmophasia boopis* (Day)

1873. *Chela boopis* Day, Proc. zool. Soc. Lond., p. 708 (type locality: South Canara).

1991. *Salmostoma boopis*, Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, Vol. 1: 322.

1998. *Salmophasia boopis*, Kottelat, *J. South Asian nat. Hist.*, 3(1): 108-110

Material examined: 9 exs. 44.5-48.8 mm SL, V/F. 2224, Lakkavally, 6xi.2006, K. G. Emiliyamma; 24 exs., 65-80.2 mm SL, V/F. 2208, Bhadra Reservoir, 21.ii.2007, M. J. Palot; 29 exs., 65-85.4 mm SL, V/F. 2199, Mathikere, Mosalekovu, 28.ii.2007, M. J. Palot; 15 exs., 60-82.8 mm SL, V/F. 2203, Mosalekovu, 27.ii.2009, M. J. Palot.

Disribution: Peninsular India: Western Ghats: Karnataka and Maharashtra.

5. *Devario malabaricus* Jerdon

1849. *Perilampus malabaricus* Jerdon, *Madras J. Lit. Sci.*, 15: 325 (type-locality: Malabar).

1991. *Danio malabaricus*, Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, Vol. I: 370-371.

2003. *Devario malabaricus*, Fang Farg, *Copeia*, (4): 714-728.

Material examined: 1 ex. 30.5 mm SL, V/F. 2218, Lakkavally, 6.xi.2006, K. G. Emiliyamma.; 4 exs., 28-58.8 mm SL, V/F. 2215, Lakkavalli, 7.xi.2006, K. G. Emiliyamma; 5 exs., 20-70.5 mm SL, V/F. 2213, Madlakadu, 15.xi.2007, M. J. Palot; 15 exs., 20-55.4 mm SL, V/F. 2193, Hebbae falls, 4.iii.2009, M. J. Palot; 82 exs., 33-72.8 mm SL, V/F. 2195, Lalbugh Kathri, 2.iii.2009, M. J. Palot; 12 exs. 27-36.6 mm SL, V/F. 2204, Lakkavally, 27.ii.2009, M. J. Palot.

Disribution: Peninsular India: From headwaters of Krishna River in Maharashtra, Karnataka to Kerala. Sri Lanka.

6. *Rasbora daniconius* (Hamilton)

1822. *Cyprinus daniconius* Hamilton, *Fish Ganges*, p. 327, pl. 15, Fig. 89 (type locality : Rivers of southern Bengal).

1878. *Rasbora daniconius*, Day, *Fish. India*, p. 584, pl. 146, fig. 2, 3.

1991. *Parluciosoma daniconius*, Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, Vol. I: 382-383.

1999. *Rasbora daniconius*, Jayaram, *Freshwater Fishes of the Indian Region*: 82-83.

Material examined: 5 exs., 43-67.3 mm SL., V/F. 2217, Bhadra, Lakkavalli, 6.xi.2006, K. G. Emiliyamma; 1 ex., 42.3 mm SL, V/F. 1746, Hipla, 12.xi.2006, K. G. Emiliyamma; 25 exs., 50-94 mm SL, V/F. 2194, Lalbugh Kathri, 2/iii.2009, M. J. Palot.

Disribution: Throughout India. Sri Lanka. Pakistan. Nepal. Bangladesh. Myanmar and Thailand.

7. *Cyprinus carpio* Linnaeus

1758. *Cyprinus carpio* Linnaeus, *Systema Naturae*, ed. 10, 1: 320 (Type locality: Europe)

1991. *Cyprinus carpio*, Talwar and Jhingran, *Inland Fish*, 1: 184.

Material examined:

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Material examined:

Disribution: Central Asia

Remarks: An exotic species widely distributed in inland waters (reservoirs) of the country through pisciculture practices.

8. *Tor khudree* (Sykes)

1839. *Barbus khudree* Sykes, *Trans zool. Soc. Lond.*, 2:357 (type locality: Mulla Mutha River nr. Poona, Maharashtra).

1991. *Tor khudree*, Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, Vol. I: 303-305.

Material examined: 1 ex., 127.5 mm SL, V/F. 13892, Bhadra Reservoir, 12.xi.2006, K. G. Emiliyamma.

Disribution: India: Deccan and the entire Peninsular India; Sri Lanka.

9. *Osteobrama vigorsii* (Sykes)

1841. *Rohtee vigorosii* Sykes, *Trans.zool. Soc. Lond.*, 2: 364, pl. 63, fig. 3 (type-locality: Bheema river at Pairgoan, Maharashtra)

1844. *Leuciscus duavaucelli* Valenciennes, *Hist. Nat. Poiss.*, 17: 77, pl.488 (figured as *Leuciscus alfredianus*) (type-locality: Bombay); Hora and Misra, 1940, *Rec. Indian Mus.*, 42(1): 160 (Status and type-locality discussed)

Material examined: 1 ex., 26.5 mm SL., V/F.1745, Hippla, 12.xi.2006, K.G. Emiliyamma; 1 ex., 125 mm SL, V/F. 1745 b, Bhadra Reservoir, 21.xi.2007, M. J. Palot.

Disribution: India: Krishna and Godavari drainage systems, and Orissa and Maharashtra.

10. *Barbodes sarana subnasutus* (Valenciennes)

1842. *Barbus subnasutus* Valenciennes, *Hist. nat. Poss.*, 16: 154 (type-locality: Pondicherry).

1991. *Puntius sarana subnasutus*, Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, Vol. I: 285-286.

1999. *Barbodes sarana subnasutus*, Menon, *Check list-Freshwater Fishes of India. Rec. zool. Surv. India, Occ. Paper No. 175*: 72-73.

Material examined: 1 ex. 120 mm SL, V/F. 2198, Lalbugh Kathri, 2. iii.2009, M. J. Palot.

Disribution: India: Peninsular: Krishna River and South.

11. *Puntius amphibius* (Valenciennes)

1842. *Capoeta amphibia* Valenciennes, *Hist. nat. Poiss.*, **16**: 282, pl. 478 (type-locality: Bombay).

1991. *Puntius amphibius*, Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, Vol. I: 257-258.

Material examined: 3 exs., 29.6 - 38.3 mm SL, V/F. 1749, Hipla, Hebbae, 12.xi.2006, K.G. Emiliyamma

Disribution: India: Peninsular India upto Orissa and Rajasthan. Sri Lanka.

12. *Puntius bimaculatus* (Bleeker)

1864. *Gnathopogon bimaculatus* Bleeker, *Verb. nat. Holl. Maatsch. Haarlem*, **2**(20): 17, pl. 4, fig. 1 (type-locality: Ceylon [Sri Lanka]).

1952. *Puntius bimaculatus*, Deraniyagala, *Coloured Atlas Vert.* Ceylon (Sri Lanka).

1991. *Puntius bimaculatus*, Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, Vol. I: 259-260.

Material examined: 1ex. 40.6 mm SL, V/F. 2230, Lakkavally, 6.xi.2006, K. G. Emiliyamma.

Disribution: India: Peninsular India. Sri Lanka.

13. *Puntius chola* (Hamilton)

1822. *Cyprinus chola* Hamilton-Buchanan, *Fishes of Ganges*: 312, 389 (type-locality: Northeastern parts of Bengal).

1991. *Puntius chola*, Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, Vol. I: 263-265.

Material examined: 2 exs. 66.5-70 mm SL, V/F. 13892, Hipla, Hebbae, 12.xi.2006, K. G. Emiliyamma.

Disribution: India, Pakistan, Nepal, Bangladesh, Sri Lanka and Burma.

14. *Puntius ticto* (Hamilton)

1822. *Cyprinus ticto* Hamilton-Buchanan, *Fishes of Ganges*: 314, 398, pl. 8, fig. 87 (type-locality: south-eastern parts of Bengal).

1991. *Puntius ticto*, Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, Vol. I: 291-292.

Material examined: 3 exs., 25-35 mm SL, V/F. 2219, Bhadra dam-site, 7.xi.2006, K. G. Emiliyamma; 3 exs., 30-38.6 mm SL, V/F. 2197, Lalbugh Kathri, 2.iii.2009, M. J. Palot.

Disribution: India, Nepal, Pakistan and Bangladesh.

15. *Puntius vittatus* Day

1865. *Puntius vittatus* Day, *Proc. zool. Soc. Lond.*, p. 303 (type locality: Madras).

1878. *Barbus vittatus*, Day, *Fish. India*, p. 582, pl. 144, fig. 2.

1991. *Puntius vittatus*, Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, Vol. I: 293-294.

Material examined: 2 exs., 25.4 mm SL., V/F. 1747, Hipla, 12.xi.2006, K. G. Emiliyamma.

Disribution: India: Goa, Karnataka, Kerala, Kutch, Orissa, Rajasthan, Tamil Nadu; Pakistan. Sri Lanka.

16. *Osteochilichthys nashii* (Day)

1868. *Barbus nashii* Day, *Proc. zool. Soc. London*, p. 584 (Type locality: Fraserpett river, Coorg dist., Karnataka).

1942. *Osteochilus (Osteochilichthys) nashii*, Hora, *Rec. Indian Mus.*, 44(1): 3, fig. 2b.

1999. *Osteochilichthys nashii*, Jayaram, *The Freshwater Fishes of the Indian Region*: pp. 125, 126.

Material examined: 1 ex. 130.2 mm SL, V/F. 1789, Bhadra Reservoir, 12.xi.2006, K. G. Emiliyamma.

Disribution: India: Western Ghats of Karnataka and Kerala.

Remarks: *Osteochilichthys nashii* has the body depth 3.2-3.6 times in SL, lateral line scales 40-43, and presence of a faint black band from eye to center of caudal fin.

17. *Catla catla* (Hamilton)

1842. *Gibelion* Heckel, in: *Russegger, Reisen in Europe, Asia and Africa, etc.*, 1(10: 1014 (type-species: *Cyprinus catla* Hamilton-Buchanan)

1844. *Catla* Valenciennes, *Hist. Nat. Poiss.*, 18: 140 (type-species: *Catla buechanani* Valenciennes = *Cyprinus catla* Hamilton-Buchanan.

1991. *Catla catla*, Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, Vol. I: 163-165.

Material examined: 1 ex., 275 mm SL, V/F. 2210, Bhadra Reservoir, 21.xi.2007, M. J. Palot.

Disribution: **India**: Northern India, transplanted into the rivers/reservoirs of South India; Pakistan; Nepal; Myanmar; Sri Lanka and China.

18. *Labeo rohita* (Hamilton)

1822. *Cyprinus rohita* Hamilton -Buchanan, *Fishes of Ganges*: 301, 388, pl. 36, fig. 85

(Type-locality: Freshwater rivers of Gangetic provinces).

1877. *Labeo rohita*: Day, *Fishes of India*: 538, pl. 127, fig. 4.

1991. *Labeo rohita*, Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, Vol. I: 219-220.

Material examined: 1 ex. 268 mm SL, V/F. 2211, Bhadra Reservoir, 21.xi.2007, M. J. Palot.

Distribution: India: North and Central India transplanted into the rivers/reservoirs of South India; Pakistan; Bangladesh; Nepal and Burma.

19. *Garra mullya* (Sykes)

1849. *Chondrostoma mullya* Sykes, *Trans. zool. Soc. Lond.*, 2: 359, pl. 62 fig.3 (type locality: Bheema river at Daunde).

1878. *Discognathus lamta* Day (in part), *Fish. India*, p. 527, pl. 122, fig. 4 & pl. 113, fig. 1.

1991. *Garra mullya*, Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, Vol. I: 429.

Material examined: 1 ex., 55 mm SL, V/F. 2212, Madlakadu, 15.xi.2007, K. G. Emiliyamma; 4 exs., 40.5-50.8 mm SL, V/F. 2296, Holeara-halla, 2.iii.2009, K. G. Emiliyamma.

Distribution: Throughout India except Assam and the Himalaya.

Family: Balitoridae

Subfamily: Balitorinae

20. *Bhavana australis* (Jerdon)

1849. *Platycara australis* Jerdon, *Madras J. Lit. & Sci.* 15: 333 (type-locality: Walliar, Nilgiris).

1991. *Bhavana australis*, Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, Vol. I: 449-450.

Material examined: 1 ex., 96.6 mm SL, V/F. 2192, Mosalekov, 4.iii.2009, M. J. Palot.

Remarks: Head with minute tubercles, irregular spots and blotches on body, ventral surface pale and scaleless a little beyond pelvic fins, caudal fin forked and the lower lobe longer.

Distribution: India: Central and Southern Western Ghats.

Subfamily NOEMACHEILINAE

21. *Mesoemacheilus triangularis triangularis* Day

1865. *Nemacheilus triangularis* Day, *Proc. zool. Soc. Lond.*, 295 (type-locality: Mundakayam, Travancore).

1987. *Noemacheilus triangulris triangularis*, Menon, *Faun. India Pisces*, 4(1): 168, Pl. 11, figs. 4, 5 and 8.

1999. *Mesoemacheilus triangularis triangularis*, Jayaram, *Freshwater Fishes of the Indian Region*: 82-83.

Material examined: 2 exs., 22-28mm SL, V/F/ 2214, Madlakadu, 15.xi.2007, M. J. Palot.

Disribution: India: Western Ghats.

Order SILURIFORMES

Family BAGRIDAE

22. *Mystus cavasius* (Hamilton)

1822. *Pimelodus cavasius* Hamilton-Buchanan, *Fishes of Ganges*: 203, 379, pl. 11, fig. 67 (type-locality: Gangetic provinces).

1991. *Mystus cavasius*, Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, Vol. II: 559-560.

2006. *Mystus cavasius*, Jayaram, *Cat Fishes of India*: 40 (Synomy/descriptiun).

Material examined: 3exs., 154.2-155.4 mm SL, V/F. 1750, 2225, Bhadra Reservoir, 12.xi.2006, K. G. Emiliyamma.

Disribution: India, Sri Lanka, Pakistan, Bangladesh, Myanmar and Tailand.

Family SILURIDAE

23. *Ompok bimaculatus* (Bloch).

1797. *Silurus bimaculatus* Bloch, *Hist. Nat. Poss.*, Part 2: 17, Pl. 364 (type-locality: Malabar).

1950. *Ompok bimaculatus*, Haig 9in part0, *Rec. Indian museum.*, 48: 103.

1991. *Ompok bimaculatus*, Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, Vol. II: 582-583.

Material examined: 1 ex., 37.8 mm SL, V/F. 2216, Lakkavally, K. G. Emiliyamma; 5 exs., 13.5-39.6 mm SL, V/F. 1751, Hipla, Hebbe, 12.xi.2006, K. G. Emiliyamma.

Disribution: India (throughout), Sri Lanka, Pakistan Bangladesh, Myanmar, Thailand, Java, Sumatra, Borneo and China.

Order PERCIFORMES

Family AMBASSIDAE

24. *Chanda nama* (Hamilton)

1822. *Chanda nama* Hamilton-Buchanan, *Fishes of Ganges*: 109, 371, pl. 39, fig. 37 (type-locality: N.E.Bengal).

1991. *Chanda nama*, Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, Vol. II: 799-800.

Material examined: 1 ex., 58.6 mm SL, V/F. 1754, Hipla, Hebbe, 12.xi.2006, K. G. Emiliyamma; 31 exs., 40-51.4 mm SL, V/F. 2227, Lakkavally, 6.xi.2006, K. G. Emiliyamma; 12 exs., 37-50.6 mm SL, V/F. 2205, Mosalekovu, 1.iii.2009, M. J. Palot.

Disribution: Throughout India, Pakistan, Bangladesh, Nepal and Myanmar.

25. *Parambassis thomassi* (Day)

1870. *Ambassis thomassi* Day, Proc. zool. Soc. Lond.,: 369 (type-locality: Calicut and Mangalore).

1991. *Parambassis thomassi*, Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, Vol. II: 802-803.

Material examined: 1 ex., 48 mm SL, V/F. 2238, Hipla, Hebbae, 12.xi. 2006, K. G. Emiliyamma.

Disribution: Western Ghats of Kerala and Karnataka.

26. *Pseudambassis ranga* (Hamilton)

1822. *Chanda ranga* Hamilton, *Fish. Ganges*, pp.113, 371, pl. 6, fig. 38 (Type locality: Freshwaters of Gangetic Province).

1828. *Ambassis ranga*, Cuvier, (in C&V), *Hist. Nat. Poiss.*, 2: 183

1991. *Pseudambassis ranga*, Talwar and Jhingran, *Inland Fishes of India*, 2: 805.

Material examined: 3 ex., 30-68.4 mm SL, V/F. 1753, 2238, Hipla, Hebbae, 12.xi.'06, K. G. Emiliyamma; 3 exs., 60.5-70 mm SL, V/F. 2226, Lakkavally, 6.xi.'06, K. G. Emiliyamma; 8 exs., 43-49.4 mm SL, V/F. 2209, Bhdra Reservoir, 21xi. 'o6, K. G. Emiliyamma.; 38 exs., 35-50.4 mm SL, V/F. 2315, Mathikere, Masalekov, 28.ii.'09, K. G. Emiliyamma.

Disribution: India.

Family BELONTIDAE

27. *Pseudosphromenus cupanus* (Cuvier)

1831. *Polyacanthus cupanus* Cuvier 9in C & V), *Hist. Nat. Poiss.*, 7: 357 (type-locality: Ariancoupam river at Pondicherry).

1929. *Macropodus cupanus*, Deraniyagala, Ceylon J. Sci., 2(2): Pl. 31, fig. 44.

1991. *Pseudosphromenus cupanus*, Pethiyagoda, Freshwater fish. Sri Lanka, p. 267.

Material examined: 12 exs., 18.8-33.6 mm SL, V/F. 2219, Kavalpura, 21.xi.2007, M. J. Palot.

Disribution: India: Peninsular India; and Sri Lanka.

Family CHANNIDAE

28. *Channa gachua* Hamilton

1822. *Opheocephalus gachua* Hamilton, *Fishes of Ganges*: 68, 367, pl. 21, fig. 21 (Type locality: Bengal).

1991. *Channa gachua*, Pethiagoda, *Freshwater Fishes of Sri Lanka*: 277.

2009. *Channa gachua*, Vishwanath and Geetakumari, *J. Threatened Taxa*, 1 (2): 98.

Material examined: 1 ex., 65.3 mm SL, V/F. 1755, Hipla, Hebbae, 12.xi.'06, K. G. Emiliyamma; 2 exs., 40 mm SL, V/F. 2200, 2209, Madla, Muthody Range, 15.xi.'06, K. G. Emiliyamma; 2 exs., 40-135 mm SL, V/F. 2221, Lakkavally, 7.xi.'06, K. G. Emiliyamma; 1 ex., 39 mm SL, V/F. 2202, Kavalpura, 20.xi.'07, M. J. Palot.

Disribution: India (throughout). Afganistan. Bangladesh. Borneo. Iran. Malaysia. Myanmar. Nepal. Pakistan. Indonesia. Sri Lanka.

DISCUSSION

Hora (1937), based on the fish collections from the highland watersheds of Thunga and Bhadra Rivers, catalogued about 30 species of fish. Jayaram (1995), under a programme of Biodiversity Conservation Prioritization Project (BCPP) - India, made an assessment of fish-diversity of the Karnataka State, recognizing about 160 species as being the common freshwater fishes of the State. According to Chandrashekhariah *et al* (2000), the stretches of the inter-state rivers of Krishna, Cauvery and Godavary systems falling within the geographical limits of the Karnataka State, when independently considered for their respective potential for fish diversity realized from the state, have the recorded diversity levels of 101, 97 and 60 species respectively. Besides, a scrutiny of literature reveals that a number of west flowing minor rivers of the state are known to support and sustain the fish diversity of as many as 93 species. Venkateshwarlu *et al* (2002) in their study on the fish fauna of Bhadra Reservoir documented 27 species of fish. Shahnawas, *et al* (2009) has reported from Bhadra River 56 species of fish representing 31 genera and 15 families. Shahnawaz and Venkateshwarlu (2009) recorded from Tunga and Bhadra rivers, Karnataka, 77 fish species belonging to 5 orders, 18 families and 44 genera.

The sample-collections of fish fauna made by the Zoological Survey of India during the general faunistic survey of the sanctuary from the water bodies located within the sanctuary were not exhaustive. Ichthyofaunal component of the stream habitats within the limits of the sanctuary reflected impoverished ichthyofaunal diversity during the faunistic survey/exploration of the sanctuary. Freshwater habitats, especially the lotic systems were mostly in their depleted phase with very slow and shallow stream-inflows, which might be one reason why a sub-level diversity of fish life was observed in the

streams at the time of faunistic surveys. It is obvious, therefore, that an objective assessment or evaluation of fish faunal diversity of the sanctuary based on an under-representative sample-collection of fish from the sanctuary waters is beyond the scope of this ichthyofaunal study. The present study on the fish fauna of BWLS deals with only 28 species, including an exotic species (*Cyprinus carpio* Linnaeus) belonging to 23 genera of 8 families under 4 orders, based on the available collection of fish. The present work is to be considered as only a preliminary taxonomic work on fish fauna of the sanctuary attempted towards inventorying/monitoring the fish diversity.

But given the kind of degradation of the aquatic environment of the sanctuary has suffered in the recent period, it is not at all a surprise to surmise the reasons for the impoverished diversity or richness of the aquatic faunal components, especially of fish fauna, within the sanctuary environment.

During the sanctuary explorations conducted by the Zoological Survey of India, the survey team after closely observing certain ecological features, like the nature and quality of aquatic habitats, components of flora and fauna, etc., could realize certain harsh realities impacted by the human interventions, probably, in recent times. The forest cover portrayed a diminishing trend, from the well-forested natural environment surrounding the dam-reservoir-complex, to a more fractured and fragmented pattern with an uneven admixture of rich and thin patches of forests.

There were tell-tale evidences to suggest, corroborating the concern of the community people, that the river Bhadra has been heavily affected by the mining and quarrying activities practiced till the recent past in the river watershed areas. Local community people were very categorical about the stream/river inflows carrying large load of silt; native fishes, fish habitat and riverine fisheries have been severely impacted by siltation, changes in the hydrological regime and water quality. Fish catches from the reservoir have declined over the years, affecting the villagers who are highly dependent on fishing for livelihood (Shahnawaz, *et al*, 2009).

The ecological peril caused by heavy siltation and river inflow fluctuations is not only confined to the decreased depth of water in the reservoir, but also has apparently affected deleteriously the life of the aquatic communities, such as fishes, tending them prone to the unstable niche conditions, affecting their lifecycles that are dependent on the natural inflow rhythm of the Bhadra River.

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AMPHIBIA

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INTRODUCTION

About 6638 species (Frost, 2010) of amphibians are known globally. In India, amphibians are represented by 311 species (Dinesh *et al.*, 2009b), of which 132 species are known from Western Ghats. 88 species are documented from the Karnataka State (Dinesh, *et al.*, 2009a).

Earlier in 2006 Hegde and Ramakrishna enlisted ten species of anurans from the Bhadra Wildlife Sanctuary and Tiger Reserve (BWLS). During the current programme of surveys, a total of 27 species of frogs were collected and studied, of which 20 species recorded for the first time from this sanctuary. *Nyctibatrachus dattatreyaensis* (Dinesh *et al.*, 2008), a new species of night frog has been described from the Sanctuary. There are three new site records of *Minervarya sahyadris* (Dinesh and Radhakrishnan, 2008); *Rhacophorus lateralis* (Dinesh *et al.*, 2010) and *Raorchestes chromasynchysi* (in press) recorded in the present study from this Sanctuary. Species marked in asterisk (*) are not encountered in the present survey but are included from literature (Hegde and Ramakrishna, 2006); thus, a total of 30 species of amphibians are attributable to the BWLS.

Since the amphibian taxonomy is in a flux, the classification of Frost (2010) is followed here. For more details regarding the species enlisted in this account, works of Dutta (1997), Chanda (2002), Frost *et al.*, (2006), Frost (2009) and Dinesh *et al.*, (2009a&b) may be referred to.

SYSTEMATIC LIST

Class AMPHIBIA Gray

Order ANURA Fischer von Waldheim

Family BUFONIDAE Gray

Genus *Duttaphrynus*, Frost, Grant, Faivovich, Bain, Haas, Hddad, Desa, Channing, Wilkinson, Donnellan, Raxworthy, Campbell, Blotto, Moler, Drewes, Nussbaum, Lynch, Green and Wheeler.

1. *Duttaphrynus melanostictus* (Schneider, 1799)
2. *Duttaphrynus microtympanum* (Boulenger, 1882)

Family DICROGLOSSIDAE Anderson

Sub-family DICROGLOSSINAE Anderson

Genus *Euphlyctis* Fitzinger

3. *Euphlyctis aloysii* Joshy, Alam, Kurabayashi, Sumida and Kuramoto, 2009
4. *Euphlyctis cyanophlyctis* (Schneider, 1799)

Genus *Fejervarya* Bolkay

5. *Fejervarya caperata* Kuramoto, Joshy, Kurabayashi and Sumida, 2007
6. *Fejervarya granosa* Kuramoto, Joshy, Kurabayashi and Sumida, 2007

Genus *Hoplobatrachus* Peters

7. *Hoplobatrachus tigerinus* (Daudin, 1802)

Genus *Minervarya* Dubois, Ohler and Biju

8. *Minervarya sahyadris* Dubois, Ohler and Biju, 2001

Genus *Sphaerotheca* Gunther

9. *Sphaerotheca breviceps* (Schneider, 1799)

Family MICRIXALIDAE Dubois, Ohler and Biju

Genus *Micrixalus* Boulenger

10. *Micrixalus saxicola* (Jerdon, 1853)

Family MICROHYLIDAE Gunther

Sub-family MICROHYLINAE Gunther

Genus *Microhyla* Tschudi

11. *Microhyla ornata* (Dumeril and Bibron, 1841)
12. *Microhyla rubra** (Jerdon, 1854)

Genus *Ramanella* Rao and Ramanna

13. *Ramanella montana* (Jerdon, 1854)

14. *Ramanella variegata** (Stoliczka, 1872)

Family NYCTIBATRACHIDAE Blommers-Schlösser

Genus *Nyctibatrachus* Boulenger15. *Nyctibatrachus dattatreyaensis* Dinesh, Radhakrishnan and Bhatta, 2008

Family RANIDAE Rafinesque

Genus *Clinotarsus* Mivart16. *Clinotarsus curtipes* (Jerdon, 1853)Genus *Hylarana* Tschudi17. *Hylarana aurantiaca* (Boulenger, 1904)18. *Hylarana malabarica** (Tschudi, 1838)19. *Hylarana temporalis* (Gunther, 1864)

Family RANIXALIDAE Dubois

Genus *Indirana* Laurent20. *Indirana beddomii* (Gunther, 1875)21. *Indirana leptodactyla* (Boulenger, 1882)

Family RHACOPHORIDAE Hoffman

Sub-family RHACOPHORINAE Hoffman

Genus *Polypedates* Tschudi22. *Polypedates maculatus* (Gray, 1833)23. *Polypedates occidentalis* Das and Dutta, 2006Genus *Raorchestes* Biju, Shouche, Dubois, Dutta and Bossuyt24. *Raorchestes charius* (Rao, 1937)25. *Raorchestes chromasynchysi* (Biju and Bossuyt, 2009)26. *Raorchestes glandulosus* (Jerdon, 1853)27. *Raorchestes luteolus* (Kuramoto and Joshy, 2003)28. *Raorchestes tuberochumerus* (Kuramoto and Joshy, 2003)Genus *Rhacophorus* Kuhl and Van Hasselt29. *Rhacophorus lateralis* Boulenger, 188330. *Rhacophorus malabaricus* Jerdon, 1870

SYSTEMATIC ACCOUNT

Class : AMPHIBIA

ORDER : ANURA Fischer von Waldheim

Key to the families of order ANURA from BWLS (TR)

- Upper jaw toothless; tongue entire 1
- Upper jaw toothed; tongue bifid 3
- 1. Pupil horizontal; skin warty with parotoid glands; tongue pyriform
..... **Bufonidae**
- Pupil circular; skin smooth without parotoid glands; tongue oval **Microhylidae**
- 3. Digital pads expanded with intercalary cartilage between penultimate phalanges;
terminal phalanges T-shaped; mostly bush or tree frogs..... **Rhacophoridae**
- Digits without intercalary cartilage 4
- 4. Ventral side of the body with fejerveryan line **Dicroglossidae**
Ventral side of the body without fejerveryan line 5
- 5. Dorsum smooth without any glands or folds; vomerine teeth absent **Micrixalidae**
- Dorsum smooth with folds; vomerine teeth present 6
- 6. Skin smooth with or without longitudinal folds; pupil horizontal or roundish-sub
triangular; digits with or without disk 7
- Skin wrinkled with fine set of folds; pupil mostly rhomboidal; toes with web and with
disk **Nyctibatrachidae**
- 7. Disks of toe tips with crescentic or horse shoe shaped circum marginal groove;
terminal phalanges 'Y' shaped; tongue with papilla **Ranixalidae**
- Disks of toe tips with or without crescentic or horse shoe shaped circum marginal
groove; tongue without papilla **Ranidae**

Family BUFONIDAE Gray

Genus ***Duttaphrynus***, Frost, Grant, Faivovich, Bain,
Haas, Hddad, Desa, Channing, Wilkinson,
Donnellan, Raxworthy, Campbell, Blotto, Moler,
Drewes, Nussbaum, Lynch, Green and Wheeler

Key to the species of *Duttaphrynus* from BWLS (TR)

- Tympanum ? diameter of eye *D. melanostictus*
- Tympanum small less than ½ diameter of eye *D. microtympanum*

1. *Duttaphrynus melanostictus* (Schneider, 1799)

1799. *Bufo melanostictus* Schneider, *Hist. Amph. Nat.*: 216.
1802. *Bufo chlorogaster* Daudin, (*An. XI*), *Hist. Nat. Rain. Gren. Crap., Quarto*: 49.
1802. *Rana dubia* Shaw, *Gen. Zool.*, **3**(1): 157.
1802. *Bufo scaber* Daudin, (*An. XI*), *Hist. Nat. Rain. Gren. Crap., Quarto*: 94.
1802. *Bufo bengalensis* Daudin, (*An. XI*), *Hist. Nat. Rain. Gren. Crap., Quarto*: 96.
1802. *Bufo flaviventris* Daudin, (*An. XI*), *Hist. Nat. Rain. Gren. Crap., Quarto*: 74, pl. 74,
1802. *Rana melanosticta* Shaw, *Gen. Zool.*, **3**(1): 174.
1833. *Bufo carinatus* Gray, *Ill. Indian Zool.*: pl. 83.
1833. *Bufo dubia* - Gray, *Ill. Indian Zool.*: viii, 83.
1834. *Bufo isos* Lesson, *In Belanger (ed.), Voy. Indes-Orientales N. Eur. Caucase Georgie Perse, Zool.*: 333.
1858. *Bufo gymnauchen* Bleeker, *Natuurkd. Tijdschr. Nederl. Indie*, **16**: 46.
1861. *Docidophryne isos* - Fitzinger, "1860", *Sitzungsber. Akad. Wiss. Wien, Phys. Math. Naturwiss. Kl.*, **42**: 415.
1861. *Docidophryne spinipes* Fitzinger, "1860", *Sitzungsber. Akad. Wiss. Wien, Phys. Math. Naturwiss. Kl.*, **42**: 415.
1862. *Phrynoidis melanostictus* Cope, *Proc. Acad. nat. Sci. Philadelphia*, **14**: 358.
1867. *Bufo spinipes* Steindachner, *Reise Osterreichischen Fregatte Novara, Zool.*: 42.
1903. *Bufo longecristatus* Werner, *Zool. Anz.*, **26**: 252.
1937. *Bufo tienhoensis* Bourret, *Annexe Bull. Gen. Instr. Publique, Hanoi, 1937*: **6**, 11.
1942. *Docidophryne melanostictus* Bourret, *Batr. Indochine*: 173.
1980. *Bufo camortensis* Mansukhani and Sarkar, *Bull. Zool. Surv. India*, **3**: 97.
1990. *Ansonia kamblei* Ravichandran and Pillai, *Rec. zool. Surv. India*, **86**: 506.
2001. *Bufo melanostictus melanostictus* Khan, *Pakistan J. Zool.*, **33**: 297.

English name: Common Indian Toad.

Diagnosis: Dorsally yellow brown, ventrally yellowish. Skin rough with spiny warts and tubercles. Tympanum very prominent, large, more than ? diameter of eye. Parotoid glands large and prominent. Tibiotarsal articulation reaches eyes when the leg is held along the body. Fingers free; toes half webbed. A moderately large inner and a small outer metatarsal tubercle present (Chanda, 2002).

Material examined: Reg. no: V/A/726, 3 exs., Bygoor, 22.v.2005, coll: Dinesh, K.P & party; Reg. no: V/A/739, 1ex., Hipla camp, 12.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/706, 1 ex., Shirgola, 17.xi.2007, coll: Jafer Palot & party; Reg. no: V/A/750, 1 ex., Kavalapura BWLS, 20.xi.2007, coll: Jafer Palot & party.

Measurements: SVL 16.4 to 57.0 mm.

Habitat: Found below small boulders and decaying logs and amidst leaf litter.

Distribution: All over India (Dutta, 1997).

Elsewhere: Throughout southern Asia (Frost, 2009).

2. *Duttaphrynus microtypanum* (Boulenger, 1882)

1882. *Bufo microtypanum* Boulenger, *Cat. Batr. Sal. Coll. Brit. Mus., Ed. 2:* 307.

English name: Small-eared Toad

Diagnosis: Medium sized toad, total SVL reaching up to 75 mm in length, this species is more similar to *D. melanostictus* but can be distinguished by the species having a very small tympanum which is half or less the diameter of the eye (Chanda, 2002).

Material examined: Reg. no: V/A/759, 5 exs., Sukhalhatti, 4.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/741, 10 exs., Saave, 5.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/725, 3 exs., Chowdikattae, 6.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/733, 4 exs., Kadubailu, 13.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/730, 3 exs., Halagekerae, 15.xi.2007, coll: Jafer Palot & party.

Measurements: SVL 10.0 to 33.0 mm

Habitat: Found below small boulders, forest litter and below decaying logs.

Distribution: Kerala and Tamil Nadu (Dutta, 1997).

Remarks: Endemic to Western Ghats.

Family DICROGLOSSIDAE Anderson

Key to the genera of the family DICROGLOSSIDAE from BWLS (TR)

- Ventral side of the body with fejerveryan line; head with or without rectal glands 1
- Ventral side of the body without fejerveryan line 2
- 1. Ventral side of the body with fejerveryan line and head without rectal glands *Fejervarya*

- Ventral side of the body with fejerveryan line and head with rectal glands *Minervarya*
- 2. Inner metatarsal tubercle enlarged usually shovel shaped *Sphaerotherca*
- Inner metatarsal tubercle small not prominent 3
- 3. Dorsum with small longitudinal ridges; venter without porous warts *Hoplobatrachus*
- Dorsum granular; venter with porous warts *Euphlyctis*

Genus *Euphlyctis* Fitzinger

Key to the species of *Euphlyctis* from BWLS (TR)

- Dorsum with a thin mid-dorsal stripe; subarticular tubercles distinct *E. aloysii*
- Dorsum without a thin mid-dorsal stripe; subarticular tubercles indistinct *E. cyanophlyctis*

3. *Euphlyctis aloysii* Joshy, Alam, Kurabayashi, Sumida and Kuramoto, 2009

2009. *Euphlyctis aloysii* Joshy, Alam, Kurabayashi, Sumida and Kuramoto. *Alytes*, **26** (1-4): 97-116.

English name: Aloysii Skittering Frog.

Diagnosis: Small species of frog SVL ranging up to 45.2 mm, dorsum with four large elliptical dark markings; relative to SVL head smaller, hind limbs shorter and eye lids wider. Head wider than long, snout slightly pointed; nostril nearer to tip of snout than to eye; loreal region concave, canthus rostralis blunt, tympanum large about 75% of the eye diameter. Supratympanic fold thin. Fingers free, first finger longer the second; subarticular tubercle moderate. Toe tip slightly pointed subarticular tubercle moderate, web nearly reaching toe tip and sharply incised. In life, dorsum light brown with thin greenish mid-dorsal stripe and green patches over upper jaw and from eyelid to shoulder; two pairs of rather conspicuous large elliptical markings on the dorsum (Joshy *et al.*, 2009).

Material examined: Reg. no: V/A/743, 2 exs., Kesaruhalla, 8.xi.2006, coll: Emiliyamma, K.G & party.

Measurements: SVL 16.0 to 17.0 mm

Habitat: Found in a mud puddle along the trek path inside the forest.

Distribution: Mangalore (type locality), Karnataka.

Remarks: First report of the species, after the original description. Endemic to Western Ghats of Karnataka.

4. *Euphlyctis cyanophlyctis* (Schneider, 1799)

1799. *Rana cyanophlyctis* Schneider, *Hist. Amph. Nat.*: 137.
1801. *Bufo cyanophlyctis* - Latreille In Sonnini de Manoncourt and Latreille, (An. X), *Hist. Nat. Rept.*, 2: 132.
1802. *Rana cyanophlyctis* - Shaw, *Gen. Zool.*, 3(1): 111.
1802. *Bufo cyanophlyctis* Daudin, (An. XI), *Hist. Nat. Rain. Gren. Crap., Quarto*: 103.
1803. *Bufo cyanophlyctis* - Daudin, (An. XI), *Hist. Nat. Gen. Part. Rept.*, 8: 209.
1833. *Rana bengalensis* Gray, *Ill. Indian Zool.*
1841. *Rana leschenaultii* Dumeril and Bibron, *Erp. Gen.*, 8: 342.
1853. *Rana benghalensis* - Kelaart, *Prodr. Faunae Zeylan.*, 1, 1: 192.
1860. *Dicroglossus adolfi* Gunther, *Proc. zool. Soc. London*, 1860: 158.
1861. *Euphlyctis leschenaultii* - Fitzinger, "1860", *Sitzungsber. Akad. Wiss. Wien, Phys. Math. Naturwiss. Kl.*, 42: 414.
1882. *Rana cyanophlyctis* Mason, *Burma, Ed. 3*: 290.
1899. *Rana cyanophlyctis* var. *seistanica* Nikolskii, *Ann. Mus. Zool. Acad. Imp. Sci. St. Petersburg*, 4: 406.
1920. *Rana (Rana) cyanophlyctis* Boulenger, *Rec. Indian Mus.*, 20: 6.
1938. *Dicroglossus cyanophlyctis* - Deckert, *Sitzungsber. Ges. Naturforsch. Freunde Berlin*, 1938: 138.
1941. *Rana cyanophlyctis cyanophlyctis* Parker, *Exped. SW Arabia 1937-1938*, 1, 1: 5.
1950. *Rana (Rana) cyanophlyctis* Guibe, "1948", *Cat. Types Amph. Mus. Natl. Hist. Nat.*: 37.
1958. *Rana cyanophlyctis* variety *fulvus* - De Silva, *Spolia Zeylan.*, 28: 158.
1958. *Rana cyanophlyctis* variety *flavens* - De Silva, *Spolia Zeylan.*, 28: 158.
1974. *Rana (Dicroglossus) cyanophlyctis cyanophlyctis* - Dubois, *Bull. Mus. Natl. Hist. Nat. Paris, Ser. 3, Zool.*, 213: 376.
1981. *Rana (Euphlyctis) cyanophlyctis* - Dubois, *Monit. Zool. Ital., N.S., Suppl.*, 15: 240.
1985. *Euphlyctis cyanophlyctis* Poynton and Broadley, *Ann. Natal Mus.*, 27: 124.
1987. *Occidozyga (Euphlyctis) cyanophlyctis* - Dubois, "1986", *Alytes*, 5: 59.
1992. *Euphlyctis cyanophlyctis* Dubois, *Bull. Mens. Soc. Linn. Lyon*, 61: 315.
1997. *Euphlyctis cyanophlyctis cyanophlyctis* - Khan, *Pakistan J. Zool.*, 29: 108.
1997. *Euphlyctis cyanophlyctis microspinulata* Khan, *Pakistan J. Zool.*, 29: 108.
1997. *Euphlyctis cyanophlyctis seistanica* - Dutta, *Amph. India Sri Lanka*: 115.

English name: Skittering Frog.

Diagnosis: Medium sized frog, snout rounded. First and second fingers more or less equal in length. Tibiotarsal articulation reaches up to either between the tympanum and eye or eye and nostril when the leg is held along the side of the body. Toe tips swollen and rounded, but without disks. A single line of porous warts on flanks, from behind the shoulder to the groin. Inner metatarsal tubercle fingerlike. Skin on dorsum warty. A strong fold from behind the eye to the shoulder. A U-shaped line of warts above the anus. Ventrally smooth. Dorsum grey olive, brown with darker spots or marblings. Back of the thighs with a dark-edged white band. Ventrally white, often spotted, vermiculated or marbled with black. The black coloration on the belly is commoner and more widespread in the larger females (Chanda, 2002).

Material examined: Reg. no: V/A/659, 2 exs., Chowdikattae, 06.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/744, 1 ex., Keasruhalla, 8.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/745, 2 exs., Halagekerae, 15.xi.2007, coll: Jafer Palot & party; Reg. no: V/A/746, 1 ex., Thegadagudda, 19.xi.2007, coll: Jafer Palot & party.

Measurements: SVL 27.0 to 37.0 mm.

Habitat: Ponds in the forest.

Distribution: Throughout India (Dutta, 1997).

Elsewhere: India: Iran, Pakistan, Nepal, Afghanistan, Sri Lanka, Malaysia, and Vietnam (Frost, 2009).

Remarks: According to Joshy *et al.*, (2009) future studies will reveal the existence of several cryptic species allied to this species.

Genus *Fejervarys* Bolckay

Key to the species of *Fejervarya* from BWLS (TR)

- Dermal ridges on the back are short or rounded *F. granosa*
- Dermal ridges on the back are long like four longitudinal lines *F. caperata*

5. *Fejervarya caperata* Kuramoto, Joshy, Kurabayashi and Sumida, 2007

2007. *Fejervarya caperata* Kuramoto, Joshy, Kurabayashi and Sumida, *Current Herpetology* 26(2): 81-105.

English name: Wrinkled fejervarya.

Diagnosis: A small species of frog, head slightly wider than long, snout slightly pointed, loreal region heavily concave, canthus rostralis rounded, nostril nearer to tip of

snout than to eye, tympanum about 60% of eye in diameter. Fingers free, tip rounded, subarticular and palmar tubercles distinct. Hindlimbs relatively short, tibia longer than femur, toe tip rounded, subarticular tubercle moderate. Snout and upper eyelid smooth; dorsum with many longitudinal ridges roughly forming four longitudinal series, mid-dorsal stripe present (Kuramoto *et al.*, 2007).

Material examined: Reg. no: V/A/754, 1 ex., Tadabehalla, 11.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/737, 4 exs., Hipla camp, 12.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/752, 1 ex., Mullayanagiri, 15.viii.2007, coll: Dinesh, K.P & party; Reg. no: V/A/731, 2 exs., Madla, 15.xi.2007, coll: Emiliyamma, K.G & party; Reg. no: V/A/742, 3 exs., Talabidri, 16.xi.2007, coll: Jafer Palot & party; Reg. no: V/A/749, 3 exs., Shirgola, 17.xi.2007, coll: Jafer Palot & party; Reg. no: V/A/751, 2 exs., Kavalapura, 20.xi.2007, coll: Jafer Palot & party; Reg. no: V/A/756, 1 ex., Virupakshikhan, 5.iii.2009, coll: Jafer Palot & party.

Measurements: SVL 12.0 to 33.0 mm.

Habitat: Found in litter along the water bodies in the forest.

Distribution: From the type locality Mangalore and Madikeri (Karnataka).

Remarks: First report of the species, after the original description. Endemic to Western Ghats, this species was placed earlier in the assemblage of *Fejervarya limnocharis* - cryptic taxa; *F. caperata*, *F. granosa*, *F. kudremukhensis* and *F. mudduraja* are regarded as cryptic species that are difficult to be identified by morphological traits alone (Kuramoto *et al.*, 2007).

6. *Fejervarya granosa* Kuramoto, Joshy, Kurabayashi and Sumida, 2007

2007. *Fejervarya granosa* Kuramoto, Joshy, Kurabayashi and Sumida, *Current Herpetology* 26(2): 81-105.

English name: Granular fejervarya.

Diagnosis: A small species of frog, head wider than long, snout, moderately pointed, loreal region concave, canthus rostralis blunt, nostril slightly nearer to tip of snout than to eye, tympanum distinct, about 55% of eye in diameter. Finger tip rounded, subarticular tubercle well developed. Hindlimbs moderately long, tibia longer than femur. Dorsum with large rounded or elliptical ridges interrupted inverse V-shaped ridge on the middle of dorsum at the level of forelimb (Kuramoto *et al.*, 2007).

Material examined: Reg. no: V/A/758, 1 ex., Sukhalhatti, 4.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/760, 9 exs., Chowdikattae, 6.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/736, 7 exs., Kesaruhalla, 8.xi.2006, coll: Emiliyamma, K.G & party;

Reg. no: V/A/755, 1 ex., Tadabehalla, 11.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/738, 2 exs., Hipla camp, 12.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/734, 4 exs., Kadubailu, 13.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/732, 2 exs., Halasinakhan, 14.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/729, 2 exs., Halagekerae, 15.xi.2007, coll: Jafer Palot & party; Reg. no: V/A/748, 2 exs., Shirgola, 17.xi.2007, coll: Jafer Palot & party; Reg. no: V/A/753, 2 exs., Kavalapura, 20.xi.2007, coll: Jafer Palot & party; Reg. no: V/A/757, 1 ex., Virupakshikhan, 5.iii.2009, coll: Jafer Palot & party

Measurements: SVL 12.0 to 32.0 mm.

Habitat: Found in leaf litter along the water bodies in the forest.

Distribution: From the type locality, Chickmagalur and Madikeri (Karnataka).

Remarks: First report of the species, after the original description. Endemic to Western Ghats, this species was placed earlier in the assemblage of *Fejervarya limnocharis* - cryptic taxa; *F. caperata*, *F. granosa*, *F. kudremukhensis* and *F. mudduraja* are regarded as cryptic species that are difficult to be identified by morphological traits alone (Kuramoto *et al.*, 2007).

Genus *Hoplobatrachus* Peters

7. *Hoplobatrachus tigerinus* (Daudin, 1802)

1758. *Rana typhonia* Linnaeus, *Syst. Nat.*, Ed. 10, 1: 211.

1799. *Bufo typhoni* - Schneider, *Hist. Amph. Nat.*: 207.

1802. *Rana tigerina* Daudin, (An. XI), *Hist. Nat. Rain. Gren. Crap.*, Quarto: 62.

1820. *Rana tigrina* - Merrem, *Tent. Syst. Amph.*: 174.

1829. *Rana picta* Gravenhorst, *Delic. Mus. Zool. Vratislav.*, 1: 39.

1838. *Osilophus typhoni* - Tschudi, *Classif. Batr.*: 52: 89.

1841. *Cystignathus typhoni* - Dumeril and Bibron, *Erp. Gen.*, 8: 402.

1843. *Leptodactylus typhoni* - Fitzinger, *Syst. Rept.*: 31.

1853. *Rana malabarica* Kelaart, *Prodr. Faunae Zeylan.*, 1, 1: 191.

1870. *Rana gracilis* var. *pulla* Stoliczka, *J. Asiat. Soc. Bengal*, 39: 139.

1871. *Otilophus typhoni* - Peters, *Monatsber. Preuss. Akad. Wiss. Berlin*, 1871: 403.

1875. *Oxyrhynchus typhoni* - Jimenez de la Espada, *Vert. Viaje Pacif. Verif. 1862-1865*: 178.

1875. *Oxyrhynchus typhoni* - Jimenez de la Espada, *Vert. Viaje Pacif. Verif. 1862-1865*: 178.

1882. *Leptodactylus typhoni* - Boulenger, *Cat. Batr. Sal. Coll. Brit. Mus.*, Ed. 2: 246.

1912. *Rana tigrina* - Barbour, *Mem. Mus. Comp. Zool.*, **44**: 63.
1915. *Rana (Fejervarya) tigrina* Bolkay, *Anat. Anz.*, **48**: 175.
1920. *Rana (Rana) tigrina* - Boulenger, *Rec. Indian Mus.*, **20**: 6.
1933. *Bufo typhonius typhonius* - Leavitt, *Copeia*, **1933**: 8.
1938. *Dicroglossus tigrinus* - Deckert, *Sitzungsber. Ges. Naturforsch. Freunde Berlin*, 1938: 138.
1940. *Rana tigrina tigrina* Smith, *Rec. Indian Mus.*, **42**: 465-486.
1953. *Bufo (Otylophus) typhonius* Cei, *Arch. Zool. Ital. Torino*, **38**: 511.
1969. *Rana tigrina tigrina* - Mertens, *Stuttgart. Beit. Naturkd.*, **197**: 17.
1974. *Rana (Dicroglossus) tigrina tigrina* - Dubois, *Bull. Mus. Natl. Hist. Nat. Paris, Ser. 3, Zool.*, **213**: 341-411.
1981. *Rana (Euphlyctis) tigrina* Dubois, *Monit. Zool. Ital., N.S., Suppl.*, **15**: 239.
1985. *Euphlyctis tigrina* - Poynton and Broadley, *Ann. Natal Mus.*, **27**: 124.
1987. *Limnonectes (Hoplobatrachus) tigrinus* - Dubois, "1986", *Alytes*, **5**: 59.
1991. *Tigrina tigrina* Fei, Ye, and Huang, "1990", *Key to Chinese Amph*: 144.
1992. *Hoplobatrachus tigrinus* - Dubois, *Bull. Mens. Soc. Linn. Lyon*, **61**: 315.

English name: Indian Bull Frog.

Diagnosis: Large sized frogs, males smaller compared to females. Snout projecting beyond mouth. Tympanum distinct, equal to or slightly smaller than the diameter of the eye. First finger longer than second. Toes fully webbed but the web not reaching the tip of the fourth toe. Fifth toe with an outer fringe of web. Outer metatarsals separated by web nearly to the base. An obtuse inner metatarsal tubercle. Tibiotarsal articulation reaches the eye or between the eye and the nostril. Heels overlap when folded at right angles to the body. Skin smooth or granulate above with distinct longitudinal glandular folds. A fold from behind the eye to the shoulder. Ventral skin smooth. Dorsum olive green or brown with darker markings. A light colored vertebral streak from snout to vent often present (Chanda, 2002).

Material examined: Reg. no: V/A/656, 1 ex., Sukhalhatti, 04.xi.2006, coll: Emiliyamma, K.G & party

Measurements: SVL 66.8 mm.

Habitat: Found near a mud pool in the forest.

Distribution: Throughout India (Dutta, 1997).

Elsewhere: India: Nepal, Bhutan, Pakistan, and Sri Lanka (Frost, 2009).

Genus *Minervarya* Dubois, Ohler and Biju**8. *Minervarya sahyadris* Dubois, Ohler and Biju, 2001**

2001. *Minervarya sahyadris* Dubois, Ohler and Biju, *Alytes*, **19**: 58.

2007. *Fejervarya sahyadris* - Matsui, Joshy, Kurabayashi, and Sumida, *Curr. Herpetol.*, **26**: 98-99.

2009. *Minervarya sahyadris* - Ohler, Deuti, Grosjean, Paul, Ayyaswamy, Ahmed and Dutta, *Zootaxa*, **2209**: 43-56.

English name: Minervarya frog.

Diagnosis: A small frog with fejerveryan lines on both sides of the belly in life; possessing a rictal gland at the mouth commissure, prominent in life; distinct canthus rostralis; nostrils near to snout tip than to eye; a white horizontal band along the upper lip in life; vomerine teeth present; median lingual process absent; digital extremities rounded, not dilated; webbing rudimentary; inner metatarsal tubercle short, conical; outer metatarsal tubercle present, minute; tarsal ridge present; heels strongly overlapping when folded at right angles to each other; tibiotarsal articulation reaching up to posterior corner of eye. Dorsal skin with longitudinal folds; pupil horizontal and oval, iris golden yellow; sides of head brownish, darker in tympanic region; mid dorsum brown to brick red; upper arm brick red; upper lip white colored; venter yellowish white.

Material examined: Reg. no: V/A/609, 7 exs., Hipla camp, 12.xi.2006, coll: Emiliyamma, K.G & party

Measurements: SVL 14.8 to 17.8 mm.

Habitat: Found breeding in a small pool of water in a semi dried stream bed.

Distribution: Kerala and Karnataka (Dinesh and Radhakrishnan, 2008).

Remarks: Endemic to Western Ghats.

Genus *Sphaerotheca* Günther**9. *Sphaerotheca breviceps* (Schneider, 1799)**

1799. *Rana breviceps* Schneider, *Hist. Amph. Nat.*: 140.

1829. *Rana variegata* Gravenhorst, *Delic. Mus. Zool. Vratislav.*, **1**: 33.

1838. *Systoma breviceps* - Tschudi, *Classif. Batr.*: 86.

1854. *Pyxicephalus fodiens* Jerdon, "1853", *J. Asiat. Soc. Bengal*, **22**: 534.

1854. *Pyxicephalus pluvialis* Jerdon, "1853", *J. Asiat. Soc. Bengal*, **22**: 534.

1859. *Sphaerotheca strigata* Günther, "1858", *Cat. Batr. Sal. Coll. Brit. Mus.*,: 20.

1860. *Pyxicephalus (Tomopterna) fodiens* - Peters, *Monatsber. Preuss. Akad. Wiss. Berlin*, 1860: 186.
1860. *Tomopterna strigata* - Gunther, *Proc. zool. Soc. London*, 1860: 165.
1864. *Pyxicephalus breviceps* - Gunther, *Rept. Brit. India*: 411.
1920. *Rana (Tomopterna) breviceps* - Boulenger, *Rec. Indian Mus.*, 20: 102.
1938. *Tomopterna breviceps* - Deckert, *Sitzungsber. Ges. Naturforsch. Freunde Berlin*, 1938: 142.
1956. *Rana swani* Myers and Leviton In Leviton, Myers, and Swan, *Occas. Pap. Nat. Hist. Mus. Stanford Univ.*, 1: 7.
1976. *Tomopterna swani* - Dubois, *Cah. Nepal., Doc.*, 6: 12.
1981. *Rana (Tomopterna) swani* - Dubois, *Monit. Zool. Ital., N.S., Suppl.*, 15: 233.
1983. *Rana (Tomopterna) breviceps breviceps* - Dubois, *Alytes*, 2: 166.
1987. *Tomopterna (Sphaerotheca) breviceps* - Dubois, "1986", *Alytes*, 5: 57.
1987. *Tomopterna (Sphaerotheca) swani* - Dubois, "1986", *Alytes*, 5: 57.
1998. *Tomopterna maskeyi* Schleich and Anders, In Schleich and Kästle, *Contr. Herpetol. S. Asia Nepal India*, 4: 57.
1999. *Sphaerotheca breviceps* - Dubois, *J. South Asian Nat. Hist.*, 4: 8.
2000. *Sphaerotheca pluvialis* - Marmayou, Dubois, Ohler, Pasquet, and Tillier, *C. R. Acad. Sci., Ser. 3, Paris*, 323: 293.
2000. *Sphaerotheca swani* - Vences, Glaw, Kosuch, Das, and Veith, Lourenco and Goodman (eds.), *Diversite et Endemisme a Madagascar*: 232.
2000. *Sphaerotheca maskeyi* - Vences, Glaw, Kosuch, Das, and Veith, Lourenco and Goodman (eds.), *Diversite et Endemisme a Madagascar*: 232.

English name: Indian Burrowing Frog.

Diagnosis: Medium sized frog, snout less than the diameter of the eye in length, rounded, tympanum distinct. First finger considerably longer than second. Tibiotarsal articulation reaches the shoulder. Heels do not meet when the legs are folded at right angles to the body. Sub-articulate tubercles prominent, inner metatarsal tubercle large compressed, crescentic and more than the inner toe in length (Chanda, 2002).

Material examined: Reg. no: V/A/762, 1 ex., Kadubailu, 13.xi.2006, coll: Emiliyamma, K.G & party.

Measurements: SVL 41.12 mm.

Habitat: Found below a timber log in the forest.

Distribution: Punjab, Orissa, West Bengal, Rajasthan, Tamil Nadu, Kerala, Maharashtra and Karnataka (Dutta, 1997 and Biju, 2001).

Elsewhere: Pakistan, Nepal, Myanmar and Sri Lanka (Frost, 2009).

Family MICRIXALIDAE Dubois, Ohler and Biju

Genus *Micrixalus* Boulenger

10. *Micrixalus saxicola* (Jerdon, 1853)

1854. *Polypedates saxicola* Jerdon, "1853", *J. Asiat. Soc. Bengal*, **22**: 533.

1882. *Ixalus saxicola* - Boulenger, *Cat. Batr. Sal. Coll. Brit. Mus., Ed. 2*: 97.

1888. *Micrixalus saxicola* - Boulenger, *Proc. zool. Soc. London*, 1888: 205.

English name: Small Torrent Frog.

Diagnosis: Tongue with a free pointed papilla in the anterior part of the median line. Snout sub acuminate, as long as the diameter of the orbit; canthus rostralis angular; loreal region flat, vertical; nostrils midway between eye and the tip of the snout; interorbital space as broad as the upper eyelid; tympanum small, hidden. Toes very broadly webbed, the web reaching the disks, disks very large; subarticular tubercles small; inner metatarsal tubercle small. Tibiotarsal articulation reaches the tip of the snout or somewhat beyond when the leg is held along the body. Skin smooth above, with more or less distinct darker reticulations; limbs with dark cross bands; throat and breast often marbled with brown. Males with internal vocal sacs, the opening of which are very small (Chanda, 2002).

Material examined: Reg. no: V/A/655, 11 exs., Chowdikattae, 06.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/740, 1 ex., Hipla camp, 12.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/658, 2 exs., Halasinakhan, 14.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/711, 1 ex., Mullayanagiri, 15.viii.2007, coll: Dinesh, K.P & party; Reg. no: V/A/707, 3 exs., Haligekeerae, 15.xi.2007, coll: Jafer Palot & party

Measurements: SVL 21.4 to 28 mm.

Habitat: Found on the rocks and boulders in the fast flowing streams of the forest.

Distribution: Karnataka and Kerala (Dutta, 1997).

Remarks: Endemic to Western Ghats.

Family MICROHYLIDAE Gunther

Key to the genera of family MICROHYLIDAE from BWLS (TR)

- Tips of finger not dilated *Microhyla*
- Tips of fingers dilated into discs *Ramanella*

Genus *Microhyla* Tschudi

Key to the species of *Microhyla* from BWLS (TR)

- Habit slender, two normal metatarsal tubercles *M. ornata*
- Habit stout, two shovel shaped metatarsal tubercles *M. rubra*

11. *Microhyla ornata* (Dumeril and Bibron, 1841)

1841. *Engystoma ornatum* Dumeril and Bibron, *Erp. Gen.*, 8: 745.
1843. *Siphneus ornatum* - Fitzinger, *Syst. Rept.*: 33.
1854. *Engystoma malabaricum* Jerdon, "1853", *J. Asiat. Soc. Bengal*, 22: 534.
1854. *Engystoma carnaticum* Jerdon, "1853", *J. Asiat. Soc. Bengal*, 22: 534.
1859. *Diploelma ornatum* Gunther, "1858", *Cat. Batr. Sal. Coll. Brit. Mus.*: 50.
1870. *Diploelma carnaticum* Stoliczka, *J. Asiat. Soc. Bengal*, 39: 154.
1882. *Microhyla (Engystoma) carnatica* - Mason, *Burma, Ed. 3*: 292.
1882. *Microhyla ornata* - Boulenger, *Cat. Batr. Sal. Coll. Brit. Mus., Ed. 2*: 165.
1927. *Microhyla (Diploelma) ornata* - Bourret, *Fauna Indochine, Vert.*, 3: 263.

English name: Ornate Narrow-mouthed Frog.

Diagnosis: A small slender microhylid. The colour pattern of the back is distinctive. Interorbital width nearly twice as broad as upper eyelid. Toes with a rudiment of web. Two prominent metatarsal tubercles. Tibiotarsal articulation reaches the shoulder or slightly beyond the anterior border of eye when the leg is held along the body. The heels meet when the legs are folded at right angles to the body. Skin smooth or slightly tubercular. The characteristic pattern on the back, which may be bright pink or brown of varying shades, begins between the eyes where it extends to both eyelids, narrows on the nape, widens above the shoulder, narrows again and finally broadens out sending a stripe to the groin and the thigh. A dark streak from behind the eye to the shoulder, limbs cross barred. White below, throat and chest may be stippled with brown. Throat in breeding male black (Chanda, 2002).

Material examined: Reg. no: V/A/735, 2 exs., Kadubailu, 13.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/652, 3 exs., Rashigudda, 16.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/673, 1 ex., Muthodi, 20.xi.2007, coll: Jafer Palot & party

Measurements: SVL 10.0 to 14.5 mm.

Habitat: Found in the forest floor litter close to temporary mud puddles and water pools.

Distribution: Throughout India (Dutta, 1997), including Andaman and Nicobar Islands (Sarkar, 1990).

Elsewhere: Japan, China, Pakistan, Nepal and Sri Lanka Malaysia (Frost, 2009).

12. *Microhyla rubra* (Jerdon, 1854)*

1854. *Engystoma rubrum* Jerdon, "1853", *J. Asiat. Soc. Bengal*, **22**: 534.

1864. *Copea fulva* Steindachner, *Verh. Zool. Bot. Ges. Wien*, **14**: 286.

1882. *Microhyla rubra* - Boulenger, *Cat. Batr. Sal. Coll. Brit. Mus., Ed. 2*: 164.

1987. *Microhyla (Diplopelma) rubra* - Dubois, *Alytes*, **6**: 4.

English name: Red Narrow-mouthed Frog.

Diagnosis: Dorsum brownish; venter dull whitish, darker on gular region; dorsum warty, ventrally smooth. Head broader than long; snout rounded a little longer than diameter of eye; nostril nearer to tip of snout than eye. Inter-orbital width broader than that of upper eyelid; tympanum hidden. Fingers tree, first finger much shorter than second, tips swollen; two large shovel shaped metatarsal tubercle present. Tibiotarsal articulation reaching eyes.

Distribution: Goa, Karnataka, Tamil Nadu and West Bengal (Dutta, 1997).

Elsewhere: Sri Lanka (Frost, 2009).

Note: Endemic to Western Ghats and Sri Lanka.

Genus *Ramanella* Rao and Ramanna

Key to the species of *Ramanella* from BWLS (TR)

- Belly black spotted, toes webbed *R. montana*
- Belly immaculate white *R. variegata*

13. *Ramanella montana* (Jerdon, 1854)

1854. *Hylaedactylus montanus* Jerdon, "1853", *J. Asiat. Soc. Bengal*, **22**: 533.

1934. *Ramanella montana* - Parker, *Monogr. Frogs Fam. Microhylidae*: 91.

English name: Jerdon's Ramanella.

Diagnosis: A small sized frog, post narial ridges well marked and nearly in contact on mid-line; finger discs twice as broad as penultimate joint. Toes webbed, webbing more extensive in the male than the female, two metatarsal tubercles; tibiotarsal articulation

reaches to shoulder or between shoulder and eye. Skin smooth, coloration on the dorsum brown with varying shades. Below dark brown, almost blackish with white spots or blotches (Chanda, 2002).

Material examined: Reg. no: V/A/653, 1 ex., Rashigudda, 16.xi.2006, coll: Emiliyamma, K.G & party.

Measurements: SVL 20.86 mm.

Habitat: Found below the bark of a tree, about five feet above the ground.

Distribution: Gujarat, Maharashtra, Karnataka, Kerala and Tamil Nadu (Dutta, 1997).

Remarks: Endemic to Western Ghats.

14. *Ramanella variegata* (Stoliczka, 1872)*

1854. *Hylaedactylus carnaticus* Jerdon, "1853", *J. Asiat. Soc. Bengal*, **22**: 533.

1872. *Callula variegata* Stoliczka, *Proc. Asiat. Soc. Bengal*, 1872: 111.

1876. *Callula olivacea* Günther, "1875", *Proc. zool. Soc. London*, 1875: 576.

1918. *Kaloula variegata* Rao, *Rec. Indian Mus.*, **15**: 43.

1925. *Ramanella symbioitica* Rao and Ramanna, *Proc. zool. Soc. London*, 1925: 1445.

English name: Variegated Ramanella.

Diagnosis: Dorsum more or less smooth and brownish. Venter smooth and white with reddish brown at gular region; anal region poorly granular. Head broader than long; snout rounded, as long as diameter of eye, nostril nearer to tip of snout than eye; inter-orbital with much broader than the upper eyelid; tympanum hidden; dermal ridge a little away behind the internal nares. Fingers free, first shorter than second, tips bearing well developed truncated disc; sub-articular tubercles of fingers and toes distinct. Toes feebly webbed, tips a little dilated; inner metatarsal tubercles prominent, outer metatarsal tubercle not prominent. Tibiotarsal articulation reaching the shoulder.

Distribution: Madhya Pradesh, West Bengal, Orissa, Tamil Nadu, Karnataka and Kerala (Dutta, 1997).

Elsewhere: Sri Lanka (Frost, 2008).

Family NYCTIBATRACHIDAE Blommers-Schlösser

Genus *Nyctibatrachus* Boulenger

15. *Nyctibatrachus dattatreyaensis* Dinesh, Radhakrishnan and Bhatta, 2008

2008. *Nyctibatrachus dattatreyaensis* Dinesh, Radhakrishnan and Bhatta, *Zootaxa*, **1914**: 45-56.

English name: Dattatreya Night Frog.

Diagnosis: A medium sized night frog, head wider than long, snout slightly projecting beyond mouth; whole of dorsum corrugated with several transverse folds, the anterior three folds very prominent and with a longitudinal dorsolateral fold on either side; lateral part of the body with two longitudinal folds; a well defined supratympanic fold from posterior corner of eye to shoulder; a small fold from eye to the posterior corner of mouth commissure; fingers and toes with disks, circummarginal grooves restricted to toe discs; webbing on toes medium ($3/4^{\text{th}}$); femoral glands and thumb pad very prominent in adult males; body, colored reddish-brown to blackish brown dorsally with two yellowish dorsolateral bands and pale ventrally (Dinesh *et al.*, 2008).

Material examined: Reg. no: V/A/647 to V/A/649, 3 exs., Datta Peeta, 09.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/705, 7 exs., Datta Peeta, 9.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/646, 1 ex., Datta Peeta, 27.xii.2007, coll: Dinesh, K.P & party; Reg. no: V/A/650 & V/A/651, 2 exs., Datta Peeta, 27.xii.2007, coll: Dinesh, K.P & party; Reg. no: V/A/702, 2 exs., Datta Peeta, 22.vi.2009, coll: Dinesh, K.P & party

Measurements: SVL 20.2 to 41.0 mm.

Habitat: Found below the small boulders in perennial streams and also in litter during day time and along edges of water bodies during night.

Distribution: From type locality Dattapeeta and surroundings only (Dinesh *et al.*, 2008).

Remarks: Endemic to Western Ghats.

Family RANIDAE Rafinesque

Key to the genera of family RANIDAE from BWLS (TR)

Discs of fingers, if present, without groove or the groove indistinct *Clinotarsus*

Discs of the finger bearing a groove separating the upper from the lower surface
..... *Hylarana*

Genus *Clinotarsus* Mivart

16. *Clinotarsus curtipes* (Jerdon, 1853)

1854. *Rana curtipes* Jerdon, "1853", *J. Asiat. Soc. Bengal*, 22: 532.

1868. *Pachybatrachus robustus* Mivart, *Proc. zool. Soc. London*, 1868: 557.

1869. *Clinotarsus robustus* Mivart, *Proc. zool. Soc. London*, 1869: 280.

1870. *Hylarana curtipes* - Jerdon, *Proc. Asiat. Soc. Bengal*, 1870: 83.

1882. *Rana curtipes* Boulenger, *Cat. Batr. Sal. Coll. Brit. Mus.*, Ed. 2: 61.

1920. *Rana (Hylarana) curtipes* - Boulenger, *Rec. Indian Mus.*, 20: 131-133.

1987. *Rana (Hylarana) curtipes* - Dubois, "1986", *Alytes*, 5: 42.

1992. *Rana (Clinotarsus) curtipes* - Dubois, *Bull. Mens. Soc. Linn. Lyon*, 61: 328.

2005. *Clinotarsus curtipes* - Krishna and Krishna, *Herpetol. Rev.*, 36: 21.

English name: Bicoloured Frog.

Diagnosis: Medium sized frogs; head depressed, snout obtusely pointed, canthus rostralis distinct. Loreal region concave. Interorbital width broader than upper eyelid. Tips of fingers and toes swollen or dilated into disks with indistinct circummarginal groove. First finger longer than second. Tibiotarsal articulation reaches the tympanum or eye. Heels meet when the limbs are folded at right angles to the body; toes $\frac{3}{4}$ or entirely webbed; inner metatarsal tubercle small; no tarsal fold. Males with internal vocal sacs. Forelimbs robust. Inner metacarpal tubercle on the inner side of the first finger with a small, grey, velvety, rugous patch. Skin smooth. Dorsolateral glandular fold narrow and moderately prominent. Supratympanic fold present. Coloration distinctive with grey above and with or without black dots; black below. Both colors are sharply separated (Chanda, 2002).

Material examined: Reg. no: V/A/657, 1 ex., Sukhalhatti, 04.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/660, 1 ex., Chowdikattae, 06.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/677, 1 ex., Halagekerae, 15.xi.2007, coll: Jafer Palot & party.

Measurements: SVL 43.0 to 56.9 mm.

Habitat: Found on the forest floor.

Distribution: Karnataka and Kerala (Dutta, 1997 and Biju, 2001).

Remarks: Endemic to Western Ghats.

Genus *Hylarana* Tschudi

Key to the species of *Hylarana* from BWLS (TR)

- Toes with disks 2
- Toes without disks; tibiotarsal articulation reaches tympanum or eye
..... *H. malabarica*
- 2 Tibio-tarsal articulation reaching between eye and the nostril *H. aurantiaca*
- Tibio-tarsal articulation reaching nostril or tip of snout or a little beyond
..... *H. temporalis*

17. *Hylarana aurantiaca* (Boulenger, 1904)

1904. *Rana aurantiaca* Boulenger, *J. Bombay nat. Hist. Soc.*, **15**: 430.
1920. *Rana (Hylarana) aurantiaca* - Boulenger, *Rec. Indian Mus.*, **20**: 127-130.
1922. *Rana (Hylarana) bhagmandlensis* Rao, *J. nat. Hist. Soc. Bombay*, **28**: 441.
1987. *Rana (Hylarana) aurantiaca* - Dubois, "1986", *Alytes*, **5**: 42.
1987. *Rana (Hylarana) bhagmandlensis* - Dubois, "1986", *Alytes*, **5**: 42.
1992. *Rana (Sylvirana) aurantiaca* Dubois, *Bull. Mens. Soc. Linn. Lyon*, **61**: 326.
1992. *Rana (Sylvirana) bhagmandlensis* Dubois, *Bull. Mens. Soc. Linn. Lyon*, **61**: 326.
2005. *Hylarana aurantiaca* - Chen, Murphy, Lathrop, Ngo, Orlov, Ho, and Somorjai, *Herpetol. J.*, **15**: 237.
2006. *Sylvirana aurantiaca* - Frost, Grant, Faivovich, Bain, Haas, Haddad, de Sa, Channing, Wilkinson, Donnellan, Raxworthy, Campbell, Blotto, Moler, Drewes, Nussbaum, Lynch, Green, and Wheeler, *Bull. Am. Mus. Nat. Hist.*, **297**: 370.

English name: Golden Frog.

Diagnosis: Small to medium sized slender frogs; snout long and narrow, canthus rostralis distinct; loreal region vertical. Interorbital width very slightly broader than the upper eyelid. Tympanum distinct; $\frac{1}{2}$ or ? the diameter of the eye. Tips of fingers and toes dilated into disks with circummarginal groove. Toes ? webbed; subarticular tubercles moderate; the outer metatarsal tubercle small and round whereas the inner elongated. Tibiotarsal articulation reaches between eye and the nostril when leg is held along the body. Males have a darkly pigmented humeral gland close to the axilla and an internal vocal sac. A nuptial pad is present on the first finger. Skin smooth or coarsely shagreened with an irregular scattering of conical tubercles. A distinct but narrow dorsolateral glandular fold extends from behind the eye to the region of the vent. Below this fold is a broad chocolate brown band which runs from the tip of the snout through the nostril, eye and tympanum fading on the flanks. Throat speckled and the vent is immaculate. Dorsum orange in colour without spots; limbs without bars; a black band along each side of the head and body; upper lip, canthus rostralis and dorsolateral folds white; terminal disks of toes black, lower parts white (Chanda, 2002).

Material examined: Reg. no: V/A/708, 1 ex., Virupakshikhan, 22.xi.2007, coll: Jafer Palot & party.

Measurements: SVL 31.6 mm.

Habitat: Found on the forest floor near moist and humid area.

Distribution: Maharashtra, Karnataka, Kerala, Tamil Nadu (Frost, 2009).

Elsewhere: Sri Lanka (Frost, 2009).

18. *Hylarana malabarica* (Tschudi, 1838)*

1838. *Rana malabarica* Tschudi, *Classif. Batr.*: 40, 80.
1859. *Hylarana malabarica* - Gunther, "1858", *Cat. Batr. Sal. Coll. Brit. Mus.*: 131.
1861. *Hydrophylax malabaricus* - Fitzinger, "1860", *Wiss. Wien, Phys. Math. Naturwiss. Kl.*, **42**: 414.
1864. *Hylorana malabarica* Gunther, *Rept. Brit. India*: 426.
1882. *Rana malabarica* Boulenger, *Cat. Batr. Sal. Coll. Brit. Mus.*, Ed. 2: 60.
1920. *Rana (Rana) malabarica* - Boulenger, *Rec. Indian Mus.*, **20**: 9.
1992. *Rana (Hydrophylax) malabarica* - Dubois, *Bull. Mens. Soc. Linn. Lyon*, **61**: 325.
2006. *Hydrophylax malabaricus* - Frost, Grant, Faivovich, Bain, Haas, Haddad, de Sa, Channing, Wilkinson, Donnellan, Raxworthy, Campbell, Blotto, Moler, Drewes, Nussbaum, Lynch, Green, and Wheeler, *Bull. Am. Mus. Nat. Hist.*, **297**: 368.
2007. *Hylarana malabarica* - Che, Pang, Zhao, Wu, Zhao, and Zhang, *Mol. Phylogenet. Evol.*, **43**: 1-13, by implication.

English name: Fungoid Frog.

Diagnosis: Medium sized frogs. Adults can be easily identified by distinctive coloration. Snout obtuse, projecting slightly beyond the mouth. Tympanum very distinct, slightly less or equal to the diameter of the eye. Tips of fingers and toes swollen. First finger longer than second. Tibiotarsal articulation reaches the tympanum or the eye when the leg is held along the body. Heels overlap feebly when the legs are folded at right angles to the body. Toes feebly webbed; two or three phalanges of the fourth toe free. Subarticular tubercles on fingers and toes and the inner metatarsal tubercles large and prominent. Skin smooth or granular above with a distinct dorsolateral glandular fold from above the tympanum to the groin. A shorter fold terminating in a large gland below the tympanum or is continued as a line of glands along the flanks, present. Ventrally granulate on belly and the underside of the thighs. Back bright orange red, yellowish red or crimson, from the tip of the snout to vent, distinctly separated from the black coloration on the flanks starting canthus rostralis; upper lip white and the colour may extend along the line of glands on one sides. Ventrally white, uniform or spotted or marbled with black. Throat and chest often wholly brownish black or black barred or marbled with yellowish white. The barring in some of the young specimens resembles stripes.

Distribution: Western Ghats, Assam and Meghalaya (Dutta, 1997).

Elsewhere: Not known.

19. *Hylarana temporalis* (Gunther, 1864)

1854. *Rana flavescens* Jerdon, "1853", *J. Asiat. Soc. Bengal*, **22**: 531.

1864. *Hylarana temporalis* Gunther, *Rept. Brit. India*: 427.

1870. *Hylarana flavescens* - Jerdon, *Proc. Asiat. Soc. Bengal*, 1870: 83.

1882. *Rana temporalis* - Boulenger, *Cat. Batr. Sal. Coll. Brit. Mus.*, Ed. 2: 63.

1920. *Rana (Hylarana) temporalis* - Boulenger, *Rec. Indian Mus.*, **20**: 127-130.

1922. *Rana (Hylarana) gracilis montanus* Rao, *J. Nat. Hist. Soc. Bombay*, **28**: 439.

1937. *Rana (Hylarana) intermedius* Rao, *Proc. Indian Acad. Sci., Ser. B*, **6**: 394.

1987. *Rana (Hylarana) temporalis* - Dubois, "1986", *Alytes*, **5**: 42.

1992. *Rana (Sylvirana) temporalis* - Dubois, *Bull. Mens. Soc. Linn. Lyon*, **61**: 326.

2005. *Hylarana temporalis* - Chen, Murphy, Lathrop, Ngo, Orlov, Ho, and Somorjai, *Herpetol. J.*, **15**: 237.

2006. *Sylvirana temporalis* Frost, Grant, Faivovich, Bain, Haas, Haddad, de Sa, Channing, Wilkinson, Donnellan, Raxworthy, Campbell, Blotto, Moler, Drewes, Nussbaum, Lynch, Green, and Wheeler, *Bull. Am. Mus. Nat. Hist.*, **297**: 370.

English name: Bronze Frog.

Diagnosis: Medium sized frogs. Head depressed; snout acute, projecting beyond the mouth; canthus rostralis angular; loreal region strongly concave. Interorbital width broader than upper eyelid. Tympanum very distinct, $\frac{3}{4}$ the diameter of the eye. Tips of fingers and toes dilated into well developed disks with a distinct circummarginal groove. First finger longer than second. Toes nearly entirely webbed; inner metatarsal tubercle small; no tarsal fold. Tibiotarsal articulation reaches nostril or tip of snout or a little beyond. The heels strongly overlap when the limbs are folded at right angles to the body. Males with internal vocals sacs. Fore limb strong with a pad on the inner side of the first finger, covered during the breeding season with grayish brown velvet like horny layer. Skin smooth; a prominent glandular dorsolateral fold from above the tympanum to the hip. Lower parts smooth (Chanda, 2002).

Materials examined: Reg. no: V/A/727, 3 exs., Bygoor, 22.v.2005, coll: Dinesh, K.P & party; Reg. no: V/A/654, 1 ex., Tadabehalla, 11.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/676, 1 ex., Halagekerae, 15.xi.2007, coll: Jafer Palot & party

Measurements: SVL 38.0 to 61.5 mm.

Habitat: Found breeding in the sides of the perennial streams of the forest.

Distribution: *Distribution*: Kerala, Maharashtra, Tamil Nadu and Karnataka (Dutta, 1997 and Biju, 2001).

Elsewhere: Sri Lanka (Frost, 2009).

Family RANIXALIDAE Dubois

Genus *Indirana* Laurent

Key to the species of *Indirana* from BWLS (TR)

- Toes ½ to ? webbed; tympanum ½ to ? diameter of eye *I. beddomii*
- Toes not more than ¼ webbed; tympanum very distinct *I. leptodactyla*

20. *Indirana beddomii* (Gunther, 1875)

1876. *Polypedates beddomii* Gunther, "1875", *Proc. zool. Soc. London*, 1875: 571.

1882. *Rana beddomii* - Boulenger, *Cat. Batr. Sal. Coll. Brit. Mus.*, Ed. 2: 55.

1918. *Rana (Discodeles) beddomi* - Boulenger, *Ann. Mag. Nat. Hist.*, Ser. 9, 1: 238.

1986. *Indirana beddomii* - Laurent, In Grassé and Delsol (eds.), *Traite de Zool.*, 14: 761.

1987. *Ranixalus beddomii* Dubois, "1986", *Alytes*, 5: 69.

1987. *Indirana beddomii* Dubois, "1986", *Alytes*, 5: 175-176.

1989. *Rana (Discodeles) beddomii* Daniel and Sekar, *J. Bombay Nat. Hist. Soc.*, 86: 194.

English name: Beddome's Indian Frog.

Diagnosis: Medium sized frogs. This species closely resembles *Indirana leithii* but can be separated from it by the following set of characters: Interorbital space as broad as the upper eye lid; fingers moderate, first at least as long as second; the tibiotarsal articulation reaches the tip of the snout or a little beyond when the leg is held along the body; heels strongly overlap when the limbs are folded at right angles to the body; skin of back with short longitudinal glandular folds; a strong supra tympanic fold from the eye to the shoulder; colour brown above with rather indistinct darker spots, rarely uniform pinkish, sometimes with a light vertebral band; a dark cross band between eyes; a black band along the canthus rostralis and a black temporal spot; limbs more or less distinctly cross barred; lower parts uniform white (Chanda, 2002).

Material examined: Reg. no: V/A/764, 1 ex., Shirgola, 17.xi.2007, coll: Jafer Palot & party.

Measurements: SVL 26.0 mm.

Habitat: Found below small rocks in a dried stream bed in the forest.

Distribution: Maharashtra, Karnataka, Kerala and Tamil Nadu (Dutta, 1997).

Remarks: Endemic to Western Ghats

21. *Indirana leptodactyla* (Boulenger, 1882)

1876. *Polypedates brevipalmatus* Gunther, "1875", *Proc. Zool. Soc. London*, 1875: 572.

1882. *Rana leptodactyla* Boulenger, *Cat. Batr. Sal. Coll. Brit. Mus., Ed. 2*: 57.

1920. *Rana (Discodeles) leptodactyla* -Boulenger, *Rec. Indian Mus.*, 20: 98.

1986. *Indirana leptodactyla* -Laurent, In Grasse and Delsol (eds.), *Traite de Zool.*, 14: 761.

1987. *Ranixalus leptodactylus* -Dubois, "1986", *Alytes*, 5: 69.

1987. *Indirana leptodactyla* -Dubois, "1986", *Alytes*, 5: 175-176.

1989. *Rana (Discodeles) leptodactyla* -Daniel and Sekar, *J. Bombay nat. Hist. Soc.*, 86: 194.

English name: Boulenger's Indian Frog

Diagnosis: Small sized frog, tongue with a papilla, head depressed, snout blunt, tympanum ? diameter of the eye. First finger shorter than second. Toes ¼ webbed. Tips of disc dilated into discs. Tibio-tarsal articulation reaching the tip of snout or beyond. Heels overlap when the limbs are folded at right angles to the body. Skin of the back with short longitudinal glandular folds (Chanda, 2002).

Materials examined: Reg. no: V/A/763, 1 ex., Chowdikattae, 6.xi.2006, coll: Emiliyamma, K.G & party

Measurements: SVL 18.29 mm.

Habitat: Found in a water body in the forest.

Distribution: Karnataka, Kerala and Tamil Nadu (Dutta, 1997).

Remarks: Endemic to Western Ghats.

Family: RHACOPHORIDAE Hoffman

Key to the genera of family RHACOPHORIDAE from BWLS (TR)

- Medium to large sized frogs; generally found on trees, known for foam nest construction with tadpole stage 1
- Small to medium sized frogs; generally found on bushes, known for direct development surpassing the tadpole stage *Raorchestes*
- 1. Dorsum green, without any specific pattern of markings *Rhacophorus*
- Dorsum brown with either irregular blotches or hourglass pattern ... *Polypedates*

Genus *Polypedates* Tschudi

Key to the species of *Polypedates* from BWLS (TR)

- Dorsum brown with irregular blotches *P. maculatus*
- Dorsum brown with specific hourglass pattern *P. occidentalis*

22. *Polypedates maculatus* (Gray, 1833)

1833. *Hyla maculata* Gray, *Ill. Indian Zool.*: pl. 82.
 1838. *Bürgeria maculata* Tschudi, *Classif. Batr.*: 34, 75.
 1838. *Hyla Reynoudi* Tschudi, *Classif. Batr.*: 34, 75.
 1859. *Polypedates maculatus* -Gunther, "1858", *Cat. Batr. Sal. Coll. Brit. Mus.*: 78.
 1882. *Rhacophorus maculatus* -Boulenger, *Cat. Batr. Sal. Coll. Brit. Mus.*, Ed. 2: 83.
 1901. *Rhacophorus acanthostomus* Werner, *Zool. Anz.*, 24: 98.
 1912. *Rhacophorus maculatus himalayensis* Annandale, *Rec. Indian Mus.*, 8: 14.
 1927. *Rhacophorus (Polypedates) maculatus* -Bourret, *Fauna Indochine, Vert.*, 3: 264.
 1931. *Rhacophorus (Rhacophorus) acanthostomus* -Ahl, *Das Tierreich*, 55: 120.
 1931. *Rhacophorus (Rhacophorus) maculatus* -Ahl, *Das Tierreich*, 55: 133.
 1931. *Rhacophorus (Rhacophorus) acanthostomus* -Ahl, *Das Tierreich*, 55: 137.
 1931. *Rhacophorus (Rhacophorus) leucomystax himalayensis* -Ahl, *Das Tierreich*, 55: 137.
 1936. *Rhacophorus leucomystax maculatus* -Wolf, *Bull. Raffles Mus.*, 12: 181.
 1987. *Rhacophorus (Rhacophorus) maculatus himalayensis* -Dubois, "1986", *Alytes*, 5: 84-85.

English name: Chunam Frog.

Diagnosis: A slender medium sized frog, vomerine teeth present, snout acuminate, canthus rostralis distinct, interorbital width broader than the upper eyelid; tympanum about $\frac{3}{4}$ the diameter of the eye; first finger as long as second; fingers with rudiment of web; toes $\frac{3}{4}$ webbed; tips of fingers and toes with dilated disks; subarticular tubercle distinct; inner metatarsal tubercle prominent; tibiotarsal articulation reaches the nostrils; heels strongly overlap when folded to at right angles to the body. Brownish yellow or grayish above with darker spots; hinder side of the thighs with round yellow spots on a brownish background (Chanda, 2002).

Material examined: Reg. no: V/A/761, 1 ex., Saave, 5.xi.2006, coll: Emiliyamma, K.G & party.

Measurements: SVL 47.46 mm.

Habitat: Found hiding below a tree leaf, in the vicinity of back waters of the Bhadra dam.

Distribution: Throughout India (Dutta, 1997).

Elsewhere: Bangladesh and Sri Lanka (Frost, 2009).

23. *Polypedates occidentalis* Das and Dutta, 2006

2006. *Polypedates occidentalis* Das and Dutta, *J. Herpetol.*, **40**: 215.

English name: Charpa Tree Frog.

Diagnosis: A medium sized tree frog; head relatively long and wide; snout obtusely pointed; nostril closer to tip of snout than to eye; canthus rostralis flattened in transverse section; loreal region slightly concave; interorbital distance greater than width of upper eyelid; distinct supratympanic fold from posterior corner of upper eyelid; tympanum distinct; vomerine teeth present; tongue smooth, lacking median conical lingual papilla.

Forelimbs relatively short; tips of fingers dilated into large, flattened, rounded disks with circum-marginal grooves; fingers webbed basally, most extensive webbing between fingers I and II; all fingers with dermal fringes on inner and outer aspects; no dermal fringe on elbow; large unpigmented nuptial pads on dorsal surfaces of fingers I and II. Hind limbs relatively long; tibia long; tips of toes dilated into flattened disks with circummarginal grooves; webbing medium; distinct inner metatarsal tubercle present; outer metatarsal tubercle absent.

Dorsum smooth, lacking tubercles; outer edge of upper eyelids with smooth granules; throat with longitudinal pleated skin; abdominal regions granular, with large rounded tubercles; undersurface of forelimbs and the undersurface of thighs smooth; posterior surface of hind limbs with large, rounded tubercles. Dark brown hourglass shaped marking present on dorsum, commencing in interorbital region, narrowing in occipital region, and widening so as to terminate as a three pronged figure at about mid length of body; rest of dorsum yellow brown, with gray brown blotches; dark brown line from posterior of orbit to the upper level of axilla, fragmenting into two or three blotches on flanks; fore- and hind limbs with dark brown bars; posterior surface of thigh with brownish-yellow and dark brown reticulations; venter cream, except the dark brown mottlings on throat (Das and Dutta, 2006).

Material examined: Reg. no: V/A/670, 1 ex., Bygoor, 13.viii.2007, coll: Dinesh, K.P & party

Measurements: SVL 35.6 mm.

Habitat: Found in the coffee plantation adjacent to the forest area.

Distribution: From type locality only (Charpa Forest Range, Vazhachal Forest Division, Thrissur, Kerala).

Remarks: First report of the species, after the original description. Endemic to Western Ghats.

Genus ***Raorchestes*** Biju, Shouche, Dubois, Dutta and Bossuyt

Key to the species of *Raorchestes* from BWLS (TR)

- Tongue with a free pointed papillae 1
- Tongue without a free pointed papillae 2
- 1. Dorsum uniform dark green; posterior surface of thighs dark brown and anterior surface of thighs and groins dark brown with yellow blotches *R. chromasynchysi*
- Dorsum shagreened; dorsal surface of forearm and loreal region yellow; anterior and posterior surface of thighs yellow *R. glandulosus*
- 2. Dorsum yellow to cream with minute brown dots and larger brown patches on the back *R. luteolus*
- Dorsum brownish 3
- 3. A bony projection on the underside of the humerus bone *R. tuberothumerus*
- Bony projection on the underside of the humerus bone absent groin and posterior part of thighs uniform brownish black with large yellow blotches *R. charius*

24. *Raorchestes charius* (Rao, 1937)

1937. *Philautus charius* Rao, *Proc. Indian Acad. Sci., Ser. B*, **6**: 405.

2001. *Philautus (Philautus) charius* - Bossuyt and Dubois, *Zeylanica*, **6**: 48.

2010. *Raorchestes charius* Biju, Shouche, Dubois, Dutta and Bossuyt, *Current Science*, **98** (8): 119-1125.

English name: Seshachar's Bush Frog.

Diagnosis: Medium sized bush frog, head broader than long, snout rounded, canthus rostralis rounded, loreal region slightly concave, nostrils closer to tip of snout, tympanum rather indistinct, 35 % of eye diameter. Vomerine ridge present, tongue bearing no lingual papilla, supratympanic fold distinct. Forearm shorter than hand; fingers moderately long; tips of fingers with well-developed disks with distinct circummarginal grooves; dermal fringe on inside of all fingers, subarticular tubercles prominent, prepollex distinct, oval; two palmar tubercles; supernumerary tubercles present on all fingers.

Hind limbs moderately long, heels barely in touch when limbs are folded at right angles to body; tibia shorter than thigh; tips of all toes with moderate disks with distinct

circummarginal grooves; webbing present, subarticular tubercles distinct; inner metatarsal tubercle distinct; supernumerary tubercles present.

Skin on the side of head smooth; anterior and posterior part of back with small horny spinules, upper part of flanks shagreened. Dorsal part of forelimb, thigh, tibia and tarsus smooth; throat, chest, belly and ventral part of thighs granular. Head with a light brown triangle from tip of snout to between eyes and with an interocular dark brown cross-bar, dorsum with a dark cross mark, flanks greyish, groin grey with large pale yellow spots, loreal region dark brown, tympanic region and tympanum greyish. Forelimb, dorsal part of thigh, tibia and foot greyish with some darker bands, posterior part of thigh grey with some round pale yellow spots. Throat and margin of throat marbled with grey, chest, belly, ventral part of thighs and webbing whitish. Vocal sacs present; a pair of distinct, rounded openings at base of jaw. Secondary sexual character: horny spinules on back (Bossuyt and Dubois, 2001).

Material examined: Reg. no: V/A/728, 3 exs., Kemmanugundi, 5.iii.2009, coll: Jafer Palot & party

Measurements: SVL 28.0 to 30.0 mm.

Habitat: Found on the *Strobilanthus* bushes near trek path inside the forest.

Distribution: Found in Western Ghats parts of Karnataka (Biju and Bossuyt, 2009).

Remarks: Endemic to Western Ghats.

25. *Raorchestes chromasynchysi* (Biju and Bossuyt, 2009)

2009. *Philautus chromasynchysi* Biju and Bossuyt, *Zoological Journal of the Linnaean Society*, 155, 374-444.

2010. *Raorchestes chromasynchysi* - Biju, Shouche, Dubois, Dutta and Bossuyt, *Current Science*, 98 (8): 119-1125.

English name: Confusing green bush frog.

Diagnosis: A small to medium sized frog with a slender body; head length subequal to head width; snout slightly pointed and protruding; tongue with a free pointed papilla; canthus rostralis sharp; loreal region vertical, marginally concave; tympanum distinct; supratympanic fold distinct; forelimb shorter than hand; webbing in fingers absent; palmar tubercle and subarticular tubercle distinct; super-numerary tubercles present; nuptial pad absent; tibia length sub-equal to thigh; webbing moderate (I 1-2 II 1-2 III 1-2 IV 2-1 V); super-numerary tubercles present; skin on the dorsum smooth to sparsely granular but on the ventral side of the belly finely granular (Biju and Bossuyt, 2009).

Material examined: Reg. no: V/A/712, 6 exs., Kemmanugundi, 22.xi.2007, coll: Jafer Palot & party; Reg. no: V/A/690, 1 ex., Kemmanugundi, 05.iii.2009, coll: Dinesh, K.P & party; Reg. no: V/A/709, 3 exs., Kemmanugundi, 05.iii.2009, coll: Dinesh, K.P & party

Measurements: SVL 20.2 to 34.8 mm.

Habitat: Found on the bushes and wet rocks in stream vicinities of the forest.

Distribution: Known only from type locality (Biju and Bossuyt, 2009).

Remarks: First report of the species, after the original description.

26. *Raorchestes glandulosus* (Jerdon, 1853)

1854. *Ixalis ? glandulosa* Jerdon, "1853", *J. Asiat. Soc. Bengal*, **22**: 532.
1870. *Ixalus glandulosa* - Jerdon, *Proc. Asiat. Soc. Bengal*, 1870: 85.
1876. *Ixalus glandulosus* Gunther, "1875", *Proc. zool. Soc. London*, 1875: 573.
1882. *Ixalus pulcher* Boulenger, *Cat. Batr. Sal. Coll. Brit. Mus.*, Ed. 2: 469.
1927. *Rhacophorus noblei* Ahl, *Sitzungsber. Ges. Naturforsch. Freunde Berlin*, 1926: 40.
1927. *Rhacophorus pulcherrimus* Ahl, *Sitzungsber. Ges. Naturforsch. Freunde Berlin*, 1926: 41.
1928. *Philautus glandulosus* - Roux, *Rev. Suisse Zool.*, **38**: 465.
1931. *Rhacophorus (Philautus) glandulosus* - Ahl, *Das Tierreich*, **55**: 71.
1931. *Rhacophorus (Philautus) noblei* - Ahl, *Das Tierreich*, **55**: 55, 100.
1931. *Rhacophorus (Philautus) pulcherrimus* - Ahl, *Das Tierreich*, **55**: 55, 101.
1937. *Philautus pulcher* - Rao, *Proc. Indian Acad. Sci., Ser. B*, **6**: 423.
1974. *Philautus noblei* - Gorham, *Checklist World Amph.*: 167.
1974. *Philautus pulcherrimus* Gorham, *Checklist World Amph.*: 167.
2001. *Philautus (Philautus) glandulosus* - Bossuyt and Dubois, *Zeylanica*, **6**: 15.
2010. *Raorchestes glandulosus* - Biju, Shouche, Dubois, Dutta and Bossuyt, *Current Science*, **98** (8): 119-1125.

English name: Beautiful Bush Frog.

Diagnosis: A small frog with color varying from green to dark purple with uniform or distinct markings dorsally. Head moderately large; snout rounded and as long as the diameter of the eye; canthus rostralis distinct; nostrils equidistant from the eye and tip of snout; interorbital width broader than the diameter of the eye and tympanum hidden. A cutaneous fold extending from the eye to shoulder. Forelimbs moderately long, fingers free; hind limbs long; tibiotarsal articulation reaching eye or slightly beyond; Toes

webbed at base; tips of toes dilated into small rounded disks and a small inner metatarsal tubercle present. Ventral surface immaculate more or less spotted; dorsal skin generally smooth, sometimes with a number of small indistinct tubercles; lateral sides of the body generally granular. (Biju and Bossuyt, 2009).

Material examined: Reg. no: V/A/686, 1 ex., Aldur, 18.vii.2009, coll: Dinesh, K.P & party.

Measurements: SVL 24.6 mm.

Habitat: Found on the middle canopy trees adjacent to coffee plantations.

Distribution: Found in Western Ghats of Karnataka and Kerala (Biju and Bossuyt, 2009).

Remarks: Endemic to Western Ghats.

27. *Raorchestes luteolus* (Kuramoto and Joshy, 2003)

2003. *Philautus luteolus* Kuramoto and Joshy, *Curr. Herpetol.*, **22**: 52.

2010. *Raorchestes luteolus* - Biju, Shouche, Dubois, Dutta and Bossuyt, *Current Science*, **98** (8): 119-1125.

English name: Coorg Yellow Bush Frog.

Diagnosis: Medium sized bush frogs, width of head broader than head length; snout pointed; canthus rostralis rounded; nostrils oval, nearer tip of snout than eye; vomerine ridge absent; pupil rounded with blue ring on the outer margin; tympanum indistinct; tongue bifid without papilla. Forearm less than hand length, finger tips with well-developed disks with circum-marginal grooves, fingers with dermal fringes on both edges. Hindlimbs long, heels do not overlap when folded at right angles to the body; tibia shorter than femur and longer than foot; toe disk well developed; webbing distinct and medium; tibiotarsal articulation reaches anterior border of eye. Dorsum yellow or yellowish brown, usually with four-six faint brownish discontinuous lines from snout to vent; loreal and tympanic regions golden yellow or yellowish brown (Biju and Bossuyt, 2009).

Material examined: Reg. no: V/A/710, 9 exs., Rashigudda, 16.xi.2006, coll: Emiliyamma, K.G & party; Reg. no: V/A/687, 1 ex., Bygoor, 23.vi.2009, coll: Dinesh, K.P & party.

Measurements: SVL 18.6 to 27.0 mm.

Habitat: Found on bushes and coffee plantations, adjacent to forest regions.

Distribution: Found in Western Ghats of Karnataka (Biju and Bossuyt, 2009).

Remarks: One of the commonest bush frogs in the Coorg, Hassan and Chikkamagaluru

parts of Karnataka, male individuals making tinkling calls during late evening hours in the monsoon season. Biju and Bossuyt (2009) examined the type series of *P. neelanethrus* and the published sequence of the 16S rRNA gene and could not find any substantial difference with *P. luteolus*; therefore, they considered *P. neelanethrus* as a new synonym of *P. luteolus*. First report of the species, after the original description.

28. *Raorchestes tuberothumerus* (Kuramoto and Joshy, 2003)

2003. *Philautus tuberothumerus* Kuramoto and Joshy, *Curr. Herpetol.*, **22**: 55.

2010. *Raorchestes tuberothumerus* - Biju, Shouche, Dubois, Dutta and Bossuyt, *Current Science*, **98** (8): 119-1125.

English name: Kudremukh Bush Frog.

Diagnosis: A small frog with brown to dark dorsal color and conspicuous yellow spots on the anterior surface of the thigh and with large yellow or reddish yellow markings near groin. Snout slightly pointed, canthus rostralis rounded. Loreal region slightly concave or flat; nostril nearer to tip of snout than to eye, and protruding beyond the line between tip of snout and anterior corner of eye when viewed from above. Interorbital width much wider than the upper eyelid. Tympanum small and indistinct, less than the diameter of the eye. Supratympanic fold distinct. No papilla on the tongue. Palm longer than forearm and with a bony projection on the underside of the humerus bone, which is unique to this species. Fingers with large disks with circummarginal groove, no web between fingers. Subarticular and palmar tubercles well developed. Rudimentary web between toes. Inner metatarsal tubercle moderate; no outer metatarsal tubercle; no tarsal fold. Heels overlap when folded at right angles to the body. Dorsal surface coarsely granulated but, lower surface finely granulated (Kuramoto and Joshy, 2003).

Materials examined: Reg. no: V/A/688, 1 ex., Bygoor, 23.vi.2009, coll: Dinesh, K.P & party.

Measurements: SVL 17.8 mm.

Habitat: Found on the shrubs and bushes along side the road and trek paths of the forest areas.

Distribution: Found in Western Ghats of Karnataka.

Remarks: First report of the species, after the original description.

Genus *Rhacophorus* Kuhl and Van Hasselt

Key to the species of *Rhacophorus* from BWLS (TR)

- Dorsum green with two yellow lateral lines *R. lateralis*
 Dorsum uniform green without any lateral lines *R. malabaricus*

29. *Rhacophorús lateralis* Boulenger, 1883

1883. *Rhacophorus lateralis* Boulenger, *Ann. Mag. Nat. Hist., Ser. 5*, 12: 162.

1931. *Rhacophorus (Rhacophorus) lateralis* - Ahl, *Das Tierreich*, 55: 165.

English name: Small Tree Frog.

Diagnosis: Medium sized frog, habitus slender; head short, broader than long; snout short, obtusely pointed, projecting beyond mouth; canthus rostralis distinct; loreal region slightly concave; vomerine teeth in two small oblique series between the choanae; nostrils nearer to the tip of the snout than to the eye; interorbital space broader than the upper eyelid; eyes large; tympanum half the diameter of the eye; a supratympanic fold distinct; fingers and toes with enlarged disc possessing circummarginal grooves; fingers and toes with dermal fringes and more than half webbed; subarticular tubercles not very prominent; a fold of the skin bordering the forelimb anteriorly; tibiotarsal articulation reaching the tip of the snout; dorsum smooth, belly granular; a prominent dorsolateral yellow streak on each side from the nostril to the groin along the outer edge of the upper eyelid. Dorsum green interspersed with fine sky blue spots; a distinct metallic yellow lateral stripe running from eye to the groin (Das, 2000).

Material examined: Reg. no: V/A/667, 1 ex., Bygoor, 13.viii.2007, coll: Dinesh, K.P & party; Reg. no: V/A/678, 1 ex., Magundi, 14.viii.2007, coll: Dinesh, K.P & party

Measurements: SVL 28.0 to 31.4 mm.

Habitat: Found common in coffee plantations adjacent to forest area and in most cases this species was found in association with *R. malabaricus*.

Distribution: Karnataka and Kerala (Das, 2000).

Remarks: Endemic to Western Ghats.

30. *Rhacophorus malabaricus* Jerdon, 1870

1870. *Rhacophorus malabaricus* Jerdon, *Proc. Asiat. Soc. Bengal*, 1870: 84.

1931. *Rhacophorus (Rhacophorus) malabaricus* - Ahl, *Das Tierreich*, 55: 159.

English name: Malabar Flying Frog.

Diagnosis: Medium sized frogs with vomerine teeth in two straight series; snout sub acuminate; canthus rostralis obtuse; loreal region concave; nostril nearer the end of the snout than eye; inter orbital width broader than upper eyelid; tympanum ? the diameter of the eye. Fingers and toes webbed to the disk; disk as large as the tympanum. Subarticular tubercles well developed. Tibiotarsal articulation reaches the eye or nostril. Heels overlap when the legs are folded at right angle to the body. Skin finely granular

above, more coarsely beneath; granules under the thigh intermixed with larger ones; outer border of forearm and tarsus with a dermal fold; heel with a triangular dermal process. Green above often speckled all over with black and white, lower parts whitish. Web between fingers and toes reddish (Chanda, 2002).

Material examined: Sighted at Bygoor, Magundi and Balehonnur areas adjacent to BWLS, specimen not collected.

Habitat: Found in the coffee plantations and cardamom plantations adjacent to forest areas.

Distribution: Kerala, Karnataka and Goa (Dutta, 1997).

Remarks: Endemic to Western Ghats.

SUMMARY

The present work reveals the occurrence 30 species falling under 16 genera and 8 families of anurans in BWLS, of which 20 species are recorded for the first time from this Sancturay.

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REPTILIA

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INTRODUCTION

About 5817 species of reptiles known from the world with a diversity of 460 species from India (Ramakrishna and Alfred, 2007). The state of Karnataka is known to harbour 93 species of reptiles (Daniels, 2000). The present account pertaining to the Bhadra Tiger Reserve, a part of Karnataka State and a part of the Western Ghats (WG), is based on the reptiles collected and sighted during the survey period (2006 to 2009) and also based on the bibliographic records (Murthy, 1985; Das, 1995; Daniels, 2000; Daniel, 2002; Kumar, 2002; Hegde and Ramakrishna, 2006) pertaining to the area.

Altogether 39 species of reptiles belonging to 32 genera under 14 families are recorded from the Bhadra Wildlife Sanctuary and Tiger Reserve. They belong to 1 species of crocodile, 2 species of chelonians (Turtles and tortoises), 12 species of Lizards and 24 species of snakes. Out of these, 8 are endemic to the Western Ghats *viz.* Nilgiri Palli (*Cnemapsis indica*), Reticulated Gecko (*Hemidactylus reticulatus*), Roux's Forest Calotes (*Calotes rouxii*), Draco (*Draco dussumieri*), Shieldtail (*Uropeltis* spp.), Yellow-collared Forest Keelback (*Amphiesma monticola*), Bamboo Pit Viper (*Trimeresurus gramineus*), and the Malabar Pit Viper (*Trimeresurus malabaricus*).

All the major Venomous snakes known from India are represented in the Park, which include the King Cobra (*Ophiophagus hannah*), Indian Cobra (*Naja naja*), Common Krait (*Bungarus caeruleus*), Russell's Viper (*Daboia russelii*) and Saw-scaled Viper (*Echis carinatus*).

The nomenclature followed here is after Whitaker and Captain (2004) for snake species and Das (2002) for chelonians and lizards. A systematic account is given below incorporating information on distribution in India, Conservation status as per the Indian Wildlife (Protection) Act, 1972, threatened category as per the IUCN, Appendix of CITES, and the details regarding occurrence of species during the surveys.

SYSTEMATIC ACCOUNT

Class REPTILIA

Order LORICATA (Crocodilia)

Family CROCODYLIDAE

1. *Crocodylus palustris* Lesson

Mugger/ Marsh Crocodile

Distribution: Widespread in India, extends from eastern Iran to Pakistan, Nepal, Bangladesh and Sri Lanka.

Conservation Status: Listed in the Schedule- I of Indian Wildlife (Protection) Act of 1972 (amended up to 2002), under Appendix-I of CITES and Vulnerable category of IUCN (1996).

Occurrence during the survey: No direct sighting. Many wallowing points and droppings were found on the lake bed.

Order TESTUDINES

Family TESTUDINIDAE

2. *Melanochelys trijuga* (Schweigger)

Indian Pond Terrapin

Distribution: Widespread in Peninsular and north-eastern India, also Sri Lanka, Maldives, Nepal, Bangladesh, Myanmar and Thailand.

Conservation Status: Listed in the Schedule- IV of Indian Wildlife (Protection) Act of 1972 (amended up to 2002) and under Lower risk/ Near threatened category of IUCN (2000).

Occurrence during the survey: 4 adults and an immature Pond terrapins were seen near a pond at Kunoor on 22nd Nov.2007

Family TRIONYCIDAE

3. *Lissemys punctata* (Lacepede)

Southern Flap-shelled Turtle

Distribution: Widespread in India, Nepal, Pakistan, Bangladesh, Sri Lanka and northern Myanmar.

Conservation Status: Listed in the Schedule- I of Indian Wildlife (Protection) Act of 1972 (amended up to 2002), Appendix-II of CITES and under Least concern category of IUCN (2000)

Occurrence during the survey: None; only earlier records.

Order: SQUAMATA
Suborder: SAURIA
Family: GEKKONIDAE
4. *Cnemaspis* spp.
Day Gecko

Occurrence during the survey: Sighted at Lakkavalli on the bark of a *Terminalia paniculata* tree

5. *Hemidactylus reticulatus* Beddome
Reticulated Gecko

Distribution: Known from Karnataka and Tamil Nadu states

Occurrence during the survey: Rare. Found under the rock or fallen wood.

6. *Hemidactylus frenatus* Schlegel
Ticticky House Gecko

Distribution: Widespread in Peninsular India.

Occurrence during the survey: A common species in and around the buildings and near human habitations in the Park.

Family AGAMIDAE
7. *Calotes rouxii* (Dumeril & Bibron)
Roux's Forest Lizard

Distribution: Known from the states of Gujarat, Maharashtra, Goa, Karnataka, Tamil Nadu and Kerala.

Occurrence during the survey: Sighted at many places in the Park.

8. *Calotes versicolor* (Daudin)
Indian Garden Lizard

Distribution: Widespread in India

Occurrence during the survey: A fairly common species in the park. Many immature specimens were seen during the November survey.

9. *Calotes calotes* (Linnaeus)
Southern Green Calotes

Distribution: Peninsular India and Sri Lanka

Occurrence during the survey: None; only earlier records.

10. *Draco dussumieri* Dumeril & Bibron

Draco/ Flying Lizard

Distribution: Restricted to Kerala, Karnataka, Goa and Tamil Nadu. Also reported from Eastern Ghat part in Andhra Pradesh.

Occurrence during the survey: Uncommon. Sighted at Kuthira Abbae falls and Avathi areas adjoining the coffee plantations.

11. *Psammophilus dorsalis* (Gray)

Peninsular Rock Agama

Distribution: Widespread from Bihar State, down through the Eastern Ghats, to the low hills of the Western Ghats.

Occurrence during the survey: A single male specimen was sighted from the rocky habitats of Kuthira Abbae falls.

Family CHAMAELEONIDAE

12. *Chamaeleo zeylanicus* Laurenti

Indian Chamaeleon

Distribution: Drier tracts of Peninsular India, northern Sri Lanka and eastern Pakistan

Occurrence during the survey: None; only earlier records.

Family SCINCIDAE

13. *Mabuya carinata* (Schneider)

Common Indian Skink

Distribution: Widespread in India and Sri Lanka

Occurrence during the survey: Most abundant species of Skink in the Park

14. *Mabuya macularia* (Blyth)

Bronze Grass Skink

Distribution: India, Sri Lanka, Pakistan, Nepal, Bangladesh, Bhutan to mainland south east Asia.

Occurrence during the survey: Uncommon. Found in litterfalls at the forest floors.

Family VARANIDAE

15. *Varanus bengalensis* (Daudin)

Indian Monitor Lizard

Distribution: India, Sri Lanka, Pakistan, Nepal, Bangladesh, Bhutan and Afghanistan to Myanmar

Conservation Status: Listed in the Schedule- I of Indian Wildlife (Protection) Act of 1972 (amended up to 2002), Appendix-I of CITES and under Least concern category of IUCN (2009).

Occurrence during the survey: Huge specimens were noted at many places. An huge size of more than 1m was found at Kavalapura, near the old bungalow. Two Large monitor lizard was observe sun basking near a pond at Kundur A Tiger scat containing the remains of Monitor Lizard was also noticed near Kundoor.

Suborder SERPENTES

Family TYPHLOPIDAE

16. *Ramphotyphlops braminus* (Daudin)

Common Blind Snake

Distribution: Most part of the South Asia.

Conservation Status: Listed in the Schedule- IV of Indian Wildlife (Protection) Act of 1972 (amended up to 2002).

Occurrence during the survey: None; only earlier records.

Family UROPELTIDAE

17. *Uropeltis* spp.

Shield Tail

Distribution: Restricted to southern Western Ghats.

Conservation Status: Listed in the Schedule- IV of Indian Wildlife (protection) Act of 1972 (amended up to 2002).

Occurrence during the survey: one specimen was collected from the hills of Kemmanagundi at Virupakshikhan on the road on 22nd Nov. 2007.

Family PYTHONIDAE

18. *Python molurus* (Linnaeus)

Indian Rock Python

Distribution: India, Pakistan, Bangladesh, Nepal, Bhutan and Sri Lanka

Conservation Status: Listed in the Schedule- I of Indian Wildlife (Protection) Act of 1972 (amended up to 2002) and under Lower Risk/ Near Threatened category of IUCN (1996).

Occurrence during the survey: None; only earlier records.

Family Colubridae

19. *Amphiesma stolata* (Linnaeus)

Striped Keelback

Distribution: Throughout India, Pakistan, Nepal, Bhutan, Bangladesh and Sri Lanka.

Conservation Status: Listed in the Schedule- IV of Indian Wildlife (Protection) Act of 1972 (amended up to 2002).

Occurrence during the survey: None; only earlier records.

20. *Amphiesma monticola* (Jerdon)

Yellow-collared Forest Keelback

Distribution: Endemic to southern Western Ghats from Goa to south Kerala.

Conservation Status: Listed in the Schedule- IV of Indian Wildlife (Protection) Act of 1972 (amended up to 2002).

Occurrence during the survey: None; only earlier records.

21. *Ahaetulla nasuta* (Lacepede)

Green Whip Snake

Distribution: Throughout most part of India, Also Nepal, Bangladesh and Sri Lanka.

Conservation Status: Listed in the Schedule- IV of Indian Wildlife (Protection) Act of 1972 (amended up to 2002).

Occurrence during the survey: Fairly well distributed in the Park.

22. *Boiga trigonata* (Schneider)

Common Cat Snake

Distribution: Throughout most part of South Asia, but not in Andaman & Nicobar Islands.

Conservation Status: Listed in the Schedule- IV of Indian Wildlife (Protection) Act of 1972 (amended up to 2002)

Occurrence during the survey: None; only earlier records.

23. *Chrysopelia ornata* (Shaw)

Ornate Flying Snake

Distribution: Southern Western Ghats (South of the Goa Gap); Bihar; Orissa; West Bengal; forests of north east India. Also in Sri Lanka.

Conservation Status: Listed in the Schedule- IV of Indian Wildlife (Protection) Act of 1972 (amended up to 2002)

Occurrence during the survey: None; only earlier records.

24. *Dendrelaphis tristis* (Daudin)

Common Indian Bronzeback

Distribution: Throughout Peninsular India Gujarat downwards; east to Darjeeling. Also Pakistan, Nepal, Bangladesh and Sri Lanka.

Conservation Status: Listed in the Schedule- IV of Indian Wildlife (Protection) Act of 1972 (amended up to 2002)

Occurrence during the survey: A single record from Muthodi area.

25. *Coelognathus helena* (Daudin)

Common Trinket Snake

Distribution: Throughout India, Nepal, Bangladesh and Sri Lanka.

Conservation Status: Listed in the Schedule- I of Indian Wildlife (Protection) Act of 1972 (amended up to 2002).

Occurrence during the survey: None; only earlier records.

26. *Lycodon aulicus* (Linnaeus)

Common Wolf Snake

Distribution: Throughout India, Also Pakistan, Nepal, Bangladesh, Myanmar and Sri Lanka.

Conservation Status: Listed in the Schedule- IV of Indian Wildlife (Protection) Act of 1972 (amended up to 2002).

Occurrence during the survey: None; only earlier records.

27. *Macropisthodon plumbicolor* (Cantor)

Green Keelback

Distribution: Whole of Peninsular India except the east coast. Also Pakistan, Bangladesh and Sri Lanka.

Conservation Status: Listed in the Schedule- IV of Indian Wildlife (Protection) Act of 1972 (amended up to 2002).

Occurrence during the survey: None; only earlier records.

28. *Oligodon arnensis* (Shaw)

Common Kukri Snake

Distribution: India, Nepal, Pakistan, Bangladesh and Sri Lanka..

Conservation Status: Listed in the Schedule- IV of Indian Wildlife (Protection) Act of 1972 (amended up to 2002).

Occurrence during the survey: None; only earlier records.

29. *Oligodon taeniolatus* (Jerdon)

Russel's Kukri Snake

Distribution: India, Pakistan, Bangladesh and Sri Lanka..

Conservation Status: Listed in the Schedule- IV of Indian Wildlife (Protection) Act of 1972 (amended up to 2002).

Occurrence during the survey: None; only earlier records.

30. *Ptyas mucosa* (Linnaeus)

Indian Rat Snake

Distribution: Most part of the South and South- east Asia.

Conservation Status: Listed in the Schedule- II of Indian Wildlife (Protection) Act of 1972 (amended up to 2002).

Occurrence during the survey: Fairly well distributed in the Park. A few observations from the Park

31. *Xenochrophis piscator* (Schneider)

Checkered Keelback

Distribution: Throughout India, and the rest of South Asia.

Conservation Status: Listed in the Schedule- II of Indian Wildlife (Protection) Act of 1972 (amended up to 2002).

Occurrence during the survey: A few observations from the Park. Two individuals were seen in a pond at Kundoor.

Family ELAPIDAE

32. *Bungarus caeruleus* (Schneider)

Common Krait

Distribution: Throughout India, Nepal, Pakistan, Bangladesh and Sri Lanka.

Conservation Status: Listed in the Schedule- IV of Indian Wildlife (Protection) Act of 1972 (amended up to 2002) and

Occurrence during the survey: None; only earlier records.

33. *Naja naja* (Linnaeus)

Indian Cobra

Distribution: India (excluding northeast). Also Pakistan, Nepal, Bhutan, Bangladesh and Sri Lanka.

Conservation Status: Listed in the Schedule- II of Indian Wildlife (Protection) Act of 1972 (amended up to 2002) and under the Least Concern (Lc) category of IUCN (2009).

Occurrence during the survey: None; only earlier records.

34. *Ophiophagus hannah* (Cantor)

King Cobra

Distribution: Known from the foothills of Himalaya, south-western, north-eastern India, east to Indo- China and Indo-Malaya, up to Sulawesi in Indonesia.

Conservation Status: Listed in the Schedule- II of Indian Wildlife (Protection) Act of 1972 (amended up to 2002) and under Vulnerable category of IUCN (2009)

Occurrence during the survey: None; only earlier records.

Family VIPERIDAE

35. *Daboia russelii* (Shaw & Nodder)

Russel's Viper

Distribution: Throughout India. Also Pakistan, Nepal, Bhutan, Bangladesh, Sri Lanka, and parts of South east Asia.

Conservation Status: Listed in the Schedule- II of Indian Wildlife (Protection) Act of 1972 (amended up to 2002).

Occurrence during the survey: A large specimen was collected from the local fisherman at Lakkavalli, incidentally caught in the fishing net during fishing in Bhadra Reservoir.

36. *Echis carinatus* (Fayer)

Saw-scaled Viper

Distribution: Throughout India except West Bengal and the Northeast. Also Pakistan and Sri Lanka.

Conservation Status: Listed in the Schedule- IV of Indian Wildlife (Protection) Act of 1972 (amended up to 2002).

Occurrence during the survey: None; only earlier records.

37. *Hypnale hypnale* (Merrem)

Hump-nosed Pit Viper

Distribution: Western Ghats and Sri Lanka

Conservation Status: Listed in the Schedule- IV of Indian Wildlife (Protection) Act of 1972 (amended up to 2002).

Occurrence during the survey: A few sightings from the lower reaches of the Park.

38. *Trimeresurus gramineus* (Shaw)

Bamboo Pit Viper

Distribution: Western Ghats and some part of Eastern Ghats.

Conservation Status: Listed in the Schedule- IV of Indian Wildlife (protection) Act of 1972 (amended up to 2002) and data deficient category of IUCN (2009)

Occurrence during the survey: None; only earlier records.

39. *Trimeresurus malabaricus* (Jerdon)

Malabar Pit Viper

Distribution: Endemic to the Western Ghats

Conservation Status: Listed in the Schedule- IV of Indian Wildlife (protection) Act of 1972 (amended up to 2002).

Occurrence during the survey: Many records from the Park. Most of the sightings were from the shola forests and stream beds in Kemmangundi area

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AVES

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INTRODUCTION

Karnataka is known to harbour a rich avian fauna (Davidson, 1898; Ali and Whistler, 1942-43; Foster, 1945; Betts, 1951; Ali and Ripley, 1989; Chakravarthy *et al.*, 1992; Daniels, 1993). The present account on the avian fauna of the Bhadra Wildlife sanctuary and Tiger Reserve is based on the observations made during the survey and also on the information available from past records. So far, no systematic study has been made on the birds of this important ecosystem except for some compilation of checklists and a few stray observations from the Reserve (Karanth, 1982; Shyama, 1993; Raju & Hegde, 1995; Karamarkar *et al.*, 1999; Kumar, 2002; Islam & Rahmani, 2004; Thejaswi, 2004., Hegde & Ramakrishna, 2006 and Anand, 2006). The diversity in the habitats of this Tiger Reserve is reflected in the diversity of bird species also. The species range from the typical plains species like Red vented Bulbul to the higher elevation birds like the Nilgiri Pipit, Grey headed Flycatcher, *etc* which are fairly well represented in the reserve.

Altogether 273 species under 176 genera of 55 families belonging to 17 orders were recorded from the Bhadra Tiger Reserve. 21 species are new records for the Tiger Reserve. Of the 273 species, 56 species are winter migrants, majority of these are waterfowls and there are also several species of Leaf Warblers (*Phylloscopus* sp) and birds of prey (Harriers and eagles).

A number of Western Ghats endemics like the Blue winged Parakeet, Nilgiri Wood Pigeon, Malabar Grey Hornbill, Indian Rufous Babbler, Small Sunbird, Nilgiri Pipit, White-bellied Blue Flycatcher and the White-bellied Tree-pie were observed here. The Malabar Trogon, Woodpeckers of the genus *Dinopium*, Fairy Blue Bird, Great Pied Hornbill *etc.*, which enjoy a disjunct distribution in Western Ghats, Sri Lanka and Eastern Himalaya, also occur here.

As per the 2007 IUCN updated list of Globally threatened category of birds, 15 species are recorded from the Bhadra Tiger Reserve *viz.* Darter, Oriental White Ibis, Painted

Stork, Lesser Adjutant Stork, Indian White-backed Vulture, Red-headed Vulture, Egyptian Vulture, Greater Spotted Eagle, Greater Grey-headed Fish Eagle, Pallid Harrier, Laggar Falcon, Black-tailed Godwit, Nilgiri Wood Pigeon, Great Pied Hornbill, Malabar Pied Hornbill and Nilgiri Pipit. Due to the presence of high number of endangered birds and endemics, the area has been identified as the Important Bird Area (IBA) of global conservation concern by the Birdlife International (Islam & Rahmani, 2004).

Raptors represented by 29 species of diurnal birds of prey (kites, eagles, hawks vultures, falcons etc) and 8 species of owls were recorded from the Tiger Reserve during the survey. The presence of high number of raptor species in the Park indicates high quality of the ecosystem, as these groups form the apex predators in the system. All the diurnal raptors found here belong to the Schedule-I of Indian Wildlife (Protection) Act, 1972.

Foraging association of many species of water birds was noted in the Bhadra Reservoir during the survey. Waterfowls like Median Egret (22nos), Little Cormorants (20) White-necked Stork (11), Oriental White Ibis (8), Pond Heron (5), Little Egret (2), Grey Heron (2) and a flock of Garganey (24+) was noted in the feeding association at Hosahalli area of the Bhadra Reservoir on 27th February 2009.

Large breeding colonies of Indian River Tern were also noticed during the early March, 2009. Altogether more than 10,000 birds were counted in a single day cruise through the reservoir on 1st March 2009. As the water level is too high the nesting activities is delayed and we could observe very few nests in the islets. Near River Tern Lodge on a small island we could observe only 10 nests with more than 1000 adult birds sitting around. At Singanamanae, only 8 active nests were observed with more than 500 adult birds flying around. All the nests are with single egg. Possible nesting of Little Pratincole and Little Ringed Plovers were also noticed along with the River Tern during the period.

A systematic account of the birds recorded from Bhadra Tiger Reserve with their habitat and status in Peninsular India and information on their occurrence during the survey is given below. The classification and nomenclature followed here is after Manakadan and Pittie (2001).

SYSTEMATIC ACCOUNT

Order PODICIPEDIFORMES

Family PODICIPEDIDAE Grebes

1. *Podiceps ruficollis capensis* Salvadori

Little Grebe

Habitat and Status: Invariably present in almost all water bodies with some open water. Breeds during the SW monsoon. Locally Common.

Occurrence during the survey: Not seen during the present survey; only earlier records.

Order PELECANIFORMES

Family PHALACROCORACIDAE Cormorants/Shags

2. *Phalacrocorax niger* (Vieillot)

Little Cormorant

Habitat and Status: A resident bird found in and around all wetlands and water bodies throughout its range.

Occurrence during the survey: Common. Up to 86 birds were sighted on a cruise to the Bhadra reservoir on 7th March 2009. A roost flight of more than 100 birds were seen at Lakkavalli area along with Egrets and Herons flying from east to west direction.

3. *Phalacrocorax fuscicollis* Stephens

Indian Shag

Habitat and Status: Backwaters, reservoirs. Uncommon.

Occurrence during the survey: Uncommon. Up to 12 birds were counted in the reservoir on 1st March 2009.

4. *Phalacrocorax carbo sinensis* (Shaw)

Great Cormorant

Habitat and Status: Lakes, reservoirs, backwaters. Uncommon.

Occurrence during the survey: Rare. A single bird was observed near Lakkavalli Damsite area.

5. *Anhinga melanogaster* Pennant

Oriental Darter

Habitat and Status: Small numbers present in fresh water as well as brackish wetlands; Uncommon. IUCN category: Near Threatened.

Occurrence during the survey: Rare. Only three birds were observed during the cruise through the Reservoir on 1st March 2009. A pair was also sighted at Kuthira Abbae falls on 19th Nov. 2007.

Order CICONIIFORMES

Family ARDEIDAE Herons, Egrets & Bitterns

6. *Egretta garzetta garzetta* (Linnaeus)

Little Egret

Habitat and Status: Brackish and freshwater wetlands, paddy fields and edges of tanks. Common.

Occurrence during the survey: Uncommon. Up to 25 birds were counted in and around the edges of lakes and riverbeds. Roost flight also noted near Lakkavalli.

7. *Ardea cinerea rectirostris* Gould

Grey Heron

Habitat and Status: Widespread, in small numbers; brackish wetlands, reedbeds, paddy fields. Uncommon.

Occurrence during the survey: Uncommon. A small flock of up to 3-4 birds was sighted along with other birds on the shallow water areas.

8. *Ardea purpurea manilensis* Meyen

Purple Heron

Habitat and Status: Widespread, in small numbers. Reedbeds, paddy fields. Breeding resident. Uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

9. *Casmerodius albus* (Linnaeus)

Large Egret

Habitat and Status: Throughout the area in small numbers. Coastal wetlands, mangrove swamps, paddy fields. Uncommon.

Occurrence during the survey: Rare. A few birds were seen feeding along with other egrets and herons.

10. *Mesophoyx intermedia intermedia* (Wagler)

Median Egret

Habitat and Status: Probably the second-most numerous of our egrets. Paddy fields, reedbeds, mangrove swamps. Common.

Occurrence during the survey: Uncommon. Small groups of 5-6 birds were noted on several occasions foraging on the water edges at Bhadra Reservoir

11. *Bubulcus ibis coromandus* (Boddaert)

Cattle Egret

Habitat and Status: Widespread and the most abundant of our egrets. Fallow land, grassland, cultivation lands and house compounds wherever there are cattle.

Occurrence during the survey: Commonly sighted at inhabited areas adjoining the Park.

12. *Ardeola grayii grayii* (Sykes)

Indian Pond Heron

Habitat and Status: Resident with extensive range. Seen around paddy fields, wetlands and tanks.

Occurrence during the survey: Common. Up to 18 birds were counted near the Lakkavalli dam site area. Roost flights were also noticed near Lakkavalli.

13. *Nycticorax nycticorax*

Night Heron/ Black-crowned Night Heron

Habitat and Status: Wide-ranging; breeding colonies reported at various parts of the state. Seen around large wetlands.

Occurrence during the survey: Not seen during the present survey; only earlier records.

14. *Ardeola striatus chloriceps* (Bonnaparte)

Little Green Heron

Habitat and Status: Present at almost all wetlands in low numbers. Edges of water bodies. Rare.

Occurrence during the survey: A single bird was sighted near Kuthira Abbae falls.

15. *Gorsachius melanolophus melanolophus* (Raffles)

Malayan Night Heron

Habitat and Status: Under-reported, probably, due to its forest habitat and nocturnal habits. Rare.

Occurrence during the survey: Not seen during the present survey; only earlier records.

Family CICONIIDAE Storks

16. *Mycteria leucocephala* (Pennant)

Painted Stork

Habitat and Status: Occasional sightings, Wetlands, irrigation reservoirs. Locally migratory. Uncommon. IUCN category: Near Threatened.

Occurrence during the survey: Not seen during the present survey; only earlier records.

17. *Anastomus oscitasns* (Boddaert)

Asian Openbill-Stork

Habitat and Status: Present at all major wetlands and paddy fields; Locally migratory. Uncommon.

Occurrence during the survey: A few sightings from the Bhadra Reservoir during the March Survey.

18. *Ciconia episcopus episcopus* (Boddaert)

White-necked Stork

Habitat and Status: Widespread, in small numbers. Locally migratory. Uncommon.

Occurrence during the survey: Several sightings from the Park. Up to 11 birds were observed in the Reservoir near Hosahalli along with other water birds like White Ibis, Median Egret, Little Cormorants and a small flock of Garganey.

19. *Leptoptilos javanicus* (Horsfield)

Lesser Adjutant Stork

Habitat and Status: Very rare. Wetlands, forest swamps. IUCN category: Vulnerable.

Occurrence during the survey: None; only earlier records.

Family THRESKIORNITHIDAE Ibises & Spoonbills

20. *Threskiornis melanocephalus* (Latham)

Oriental White Ibis

Habitat and Status: Present at all major wetlands, occasionally in large numbers. Locally common. IUCN category: Near Threatened.

Occurrence during the survey: Up to 8 birds were sighted feeding along with White-necked Storks and other waterfowls at the edges of the Lake near Hosahalli.

21. *Pseudibis papilosa papilosa* (Temminck)

Black Ibis

Habitat and Status: Open country. Cultivated fields. Rare.

Occurrence during the survey: Not seen during the present survey; only earlier records.

22. *Platalea leucorodia major* Temminck & Schlegel

Eurasian Spoonbill

Habitat and Status: Large wetlands, irrigated fields, backwaters etc. Occasional winter visitor. Rare.

Occurrence during the survey: Not seen during the present survey; only earlier records.

Order ANSERIFORMES

Family ANATIDAE Swans, Geese & Ducks

23. *Dendrocygna javanica* (Horsfield)

Lesser Whistling-Duck

Habitat and Status: Widespread resident. Wetlands with open water, backwaters, tanks in forest. Common.

Occurrence during the survey: A small flocks of about 20 birds were seen near the open waters of Lakkavalli area.

24. *Nettapus coromandelianus coromandelianus* (Gmelin)

Cotton Teal

Habitat and Status: Present in small numbers throughout the State. Resident, uncommon. Its number seems to be declining in many wetlands in the last two decades.

Occurrence during the survey: Not seen during the present survey; only earlier records. A good population was noted at the wetlands outside the Reserve.

25. *Anas poecilorhyncha poecilorhyncha* J.R.Forster

Spot-billed Duck

Habitat and Status: Jheels, reservoirs, backwaters, tanks Locally migratory, Uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

26. *Anas clypeata* Linnaeus

Northern Shoveller

Habitat and Status: Large water bodies, lakes, irrigation tanks and reservoir. Winter visitor in small numbers. Uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

27. *Anas acuta* Linnaeus

Northern Pintail

Habitat and Status: One of the most numerous of our migratory waterfowl, widespread. Wetlands, backwaters, lakes. Winter visitor, common.

Occurrence during the survey: Not seen during the present survey; only earlier records. A good population was noted at the wetlands outside the Reserve

28. *Anas querquedula* Linnaeus

Garganey

Habitat and Status: Along with the preceding species, found in large numbers in the wetlands and backwaters throughout. Wetlands, backwaters, lakes. Winter visitor, common.

Occurrence during the survey: A small flock of 11 birds were noticed resting in a small islet inside the Bhadra reservoir on 7th March 2009.

29. *Anas crecca* Linnaeus

Common Teal

Habitat and Status: Records few and irregular. Reedy wetlands, backwaters. Occasional winter visitor. Rare.

Occurrence during the survey: good population was noted at the wetlands outside the Reserve

Order FALCONIFORMES

Family ACCIPITRIDAE

Hawks, Eagles, Buzzards, Old World Vultures, Kites & Harriers

30. *Elanus caeruleus vociferus* (Latham)

Black-shouldered Kite

Habitat and Status: Found in open areas from coastal wetlands and fallow fields to grasslands in the hills. Resident. Locally common.

Occurrence during the survey: A few observations from the Park, mostly in the open grasslands at Kemmanagundi. A juvenile bird was noticed near Hebbae falls in March 2009.

31. *Milvus migrans govinda* Sykes

Black Kite

Habitat and Status: The most abundant raptor; apparently inseparable from human habitations. Resident.

Occurrence during the survey: Uncommon. A few observations from the Park.

32. *Haliastur indus indus* (Boddaert)

Brahminy Kite

Habitat and Status: Resident in the coastal and inland areas near water. Resident.

Occurrence during the survey: A good population thrived in the reservoir. Up to 14 birds were counted during a cruise to Bhadra reservoir on 1th March 2009. Roosting population also noted near Lakkavali damsite.

33. *Accipiter trivirgatus peninsulae* Koelz

Crested Goshawk

Habitat and Status: Evergreen and moist deciduous forests from the foothills to about 1600m. Resident. Uncommon.

Occurrence during the survey: Many observations from the park. Courtship calls also heard near Muthodi in November 2007.

34. *Spilornis cheela melanotis* (Jerdon)

Crested Serpent-Eagle

Habitat and Status: The most widespread of our eagles, found in evergreen and moist deciduous forests as well as well wooded villages. Resident.

Occurrence during the survey: Fairly common. Heard noisy calls from many localities from the park. A bird carrying a snake was noted during the survey in 2006.

35. *Ictinaetus malayensis perniger* (Hodgson)

Black Eagle

Habitat and Status: Evergreen and moist deciduous forests, neighbouring coffee and cardamom plantations. Resident. Fairly common.

Occurrence during the survey: A few observations from the Park. An attempted predation of Giant Squirrel was noticed near Mosalaekovu area of the Park in 1st March 2007.

36. *Accipiter badius badius* (Gmelin)

Shikra

Habitat and Status: A widespread resident, found in open forests, well-wooded villages and towns.

Occurrence during the survey: Several sightings from the Reserve. One of the commonest smaller raptor species in the Park.

37. *Pernis ptilorhynchus ruficollis* Lesson

Oriental Honey Buzzard

Habitat and Status: Open forest, villages in midland hill areas. Resident, locally common.

Occurrence during the survey: Fairly common. Many observations from the Park.

38. *Haliaeetus leucogaster* (Gmelin)

White-bellied Sea Eagle

Habitat and Status: Estuarine and riverine areas along the seaboard. Uncommon.

Occurrence during the survey: An adult bird was sighted at Lakkavally area soaring over the Reservoir waters on 1st March 2007.

39. *Ichthyophaga ichthyaetus ichthyaetus* (Horsfield)

Greater Grey-headed Fish-Eagle

Habitat and Status: Freshwater reservoirs and rivers in the forest; Uncommon. IUCN category: Near Threatened.

Occurrence during the survey: A single record from the Bhadra Reservoir near Lakkavalli.

40. *Neophron percnopterus ginginianus* (Latham)

Egyptian Vulture

Habitat and Status: Once not uncommon in the drier parts. Rare. IUCN category: Critically Endangered.

Occurrence during the survey: Not seen during the present survey; only earlier records.

41. *Gyps bengalensis* (Gmelin)

Indian White-backed Vulture

Habitat and Status: Common resident till recent. Very rare. IUCN category: Critically Endangered.

Occurrence during the survey: Not seen during the present survey; only earlier records.

42. *Sarcogyps calvus* (Scopoli)

Red-headed Vulture

Habitat and Status: Had been widespread in low numbers. Rare. IUCN category: Critically Endangered.

Occurrence during the survey: Not seen during the present survey; only earlier records.

43. *Circaetus gallicus gallicus* (Gmelin)

Short-toed Snake-Eagle

Habitat and Status: Open grasslands of the forested hills, rare in the midlands and coastal plains. Winter visitor. Uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

44. *Circus aeruginosus aeruginosus* (Linnaeus)

Western Marsh-Harrier

Habitat and Status: Widespread; marshes, paddy fields, riverbeds. Winter visitor. Common.

Occurrence during the survey: Not seen during the present survey; only earlier records.

45. *Circus macrourus* (S.G.Gmelin)

Pallid Harrier

Habitat and Status: Fallow land, paddy fields, open grasslands on the hills. Winter visitor. Uncommon. IUCN category: Near Threatened.

Occurrence during the survey: Not seen during the present survey; only earlier records.

46. *Circus pygargus* (Linnaeus)

Montagu's Harrier

Habitat and Status: Open country in the plains and hills. Winter visitor. Uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

47. *Accipiter virgatus besra* Jerdon

Besra Sparrow Hawk

Habitat and Status: Evergreen and moist deciduous forests, Resident. Uncommon

Occurrence during the survey: A single observation from the Kavalaepura area.

48. *Accipiter nisus nisosimilis* (Tickell)

Eurasian Sparrow Hawk

Habitat and Status: Open forests, well-wooded country. Winter visitor. Rare.

Occurrence during the survey: Not seen during the present survey; only earlier records.

49. *Butastur teesa* (Franklin)

White-eyed Buzzard

Habitat and Status: Dry scrub, open fallow lands, cultivation. Very few authentic recent records. Resident ? Rare.

Occurrence during the survey: Not seen during the present survey; only earlier records.

50. *Aquila clanga* Pallas

Greater Spotted Eagle

Habitat and Status: Winter visitor. Wetlands with grass and reedbeds, lakes, backwaters. Rare. IUCN category: Vulnerable.

Occurrence during the survey: Not seen during the present survey; only earlier records.

51. *Hieraaetus fasciatus fasciatus* (Vieillot)

Bonelli's Eagle

Habitat and Status: Open forest, well-wooded areas. Resident. Rare.

Occurrence during the survey: Not seen during the present survey; only earlier records.

52. *Hieraaetus pennatus* (Gmelin)

Booted Eagle

Habitat and Status: Winter visitor, seen at the wetlands of the plains, midlands as well as the grasslands of the highland. Uncommon.

Occurrence during the survey: A dark phase individual was sighted at Hebabaegiri area of the Park.

53. *Hieraaetus kienerii kienerii* (E.Geoffroy)

Rufous-bellied Eagle

Habitat and Status: Recorded at most of the protected areas along the Western Ghats. Evergreen and moist deciduous forests. Resident. Uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

54. *Spizaetus cirrhatus cirrhatus* (Gmelin)

Changeable Hawk-Eagle

Habitat and Status: Evergreen and moist deciduous forests, well-wooded areas adjacent to forests. Resident, uncommon.

Occurrence during the survey: A single bird was observed at Lalbhagkhathri area flying over the forests with noisy calls.

Family PANDIONIDAE Osprey

55. *Pandion haliaetus haliaetus* (Linnaeus)

Osprey

Habitat and Status: Regular winter visitor to the water bodies of the hills and plains. Uncommon.

Occurrence during the survey: Up to 3 birds were sighted during a cruise to the reservoir on 1st March 2009. Most of the time these birds were found resting on the dead logs in the reservoir.

Family FALCONIDAE Falcons

56. *Falco tinnunculus tinnunculus* Linnaeus

Common Kestrel

Habitat and Status: The race *tinnunculus* is a winter visitor affecting cultivable lands

in the coastal areas and grass and scrub lateritic plains and the midlands, ascending to grassy hills also. The race *objurgatus* is resident, mainly in the grasslands of the hills. Fairly common, locally.

Occurrence during the survey: Hovering flight of these small raptors were sighted at the montane grasslands of Kemmanagundi, Mullayangiri and Bababudan Hills.

57. *Falco jugger* J.E.Gray

Laggar Falcon

Habitat and Status: Dry open areas, cultivation, scrub. Resident? Rare.

Occurrence during the survey: Not seen during the present survey; only earlier records.

58. *Falco peregrinus peregrinator* Sundevall

Shahin

Habitat and Status: The race *japonensis* is a winter visitor to the wetlands of the coastal area and midlands. *peregrinator* is a resident of the hills with rocky cliffs.

Occurrence during the survey: Not seen during the present survey; only earlier records.

Order GALLIFORMES

Family PHASIANIDAE Pheasants, Partridges, Quails

59. *Francolinus pondicerianus pondicerianus* (Gmelin)

Grey Francolin

Habitat and Status: Resident of the drier areas. Locally common.

Occurrence during the survey: Fairly well distributed near Lakkavalli area of the Park. Many noisy calls were heard especially in the early morning.

60. *Coturnix coturnix coturnix* (Linnaeus)

Common Quail

Habitat and Status: Open country, cultivation, standing crops and scrub jungle. Winter visitor. Rare.

Occurrence during the survey: Not seen during the present survey; only earlier records.

61. *Perdicula asiatica vidali* Whistler & Kinnear

Jungle Bush-Quail

Habitat and Status: Open country, grasslands and cultivated areas. Rare.

Occurrence during the survey: Not seen during the present survey; only earlier records.

62. *Perdicula argoondah salimalii* Whistler

Rock Bush-Quail

Habitat and Status: Dry stony land with some scrub. Rare.

Occurrence during the survey: Not seen during the present survey; only earlier records.

63. *Galloperdix spadicea spadicea* (Gmelin)

Red Spurfowl

Habitat and Status: Found in edges of forests and secondary jungles. Resident.

Occurrence during the survey: Several observations from the Park during the survey.

64. *Gallus sonneratii* Temminck

Grey Junglefowl

Habitat and Status: Frequents edges and clearings of evergreen forests, moist deciduous forests and adjacent plantations and cashew groves in the lateritic midlands. Resident.

Occurrence during the survey: Fairly Common. Many sightings from the Park.

65. *Pavo cristatus* Linnaeus

Common Peafowl

Habitat and Status: Moist and dry deciduous forests as well as cultivations. Resident.

Occurrence during the survey: A good population is found in the Park. At times found associated with Common Langurs and Spotted Deers inside the forest. Also commonly sighted near the cultivated lands adjoining the Park.

Order GRUIFORMES

Family TURNICIDAE Buttonquails / Bustardquails

66. *Turnix susciator taigoor* (Sykes)

Common Buttonquail

Habitat and Status: Grass and bush at the edge of cultivation in the low country; up to 900m. Very few recent sightings. Resident. Rare.

Occurrence during the survey: Not seen during the present survey; only earlier records.

Family RALLIDAE
Rails, Crakes, Moorhens, Coots

67. *Amaurornis phoenicurus phoenicurus* (Pennant)

White-breasted Waterhen

Habitat and Status: A widespread resident of the wetlands, paddy fields, mangrove swamps, edges of tanks and river banks.

Occurrence during the survey: Number of sightings from the Park.

68. *Porphyrio porphyrio poliocephalus* (Latham)

Purple Moorhen

Habitat and Status: Widespread, mainly in the wetlands and paddy fields of the coastal plains. Resident, common.

Occurrence during the survey: Sighted near the wetlands adjoining the Lakkavalli. Up to 8-10 birds were seen during March 2009.

69. *Gallinula chloropus indica* Blyth

Common Moorhen

Habitat and Status: Jheels, lakes, paddy fields, patchily distributed in small numbers. Resident, uncommon.

Occurrence during the survey: A few sightings from the wetlands adjoining the Lakkavalli area

70. *Fulica atra* Linnaeus

Common Coot

Habitat and Status: Large water bodies, lakes, jheels Irregular winter migrant to most parts, Uncommon.

Occurrence during the survey: Common around the wetlands adjoining the Lakkavalli area.

Order CHARADRIIFORMES

Family CHARADRIIDAE

Plovers, Dotterels, Lapwings

71. *Vanellus indicus indicus* (Boddaert)

Red-wattled Lapwing

Habitat and Status: Seen in the neighbourhood of water logged paddy fields,

riverbanks and lateritic plains. A widespread resident.

Occurrence during the survey: Common. Many observations from the lake beds and in the vicinity waterlogged areas of the Park

72. *Vanellus malabaricus* (Boddaert)

Yellow-wattled Lapwing

Habitat and Status: Barren land, fallow fields; generally dry biotope. Widespread resident. Uncommon to locally common.

Occurrence during the survey: Not seen during the present survey; only earlier records.

73. *Charadrius dubius curonicus* Gmelin

Little Ringed Plover

Charadrius dubius jerdoni (Legge)

Habitat and Status: The race *curonicus* is a winter visitor in small numbers at the coastal wetlands and occasionally inland also. Uncommon. The *jerdoni* is a breeding resident in low numbers. Coastal plain and riverbanks at midlands. Uncommon.

Occurrence during the survey: A good population is noticed on the Reservoir water edges at Singanamanae near Lakkavalli. Courtship displays and flights were noted on 26th February 2009, indicated the possible breeding of the species in the area in summer.

Family SCOLOPACIDAE

Sandpipers, Stints, Snipes, Godwits & Curlews

74. *Tringa ochropus* Linnaeus

Green Sandpiper

Habitat and Status: Found mainly inland fresh water habitats like Lakes, tanks, paddy fields and marshes. A fairly common winter visitor.

Occurrence during the survey: Many observations from the lake bed and riverine areas of the Park. Up to 4 birds were sighted at Mathikovu.

75. *Tringa totanus* (Linnaeus)

Common Redshank

Habitat and Status: Seashore, estuaries, tidal mudflats, riverbanks. Winter visitor. Locally common

Occurrence during the survey: Not seen during the present survey; only earlier records.

76. *Tringa nebularia* (Gunner)

Common Greenshank

Habitat and Status: Tidal mudflats, riverbanks, paddy fields, inland marshes. Winter visitor, fairly common.

Occurrence during the survey: Not seen during the present survey; only earlier records.

77. *Tringa glareola* Linnaeus

Wood Sandpiper

Habitat and Status: Tidal mudflats, waterlogged paddy-fields, edges of backwaters, mangroves. Winter visitor, common.

Occurrence during the survey: Not seen during the present survey; only earlier records.

78. *Actitis hypoleucos hypoleucos* Linnaeus

Common Sandpiper

Habitat and Status: Frequents inland tanks, streams, ditches, riverbanks, paddy fields, as well as seashore, tidal mudflats and estuaries. A widespread common wader and a winter visitor.

Occurrence during the survey: Fairly well distributed in the park. Mainly sighted near lake bed and the edges of canals and riverine areas of the park.

79. *Gallinago gallinago gallinago* (Linnaeus)

Common Snipe

Habitat and Status: Wet paddy fields, swampy edge of backwaters. Winter visitor. Common.

Occurrence during the survey: A few observations from the marshy lake bed of Mathikovu on 1st March 2009.

80. *Limosa limosa limosa* (Linnaeus)

Black-tailed Godwit

Habitat and Status: Inland water bodies, estuaries, tidal creeks, back waters; in fresh water and brackish habitats. Winter visitor, not uncommon. IUCN category: Near Threatened.

Occurrence during the survey: Not seen during the present survey; only earlier records.

81. *Calidris minuta* (Leisler)

Little Stint

Habitat and Status: Marshy estuaries, mudflats, paddy fields, edge of backwaters. Winter visitor in small numbers. Fairly common.

Occurrence during the survey: Not seen during the present survey; only earlier records.

Family RECURVIROSTIDAE Ibisbill, Avocets & Stilts

82. *Himantopus himantopus himantopus* (Linnaeus)

Black-winged Stilt

Habitat and Status: Marshes, mudflats, estuaries. Sometimes frequents edges of polluted sewages. Winter visitor with a small breeding population. Locally common.

Occurrence during the survey: Not seen during the present survey; only earlier records.. Found good population in and around the wetlands adjoining the Lakkavalli range of the Park

Family BURHINIDAE Stone-Curlews & Stone-Plovers

83. *Burhinus oedienemus indicus* (Salvadori)

Stone-Curlew

Habitat and Status: Resident, present in small numbers at open scrub in the neighbourhood of cultivation, lateritic plains. Becoming excessively rare due to habitat loss. Uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

84. *Esacus magnirostris* (Cuvier)

Great Stone-Plover

Habitat and Status: Stony beds of rivers, estuaries and saltpans. Winter visitor/ Resident Uncommon.

Occurrence during the survey: A pair was sighted at the Lakebed adjoining the Mosaelakovu area of the Park.

Family GLAREOLIDAE Coursers & Pratincoles

85. *Glareola lactea* Temminck

Small Pratincole

Habitat and Status: Rivers with sand banks, coastal marshes. Resident. Locally common.

Occurrence during the survey: a total of about 84 birds were counted on a single day cruise in the Bhadra Reservoir on 1st March 2009. Most of them were in courtship display and found associated with breeding colonies of River Terns in the Reservoir.

Family LARIDAE Gulls, Terns & Noddies

86. *Sterna aurantia* J.E. Gray

River Tern

Habitat and Status: Estuaries, large rivers, reservoirs and tanks. Resident. Breeding records at several reservoirs in South India Essentially a fresh water tern. Uncommon.

Occurrence during the survey: Large breeding colonies were observed during the month of March at the small islets of Bhadra Reservoir. More than 10,000 birds were counted on 1st March 2009. Even though the water level was high in the reservoir, up to 20 nests were observed at the newly exposed islets in the reservoir. Most of the nests were with single eggs. Maximum number of birds was sighted at Sigri camp. The rocky and sandy plain area of the island supported more than 1000 adult terns and we could count only 10 nests with eggs.

87. *Sterna hirundo hirundo* Linnaeus

Common Tern

Habitat and Status: Seacoast, estuaries. Winter visitor. Not uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

Order COLUMBIFORMES

Family COLUMBIDAE

Pigeons & Doves

88. *Columba livia intermedia* Strickland

Blue Rock Pigeon

Habitat and Status: Seen around cultivable fields and human habitations. A common widespread resident.

Occurrence during the survey: Fairly well distributed in the suitable habitat of the Park.

89. *Streptopelia chinensis suratensis* (Gmelin)

Spotted Dove

Habitat and Status: A widespread resident found in open forests and amidst cultivation. Common.

Occurrence during the survey: Many observations from the Park.

90. *Chalcophaps indica indica* (Linnaeus)

Emerald Dove

Habitat and Status: Moist forests, well-wooded groves and sacred groves of the midlands. A common resident but found in low numbers.

Occurrence during the survey: A few sightings from the Park. A dead bird was found near the Hebbae falls.

91. *Columba elphinstonii* (Sykes)

Nilgiri Wood Pigeon

Habitat and Status: Resident of the hill forests. Fairly common, locally. Endemic. IUCN category: Vulnerable.

Occurrence during the survey: A pair was sighted at the Kemmanagundi area of the Park during November survey

92. *Streptopelia orientalis meena* (Sykes)

Oriental Turtle Dove

Habitat and Status: Open mixed deciduous and bamboo forest, foothills country and neighbourhood of cultivation. Uncommon

Occurrence during the survey: Most of the observations were from the Lakkavalli area of the park.

93. *Streptopelia decaocto decaocto* (Frivaldszky)

Eurasian Collared Dove

Habitat and Status: Occurs in the dry scrub, cultivated dry lands. Resident? Uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

94. *Treron pompadora affinis* (Jerdon)

Pompadour Green-Pigeon

Habitat and Status: A resident of the forests and well-wooded areas. Common.

Occurrence during the survey: Many flocks were observed during the survey, mainly on the fig trees with fruits.

95. *Treron phoenicoptera chlorigaster* (Blyth)

Yellow-footed Green-Pigeon

Habitat and Status: Forests and well-wooded countryside. Resident. Fairly common.

Occurrence during the survey: A few birds were sighted at Lakkavalli area of the Park.

96. *Ducula aenea pusilla* (Blyth)

Green Imperial-Pigeon

Habitat and Status: Deciduous and semi-evergreen forest, occasionally on fruiting trees in the well-wooded areas near forests. Resident. Uncommon.

Occurrence during the survey: A few observations from the park.

97. *Ducula badia cuprea* (Jerdon)

Mountain Imperial-Pigeon

Habitat and Status: Found in evergreen forests. Uncommon.

Occurrence during the survey: Fairly well distributed in the surveyed localities.

Order PSITTACIFORMES

Family PSITTACIDAE

Parakeets & Hanging Parrots

98. *Loriculus vernalis vernalis* (Sparrman)

Indian Hanging Parrot

Habitat and Status: Found in well-wooded areas and forests. Resident; fairly common.

Occurrence during the survey: Several sightings from the surveyed localities.

99. *Psittacula cyanocephala cyanocephala* (Linnaeus)

Plum-headed Parakeet

Habitat and Status: Frequents deciduous and evergreen forests and well-wooded midland regions. Resident; fairly common.

Occurrence during the survey: Fairly well distributed in the park.

100. *Psittacula cloumboides* (Vigors)

Blue-winged Parakeet

Habitat and Status: Frequents evergreen and moist deciduous forests. Resident. Endemic to Western Ghats.

Occurrence during the survey: One of the most common parakeet species from the park.

101. *Psittacula krameri manilensis* (Bechstein)

Rose-ringed Parakeet

Habitat and Status: Widespread resident. Cultivated fields, and open areas near human habitations.

Occurrence during the survey: Relatively rarer. A few observations from the Reserve, mainly from the Lakkavalli area.

Order CUCULIFORMES

Family CUCULIDAE

Cuckoos, Malkohas & Coucals

102. *Clamator jacobinus jacobinus* (Boddaert)

Pied Crested Cuckoo

Habitat and Status: Seen in the drier areas. Apparently a summer (breeding) visitor.

Occurrence during the survey: Not seen during the present survey; only earlier records.

103. *Hierococcyx varius varius* Vahl

Brainfever Bird

Habitat and Status: A widespread resident; found in light forests, cashew groves and homesteads. Resident.

Occurrence during the survey: Fairly common.

104. *Cuculus micropterus micropterus* Gould

Indian Cuckoo

Habitat and Status: Frequents well-wooded villages and forests. Apparently a summer (breeding) visitor.

Occurrence during the survey: Not seen during the present survey; only earlier records.

105. *Cacomantis sonneratii sonneratii* (Latham)

Banded Bay Cuckoo

Habitat and Status: Resident; found in deciduous and semi-evergreen forests, cashew groves and well-wooded homesteads of villages.

Occurrence during the survey: Heard many times during the survey.

106. *Eudynamys scolopacea scolopacea* (Linnaeus)

Asian Koel

Habitat and Status: A widespread resident; more abundant in towns and cities than in villages.

Occurrence during the survey: Uncommon.

107. *Cacomantis passerinus* (Vahl)

Grey-bellied Cuckoo (Indian Plaintive Cuckoo)

Habitat and Status: Mainly affects dry areas with scrub, but occasionally recorded from other habitats also. Winter visitor, Uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

108. *Phaenicophaeus leschenaultii leschenaultii* Lesson

Sirkeer Malkoha

Habitat and Status: Resident; dry thorny scrub and grass jungle. Uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

109. *Centropus sinensis parroti* Stresemann

Greater Coucal

Habitat and Status: Found in open forests, cultivation lands, plantations and homesteads. A widespread resident.

Occurrence during the survey: Fairly common in the surveyed localities.

Order STRIGIFORMES

Family STRIGIDAE

110. *Tyto alba stertens* Hartert

Barn Owl

Habitat and Status: Resident of human habitations, cultivated land. Uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

111. *Otus sunia* (Hodgson)

Oriental Scops-Owl

Habitat and Status: Evergreen, semi-evergreen and moist-deciduous forests.

Occurrence during the survey: Heard many times from Muthodi area of the park.

112. *Bubo bubo bengalensis* (Franklin)

Eurasian Eagle-Owl

Habitat and Status: Resident of dry rocky country, habitat suitable for this species rare in the state now. Uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

113. *Bubo nipalensis nipalensis* Hodgson

Forest Eagle-Owl

Habitat and Status: Evergreen and moist deciduous forests. Resident, uncommon.

Occurrence during the survey: None; earlier records.

114. *Ketupa zeylonensis leschenaulti* (Temminck)

Brown Fish-Owl

Habitat and Status: Found near water in low forests and villages. Fairly common.

Occurrence during the survey: Fairly common. A few sightings from the area.

115. *Strix leptogrammica indranee* Sykes

Brown Wood Owl

Habitat and Status: Thick forests, and well wooded areas of villages. Resident, uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

116. *Glaucidium radiatum malabaricum* (Blyth)

Jungle Owlet

Habitat and Status: Found in forests and well-wooded villages. Resident.

Occurrence during the survey: Fairly common. Many calls heard during the survey.

117. *Athene brama brama* (Temminck)

Spotted Owlet

Habitat and Status: Around human habitations, towns. Common

Occurrence during the survey: Not seen during the present survey; only earlier records.

Family CAPRIMULGIDAE

Nightjars

118. *Caprimulgus asiaticus asiaticus* Latham

Common Indian Nightjar

Habitat and Status: Scrub jungle and fallow lands in the villages. Resident, fairly common.

Occurrence during the survey: Not seen during the present survey; only earlier records.

Order APODIFORMES

Family APODIDAE

Swifts

119. *Collocalia unicolor* (Jerdon)

Indian Edible-nest Swiftlet

Habitat and Status: Inhabits forests and cultivated lands near breeding colonies. Resident.

Occurrence during the survey: Uncommon. Many large flocks were sighted during the November survey in 2007.

120. *Zoonavena sylvatica* (Tickell)

White-rumped Needletail-Swift

Habitat and Status: Frequents evergreen and moist deciduous forests. Resident. Locally common.

Occurrence during the survey: A small flock was sighted at Heabbaegiri area of the Park

121. *Apus pacificus leuconyx* (Blyth)

Pacific Swift

Habitat and Status: Open areas, reservoirs. Winter visitor, uncommon.

Occurrence during the survey: Many birds were found flying with large swarms of Red-rumped Swallows over the lake waters at Lakkavalli, especially in the early morning and late afternoon.

122. *Apus affinis affinis* (J.E.Gray)

House Swift

Habitat and Status: The most common and widespread swift of the region. Resident.

Occurrence during the survey: A small flock frequents the reservoir waters of Lakkavalli.

HEMIPROCNIDAE

Tree-Swifts

123. *Hemiprocne coronata* (Tickell)

Crested Tree-Swift

Habitat and Status: Generally frequents open and light forests, cultivated lands at forest's edge. Resident, uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

Order TROGONIFORMES

Family TROGONIDAE Trogons

124. *Harpactes fasciatus malabaricus* (Gould)

Malabar Trogon

Habitat and Status: Evergreen and moist deciduous forests, Resident. Uncommon.

Occurrence during the survey: Many sightings from the park.

Order CORACIIFORMES

Family ALCEDINIDAE

Kingfishers

125. *Alcedo atthis taporbana* Kleinschmidt

Small Blue Kingfisher

Habitat and Status: A widespread resident. Met with around coastal backwaters, canals in paddy fields and tanks.

Occurrence during the survey: Fairly well distributed in the suitable habitats.

126. *Halcyon capensis capensis* (Linnaeus)

Stork-billed Kingfisher

Habitat and Status: Seen near forest streams, inland wetlands and backwaters. Resident.

Occurrence during the survey: A pair was seen near the Dam site at Lakkavalli.

127. *Halcyon smyrnensis fusca* (Boddaert)

White-breasted Kingfisher

Habitat and Status: A widespread resident of varied habitats.

Occurrence during the survey: Most common species of Kingfishers in the park. A hole nest was noted near the lake bed at Mosaelakovu on 1st March 2009.

128. *Ceryle rudis travancorensis* Whistler & Kinnear

Lesser Pied Kingfisher

Habitat and Status: Found around coastal backwaters, tanks and rivers. A widespread resident.

Occurrence during the survey: Seven birds were noticed during the cruise through the Bhadra reservoir on 1th March 2007.

Family MEROPIDAE

Bee-Eaters

129. *Merops orientalis orientalis* Latham

Small Bee-eater

Habitat and Status: A widespread resident seen mostly in the plains.*Occurrence during the survey:* Common. Fairly well distributed in the sites surveyed.**130. *Merops philippinus philippinus* Linnaeus**

Blue-tailed Bee-eater

Habitat and Status: Mostly seen in the neighborhood of water bodies in the midlands and the coastal areas. Locally migratory.*Occurrence during the survey:* Uncommon. Roost flights of more than 50 birds sighted near Lakkavalli dam site in November 2007.**131. *Merops leschenaulti leschenaulti* Vieillot**

Chestnut-headed Bee-eater

Habitat and Status: Frequents forests and well-wooded villages. An uncommon resident bird.*Occurrence during the survey:* Found fairly common in the areas surveyed.**132. *Nyctyornis athertoni athertoni* (Jardine & Selby)**

Blue-bearded Bee-eater

Habitat and Status: Evergreen and moist deciduous forests. Resident. Rare.*Occurrence during the survey:* A single observation from Asigekerae area on 15th November 2007.

Family CORACIIDAE

Rollers

133. *Coracias benghalensis indica* Linnaeus

Indian Roller

Habitat and Status: A widespread resident bird of the open areas in the midlands and coastal plains.*Occurrence during the survey:* Uncommon in the Park. A few observations from the Lakkavalli area.

Family UPUPIDAE

Hoopoes

134. *Upupa epops ceylonensis* Reichenbach

Common Hoopoe

Habitat and Status: Frequents thinly wooded areas and cultivated fields. Patchy and local in distribution.

Occurrence during the survey: A few observations from the Park during March 2009

Family BUCEROTIDAE

Hornbills

135. *Ocyrceros griseus griseus* (Latham)

Malabar Grey Hornbill

Habitat and Status: Inhabits evergreen and moist deciduous forests and well-wooded villages in Kerala and Karnataka. Locally common Resident. Endemic to Western Ghats.

Occurrence during the survey: Small groups were noted on several occasions foraging on the fig trees.

136. *Ocyrceros birostris* (Scopoli)

Indian Grey Hornbill

Habitat and Status: Forests and well-wooded villages. Fairly common, locally.

Occurrence during the survey: Fairly well distributed in the Park. More observations were from the Lakkavalli range. Up to 17birds were seen in Lakkavalli on 3rd March 2009.

137. *Anthracoceros coronatus coronatus* (Boddaert)

Malabar Pied Hornbill

Habitat and Status: Evergreen and moist deciduous forests. Resident. Rare. IUCN Threatened category: Near Threatened

Occurrence during the survey: A single observation from Muthodi area of the Park during March 2009.

138. *Buceros bicornis homrai* Hodgson

Great Pied Hornbill

Habitat and Status: Evergreen forests. Resident, uncommon. IUCN Threatened category: Near Threatened

Occurrence during the survey: Not seen during the present survey; only earlier records.

Order PICIFORMES
Family CAPITONIDAE
Barbets

139. *Megalaima zeylanica inornata* Walden
Brown-headed Barbet

Habitat and Status: Deciduous forests and adjoining area Resident, Locally common.

Occurrence during the survey: Fairly well distributed in the park

.140. *Megalaima viridis* (Boddaert)
White-cheeked Barbet

Habitat and Status: A widespread resident; found in forests and villages.

Occurrence during the survey: Uncommon. Heard from many places during the survey

141. *Megalaima rubricapilla malabarica* (Blyth)
Crimson-throated Barbet

Habitat and Status: Met with in evergreen and moist deciduous forests. Resident.

Occurrence during the survey: A few observations from the Park.

142. *Megalaima haemacephala indica* (Latham)
Coppersmith Barbet

Habitat and Status: Can be seen in open wooded areas and villages. Resident.

Occurrence during the survey: Heard from many places during the survey.

Family PICIDAE
Woodpeckers

143. *Picumnus innominatus malayorum* Hartert
Speckled Piculet

Habitat and Status: Evergreen, semi-evergreen and moist deciduous forests. Resident. Uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

144. *Dendrocopus nanus cinericula* (Malherbe)
Brown-capped Pigmy Woodpecker

Habitat and Status: Inhabits evergreen and moist deciduous forests, and well-wooded villages. Resident. Locally common.

Occurrence during the survey: A single observation from Muthodi area of the Park.

145. *Dendrocopos mahrattensis mahrattensis* (Latham)

Yellow-fronted Pied Woodpecker

Habitat and Status: Deciduous and moist deciduous forest, thinly wooded groves. Resident. Fairly common, locally.

Occurrence during the survey: A few observations from the Park.

146. *Celius brachyurus jerdonii* (Malherbe)

Rufous Woodpecker

Habitat and Status: Inhabits evergreen, semi-evergreen and moist deciduous forests; sacred groves and the surrounding areas in midlands. Resident, uncommon.

Occurrence during the survey: A few observations from the Park.

147. *Dinopium benghalense tehminae* (Whistler & Kinnear)

Lesser Golden-backed Woodpecker

Habitat and Status: Can be seen in thin forests, well-wooded villages and homesteads. Resident.

Occurrence during the survey: Uncommon. A few sightings from the Park.

148. *Dinopium javanense malabaricum* Whistler & Kinnear

Common Golden-backed Woodpecker

(Malabar Golden backed Three-toed Woodpecker)

Habitat and Status: Frequents evergreen forests. Resident.

Occurrence during the survey: Fairly well distributed in the Park.

149. *Chrysocolaptes lucidus chersonesus* Kloss

Greater Golden-backed Woodpecker

(Malherbe's Golden-backed Woodpecker)

Habitat and Status: Inhabits evergreen and moist deciduous forests and well wooded country. Resident; fairly common.

Occurrence during the survey: Rare. A few sightings from the Park.

150. *Dryocopus javensis hodgsonii* (Jerdon)

Great Black Woodpecker

Habitat and Status: Evergreen and moist deciduous forests with large trees. Resident. Uncommon.

Occurrence during the survey: A few observations from the Park. Noisy calls were noticed at Muthodi area of the Park.

151. *Picus chlorolophus chlorigaster* Jerdon

Small Yellow-naped Woodpecker

Habitat and Status: Semi-evergreen and moist deciduous forests, well-wooded villages. Resident, uncommon.

Occurrence during the survey: Fairly common. A few sightings from the Park during the survey.

152. *Picus xanthopygaeus* Stresemann

Little Scaly-bellied Green Woodpecker

Habitat and Status: Deciduous and moist deciduous forests. Resident, uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

153. *Hemicircus canente canente* (Lesson)

Heart-spotted Woodpecker

Habitat and Status: Seen in evergreen and moist deciduous forests and well-wooded villages. Resident; fairly common.

Occurrence during the survey: A few sightings from the Park. Duetting courtship calls of a pair were noted at Muthodi in March 2009.

Order PASSERIFORMES

Family PITTIDAE

Pittas**154. *Pitta brachyura brachyura* (Linnaeus)**

Indian Pitta

Habitat and Status: Inhabits evergreen and deciduous forests and well-wooded countryside. A winter visitor. Uncommon

Occurrence during the survey: Sighted near Lakkavalli Forest Rest House regularly during the survey in last week of February 2009. Heard loud calls just after dusk and dawn from Lakkavalli area.

Family ALAUDIDAE

Larks**155. *Eremopterix grisea* (Scopoli)**

Ashy-crowned Sparrow Lark

(Ashy-crowned or Black-bellied Finch-Lark)

Habitat and Status: Dry paddy fields, lateritic plains, fallow land and grassy sea coast; midlands and coastal area, mainly. Resident, fairly common locally.

Occurrence during the survey: A few observations from the Park. Mainly from the cultivated areas adjoining the Park.

156. *Ammomanes phoenicurus testaceus* Koelz

Rufous-tailed Finch-Lark

Habitat and Status: Stony scrub, fallow land, edge of cultivation. Resident? Rare.

Occurrence during the survey: Not seen during the present survey; only earlier records.

157. *Alauda gulgula australis* Brooks

Eastern Skylark

Habitat and Status: Dry paddy fields and grassy lateritic plains of the coastal area and midlands, and grassy hill slopes. Resident. Fairly common.

Occurrence during the survey: A few observations from the Park.

158. *Mirafra affinis* Blyth

Jerdon's Bush-Lark

(Red-winged Bush-Lark, Ceylon Bush-Lark)

Habitat and Status: Dry paddy fields, scrubby lateritic plains and hillocks, fallow land. Resident. Fairly common.

Occurrence during the survey: Not seen during the present survey; only earlier records.

Family HIRUNDINIDAE

Swallows & Martins

159. *Hirundo rustica gutturalis* Scopoli

Common Swallow

Habitat and Status: A widespread winter visitor to open country and wetlands. Fairly common.

Occurrence during the survey: Large flocks were sighted in and around the Bhadra Reservoir. A large flock of more than 100 birds were sighted on an electric line adjoining the Lakkavalli dam site area in November 2007.

160. *Hirundo smithii filifera* Stephens

Wire-tailed Swallow

Habitat and Status: Frequents water logged areas. Resident.

Occurrence during the survey: A few birds were observed at Kuthira Abbae falls in Nov. 2007.

161. *Hirundo daurica nipalensis* Hodgson

Red-rumped Swallow

Habitat and Status: Affects most of the areas in the coastal plains and the midlands, and occasionally the hills too.

Occurrence during the survey: Fairly well distributed all along the Reservoir area. A large flock of about 70 individuals were sighted near Lakkavalli Dam site area along with Common Swallow in November 2007.

162. *Hirundo concolor concolor* Sykes

Dusky Crag-Martin

Habitat and Status: Seen in the neighbourhood of large dams, grassy hillside with rocks and cliffs; patchy in distribution. Resident; fairly common locally.

Occurrence during the survey: Many birds were noticed near the Lakkavalli Damsite area. Probably breeding near the damsite in March 2009.

163. *Hirundo rupestris* Scopoli

Eurasian Crag-Martin

Habitat and Status: Grassy hill side, Cliffs and the vicinity of large dams. Winter visitor? Rare.

Occurrence during the survey: Not seen during the present survey; only earlier records.

164. *Hirundo fluvicola* Blyth

Streak-throated Swallow (Cliff swallow)

Habitat and Status: Open country, cultivation mostly near water. Winter visitor? Uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

Family MOTACILLIDAE

Wagtails & Pipits

165. *Motacilla maderaspatensis* Gmelin

Large Pied Wagtail

Habitat and Status: A fairly common widespread resident that can be seen in the neighbourhood of water logged areas.

Occurrence during the survey: Fairly common near the waterlogged areas. A breeding pair was noticed near the Lakkavalli damsite area in last week of February 2009.

166. *Motacilla indica* Gmelin

Forest Wagtail

Habitat and Status: Forests, plantations. Winter visitor, fairly common.

Occurrence during the survey: A single observation from Muthodi area of the Park during November 2007.

167. *Motacilla alba dukhunensis* Sykes

White Wagtail

Habitat and Status: Grassy area, usually near water mainly in the coastal plains. Winter visitor, uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

168. *Motacilla flava thunbergi* Billberg

Yellow Wagtail

Habitat and Status: Damp paddy fields and wetlands of the coastal area, winter visitor, fairly common.

Occurrence during the survey: Not seen during the present survey; only earlier records.

169. *Motacilla cinerea cinerea* (Tunstall)

Grey Wagtail

Habitat and Status: Frequents areas from the coastal plains to the hills. A winter visitor.

Occurrence during the survey: Fairly well distributed in the Park, mainly observed near water-logged areas.

170. *Anthus rufulus* Vieillot

Paddy field Pipit/ Malay Pipit

Habitat and Status: A widespread resident seen in areas from the coastal plains to the hills; also can be seen around wet and fallow paddy fields and grasslands.

Occurrence during the survey: Commonly seen near adjoining paddy fields and the grasslands of the Park

171. *Anthus hodgsoni yunnanensis* Uchida & Kuroda

Oriental Tree Pipit

Habitat and Status: Grassy hills, open forest. Winter visitor, uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

172. *Anthus nilghiriensis* Sharpe

Nilgiri Pipit

Habitat and Status: Grassy hill slopes above 1000m. Resident. Fairly common. Endemic to the montane grasslands of Western Ghats. IUCN category: Near Threatened.

Occurrence during the survey: A few observations from Kemmangundi area of the Park

Family CAMPEPHAGIDAE

Cuckoo-Shrikes, Flycatcher-Shrikes, Minivets & Woodshrikes

173. *Coracina macei* (Lesson)

Large Cuckoo-Shrike

Habitat and Status: Inhabits well-wooded villages and forests. Resident.

Occurrence during the survey: A few observations from the Park.

174. *Coracina melanoptera sykesi* (Strickland)

Black-headed Cuckoo-Shrike

Habitat and Status: Village groves, thin forest. Resident, fairly common.

Occurrence during the survey: Uncommon in the Park

175. *Pericrocotus cinnamomeus malabaricus* (Gmelin)

Small Minivet

Habitat and Status: Seen at well-wooded homesteads, plantations, semi evergreen and moist deciduous forests. Resident.

Occurrence during the survey: A few observations from the Park. Mainly seen associated with mixed- species- flocks.

176. *Pericrocotus flammeus flammeus* (Forster)

Scarlet Minivet

Habitat and Status: Inhabits evergreen and moist deciduous forests, well-wooded villages and sacred groves. Resident.

Occurrence during the survey: Fairly well distributed in the surveyed localities. A common component of mixed- species -flocks in the Park.

177. *Hemipus picatus picatus* (Sykes)

Pied Flycatcher-Shrike

Habitat and Status: Inhabits evergreen and moist deciduous forests, well wooded

compounds around sacred groves in midland hills. A fairly common resident bird. *Occurrence during the survey:* Uncommon. A few sightings from the Muthodi area of the Park.

178. *Tephrodornis gularis* (Raffles)

Large Woodshrike

Habitat and Status: Frequents evergreen and moist deciduous forests as well as the neighbouring coffee and cardamom plantations. Resident.

Occurrence during the survey: Fairly common. An active component among the mixed hunting bird flocks in the Park.

179. *Tephrodornis pondicerianus pondicerianus* (Gmelin)

Common Woodshrike

Habitat and Status: Well-wooded villages, plantations, deciduous forests. Resident. Fairly common.

Occurrence during the survey: Uncommon in the Park

Family PYCNONOTIDAE

Bulbuls & Finchbills

180. *Pycnonotus melanicterus gularis* (Gould)

Ruby-throated Bulbul

Habitat and Status: Seen in evergreen and moist deciduous forests and secondary growths. Resident; fairly common.

Occurrence during the survey: Many observations from the Park.

181. *Pycnonotus jocosus fuscicaudatus* (Gould)

Red-whiskered Bulbul

Habitat and Status: Seen in the villages and forests alike, at almost all altitudes. Resident.

Occurrence during the survey: One of the most common bulbuls in the Park.

182. *Hypsipetes indicus indicus* (Jerdon)

Yellow-browed Bulbul

Habitat and Status: Inhabits evergreen and moist deciduous forests, nearby plantations, secondary jungles and sacred groves. Resident.

Occurrence during the survey: Fairly well distributed in the surveyed localities. A major component of the mixed hunting flock of birds in the Park.

183. *Pycnonotus cafer cafer* (Linnaeus)

Red-vented Bulbul

Habitat and Status: Forests and villages. Resident, fairly common.*Occurrence during the survey:* A few observations from the Park.**184. *Pycnonotus luteolus luteolus* (Lesson)**

White-browed Bulbul

Habitat and Status: Open scrub in the lateritic midlands, bush and scrub jungle. Patchy and local. Resident, uncommon.*Occurrence during the survey:* Fairly well distributed in the suitable habitats.**185. *Hypsipetes leucocephalus ganeesa* (Sykes)**

Black Bulbul

Habitat and Status: Found in evergreen forests from 600m; descends to lower altitudes of less rainfall during SW monsoon. Resident, locally common.*Occurrence during the survey:* Fairly common at the Kemmanagundi and adjoining hills.

Family IRENIDAE

Ioras, Chloropsis, Fairy Bluebird**186. *Aegithia tiphia multioclor* (Gmelin)**

Common Iora

Habitat and Status: Affects well-wooded villages, semi evergreen, moist deciduous and deciduous forests as well as secondary jungles. Resident.*Occurrence during the survey:* Fairly common in the sites surveyed.**187. *Chloropsis cochinchinensis jerdoni* (Blyth)**

Jerdon's Chloropsis

Habitat and Status: Seen around well-wooded homesteads and groves in villages. Also seen in secondary jungles. Resident.*Occurrence during the survey:* Uncommon in the Park.**188. *Chloropsis aurifrons frontalis* (Pelzeln)**

Gold-fronted Chloropsis

Habitat and Status: Found in moist deciduous to evergreen forests, well-wooded villages. Resident.*Occurrence during the survey:* A few sightings from the Park. Found associated with the mixed -species -flocks.

189. *Irena puella puella* (Latham)

Asian Fairy Blue Bird

Habitat and Status: Inhabits evergreen forests. Resident; fairly common.

Resident: Fairly well distributed in the Park.

Family LANIIDAE

Shrikes

190. *Lanius cristatus cristatus* Linnaeus

Brown Shrike

Habitat and Status: Met with at forest edges, grassy hillsides, open areas in villages and towns in the midlands and the coastal area. A winter visitor.

Occurrence during the survey: A few observations from the Park. Noisy territorial calls were noted at Lakkavalli during November 2007.

191. *Lanius schach caniceps* Blyth

Rufous-backed Shrike

(Southern Greybacked Shrike)

Habitat and Status: Seen around forest clearings, grasslands with bushes and also around the backwaters, mangroves, cultivated lands. A resident bird.

Occurrence during the survey: A few observations from the Lakkavalli area adjoining the Damsite.

Family MUSCICAPIDAE

Sub-family TURDINAE

Thrushes, Shortwings, Robins, Forktails, Wheatears

192. *Zoothera citrina cyanotes* (Jardine & Selby)

White-throated Ground Thrush

Habitat and Status: Affects evergreen and moist deciduous forests, cardamom and coffee plantations and sacred groves. Resident.

Occurrence during the survey: A few sightings from the Park, mainly from Muthodi area.

193. *Copsychus saularis ceylonensis* Sclater

Oriental Magpie-Robin

Habitat and Status: A widespread resident seen around human habitations and light forests.

Occurrence during the survey: A fairly common bird species of the Park.

194. *Saxicola caprata nilgiriensis* Whistler.

Pied Bushchat

Habitat and Status: Affects coastal wetlands, lateritic grassy scrub in the midlands and grassy hillsides up to an elevation of 2000m. Resident. Common in the hills and fairly common elsewhere.

Occurrence during the survey: Mainly sighted at the foothills of Kemmanagundi.

195. *Monticola cinclorhynchus* (Vigors)

Blue-headed Rock-Thrush

Habitat status: Frequents moist deciduous forests, semi-evergreen forests, edges of evergreen forests, cardamom and tea plantations, well-wooded villages and sacred groves. A fairly common winter visitor.

Occurrence during the survey: Uncommon. All the sightings were from Kemmanagundi area of the Park.

196. *Myiophonus horsfieldii horsfieldii* (Vigors)

Malabar Whistling-Thrush

Habitat and Status: Seen in the neighbourhood of streams in the forests, even close to human habitations. Resident.

Occurrence during the survey: Fairly common in the Park.

197. *Turdus merula nigropileus* (Lafresnaye)

Eurasian Blackbird (Blackcapped Blackbird)

Habitat and Status: frequents evergreen and moist deciduous forests as well as cardamom and coffee plantations. A fairly common winter visitor.

Occurrence during the survey: Not seen during the present survey; only earlier records.

198. *Erithacus brunnea brunnea* (Hodgson)

Indian Blue Robin (Indian Blue Chat)

Habitat and Status: Inhabits evergreen forests, mainly above 600m, but several sightings at lower altitudes also. An uncommon winter visitor.

Occurrence during the survey: A single observation from the Kemmanagundi area of the Park.

199. *Copsychus malabaricus malabaricus* (Scopoli)

White-rumped Shama

Habitat and Status: Evergreen and moist deciduous forest, among bamboo clumps and undergrowth. Resident, uncommon.

Occurrence during the survey: A few observations from the Park. Heard melodious songs from the bamboo clumps at Kavalapura area during March 2009.

200. *Saxicoloides fulicata fulicata* (Linnaeus)

Indian Robin

Habitat and Status: Dry stone and bush country in the midlands, dry paddy fields in the coastal plains. Resident, fairly common locally.

Occurrence during the survey: Uncommon. A few observations from the Lakkavalli area.

201. *Saxicola torquata indica* (Blyth)

Common Stone Chat

Habitat and Status: Regular winter visitor in small numbers to the Wetlands. Uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

202. *Phoenicurus ochruros rufiventris* (Vieillot)

Black Redstart

Habitat and Status: Inhabits open cultivation and woodland. Winter visitor, rare.

Occurrence during the survey: Not seen during the present survey; only earlier records.

Sub Family TIMALIINAE

Babblers, Laughingthrushes, Babaxes, Barwings & Yuhinas

203. *Pellorneum ruficeps ruficeps* Swainson

Spotted Babbler

Habitat and Status: Frequents evergreen and moist deciduous forests and sacred groves and surrounding well-wooded areas in villages. Resident.

Occurrence during the survey: Fairly common in the Park. Occasionally seen among the mixed- bird- flocks.

204. *Pomatorhinus horsfieldii* Harington

Indian Scimitar Babbler

Habitat and Status: Seen in evergreen and moist deciduous forests at all altitudes. Resident.

Occurrence during the survey: Uncommon. Heard at many localities in the Park.

205. *Rhopocichla atriceps atriceps* (Jerdon)

Black-headed Babbler (Dark-fronted Babbler)

Habitat and Status: A resident of the evergreen and moist deciduous forests, adjoining secondary growth and thick scrub.

Occurrence during the survey: Fairly common in the Park. Small groups were noted on several occasions foraging in the lower undergrowth and bamboo clumps.

206. *Turdoides subrufus subrufus* (Jerdon)

Indian Rufous Babbler

Habitat and Status: Frequents undergrowth in evergreen and moist deciduous forests and secondary vegetation; scrub jungle and the cashew groves of the lateritic midlands. Resident. Endemic to Western Ghats.

Occurrence during the survey: A few observations from the Park. A small flock of 6 birds were sighted at Kemmanagundi top hills in March 2009.

207. *Alcippe poiocephala poiocephala* (Jerdon)

Quaker Tit-Babbler

Habitat and Status: Inhabits evergreen and moist deciduous forests at all elevations. Resident.

Occurrence during the survey: Commonly seen in the Park. Found associated with the mixed hunting parties.

208. *Turdoides striatus malabaricus* (Jerdon)

Jungle Babbler

Habitat and Status: Seen around well-wooded areas and forest edges. Resident.

Occurrence during the survey: Common. Fairly well distributed in the Park.

209. *Dumetia hyperythra albogularis* (Blyth)

Rufous-bellied Babbler (Whitethroated Babbler, Tawny-bellied Babbler)

Habitat and Status: Grass and thorny scrub; bushes and undergrowth in plantations. Resident, patchy. Fairly common locally.

Occurrence during the survey: Not seen during the present survey; only earlier records.

210. *Turdoides caudatus caudatus* (Dumont)

Common Babbler

Habitat and Status: Dry, open, scrub and semi desert. Rare.

Occurrence during the survey: Not seen during the present survey; only earlier records.

Sub Family SYLVINAE
Goldcrest, Prinias, Warblers

211. *Cisticola juncidis salimalii* Whistler
Streaked Fantail-Warbler (*Zitting Cisticola*)

Habitat and Status: Affects wet paddy fields in the coastal plains and swamps in the hills around 1500m elevations. Resident.

Occurrence during the survey: Uncommon. A few observations from Mosalaekovu and other grasslands closed to water-logged areas of the Park.

212. *Prinia hodgsonii albogularis* Walden
Franklin's Prinia

Habitat and Status: Frequents moist deciduous and deciduous forests, grass and scrub jungles as well as cashew groves. A resident bird.

Occurrence during the survey: Fairly well distributed in the Park.

213. *Prinia inornata* Blyth
Plain Prinia
(*Prinia subflava franklinii* Blyth Plain Wren-Warbler)

Habitat and Status: frequents wet paddy fields, grassy shores of back waters and grassy hillsides up to about 1200m. Patchy and parochial. Resident.

Occurrence during the survey: Uncommon. A few sightings from the Park.

214. *Prinia socialis socialis* Sykes
Ashy Prinia

Habitat and Status: Grass and reeds near water; in the hills between 450m -1050m. Regularly seen in the mangrove swamps of the coastal area. Resident, patchy and restricted. Fairly common locally.

Occurrence during the survey: Not seen during the present survey; only earlier records.

215. *Acrocephalus dumetorum* Blyth
Blyth's Reed-Warbler

Habitat and Status: Affects reeds and grasses in the wetlands of the coastal areas and also found in undergrowths and scrubs in the forests and plantations, up to an altitude of 2150m. A winter visitor.

Occurrence during the survey: A common bird of the Park. Many calls were heard from the bushes and bamboo clumps during the survey.

216. *Acrocephalus stentoreus brunnescens* (Jerdon)

Indian Great Reed-Warbler (Clamorous Reed Warbler)

Habitat and Status: Reedbeds in coastal wetlands, mangroves, backwaters. Winter visitor with a small resident population. Fairly common.

Occurrence during the survey: Not seen during the present survey; only earlier records.

217. *Orthotomus sutorius guzuratus* (Latham)

Common Tailorbird

Habitat and Status: Seen in gardens in villages and towns, plantations as well as thin and open forests up to an altitude of 1050m. Resident.

Occurrence during the survey: A fairly common bird of the Park.

218. *Phylloscopus magnirostris* Blyth

Large-billed Leaf-Warbler

Habitat and Status: Inhabits evergreen forests and sholas. A locally common winter visitor.

Occurrence during the survey: Fairly well distributed in the evergreen biotopes of the Park.

220. *Phylloscopus occipitalis* (Blyth)

Western Crowned Leaf-Warbler

Habitat and Status: Seen in evergreen and moist deciduous forests, and plantations. A fairly common winter visitor.

Occurrence during the survey: Uncommon. A few observations from the Park.

221. *Phylloscopus trochiloides viridanus* Blyth

Greenish Leaf-Warbler

Habitat and Status: Affects well-wooded homesteads and plantations from the coastal areas through the midlands and forests up to about 1500m in the hills. A winter visitor.

Occurrence during the survey: A common Leaf Warbler of the Park. Small numbers were seen and heard during the survey period.

222. *Phylloscopus affinis* (Tickell)

Tickell's Leaf-Warbler

Habitat and Status: Hill forests up to 2100m, mainly above 1000m. Edge of sholas, bushes. Winter visitor, uncommon.

Occurrence during the survey: Uncommon. Mainly sighted from the higher reaches of the Park.

223. *Sylvia hortensis jerdoni* (Blyth)

Orphean Warbler

Habitat and Status: Inhabits dry thorn scrub and woodland. Winter visitor, uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

Sub Family MUSCICAPINAE

Flycatchers

224. *Muscicapa latirostris* Raffles

Asian Brown Flycatcher

Habitat and Status: frequents moist deciduous and deciduous forests, forest edges up to about 1050m, well-wooded areas in the midlands, and the coastal plains. A winter visitor with small breeding populations.

Occurrence during the survey: Fairly common in the Park.

225. *Muscicapa ruficauda* Swainson

Rusty-tailed Flycatcher

(Rufoustailed Flycatcher)

Habitat and Status: Inhabits mainly the edges of evergreen and moist deciduous forests, preferring the canopy. Winter visitor. Uncommon.

Occurrence during the survey: A single observation from the foothills of Kemmanagundi area.

226. *Muscicapa muttui muttui* (Layard)

Brown-breasted Flycatcher

Habitat and Status: frequents evergreen and moist deciduous forests, well-wooded villages, sacred groves and shady perches in the undergrowth and bushes. A winter visitor.

Occurrence during the survey: Uncommon. A few observations from The Park.

227. *Cyornis pallipes* Jerdon

White-bellied Blue-Flycatcher

Habitat and Status: Evergreen forests up to 1700m, in the undergrowth. Resident, fairly common. Endemic to Western Ghats.

Occurrence during the survey: A single observation from the Muthodi area of the Park.

228. *Cyornis tickelliae tickelliae* (Blyth)

Tickell's Blue-Flycatcher

Habitat and Status: Evergreen and moist deciduous forests up to 1500m, secondary forests, sacred groves and well wooded villages. Resident, fairly common.

Occurrence during the survey: Not seen during the present survey; only earlier records.

229. *Culicicapa ceylonensis ceylonensis* (Swainson)

Grey-headed Flycatcher

Habitat and Status: Evergreen forests, sholas, adjacent Plantations and groves between about 450m to 2150m. Resident, fairly common.

Occurrence during the survey: A common species in the hills of Kemmanagundi.

230. *Eumyias thalassina thalassina* Swainson

Verditer Flycatcher

Habitat and Status: Seen in forest edges, open forests and well-wooded areas in villages as well as sacred groves, from plains to about 1050m. A fairly common winter visitor.

Occurrence during the survey: A few observations from the evergreen biotopes of the Park.

Sub Family MONARCHINAE

Monarch-Flycatchers & Paradise-Flycatchers**231. *Terpsiphone paradisi leucogaster* (Swainson)**

Asian Paradise-Flycatcher

Habitat and Status: Affects forests, well-wooded areas, plantations and gardens in the plains as well as the hills. A winter visitor?

Occurrence during the survey: Fairly well distributed in the Park.

232. *Hypothymis azurea styani* (Hartlaub)

Black-naped Monarch-Flycatcher

Habitat and Status: Seen in evergreen and moist deciduous forests, Cardamom and coffee plantations, homesteads near forests and sacred groves. Resident.

Occurrence during the survey: A common species in the lower reaches of the Park.

Family PARIDAE Tits

233. *Parus xanthogenys travancoreensis* (Whistler & Kinnear)

Black-lored Yellow Tit

Habitat and Status: frequents evergreen and moist deciduous forests, and plantations between 900m to 1500m. Resident; fairly common.

Occurrence during the survey: A few observations from the higher reaches Kemmanagundi area.

234. *Parus major mahrattarum* Hartert

Great Tit

Habitat and Status: Moist deciduous forest, dry scrub jungle, well-wooded area; from plains to hills. Patchy. Resident. Fairly common, locally.

Occurrence during the survey: A few observations from the Park. Rarely seen associated with the mixed hunting bird flocks.

Family SITTIDAE Nuthatches

235. *Sitta frontalis frontalis* Swainson

Velvet-fronted Nuthatch

Habitat and Status: Inhabits evergreen and moist deciduous forests of all altitudes. Resident; fairly common.

Occurrence during the survey: A few observations from the Park.

236. *Sitta castanea castanea* Lesson

Chestnut-bellied Nuthatch

Habitat and Status: Dry and Moist deciduous forests. Resident. Rare.

Occurrence during the survey: Rare.

Family DICAETIDAE

Flowerpeckers

237. *Dicaeum agile agile* (Tickell)

Thickbilled Flowerpecker

Habitat and Status: Frequents evergreen and moist deciduous forests, adjoining plantations and well-wooded areas at all altitudes. Resident.

Occurrence during the survey: Uncommon in the Park.

238. *Dicaeum erythrorhynchos erythrorhynchos* (Latham)

Tickell's Flowerpecker

Habitat and Status: Seen around moist deciduous forests, forest edges, plantations, groves, and homesteads. Resident.

Occurrence during the survey: Uncommon in the Park.

239. *Dicaeum concolor concolor* Jerdon

Plain Flowerpecker (Nilgiri Flowerpecker)

Habitat and Status: Seen in forests of the low country and hills up to about 1200m. Resident.

Occurrence during the survey: A few observations in the Park.

Family NECTARINIIDAE

Sunbirds & Spiderhunters

240. *Nectarinia zeylonica flaviventris* (Hermann)

Purple-rumped Sunbird

Habitat and Status: Affects homesteads, gardens, plantations and forests. A widespread resident.

Occurrence during the survey: Fairly common in the areas surveyed.

241. *Nectarinia asiatica asiatica* (Latham)

Purple Sunbird

Habitat and Status: Frequents thin forests, gardens, villages, and cashew and rubber plantations. Seen generally in drier areas compared to other sunbirds, but may co-exist at many places. Resident.

Occurrence during the survey: Fairly common in the Park.

242. *Nectarinia lotenia hindustanica* (Whistler)

Loten's Sunbird

Habitat and Status: Affects edges of evergreen forests, moist deciduous forests, plantations, well-wooded villages and gardens. Resident.

Occurrence during the survey: A single observations from the Lakkavalli area of the Park.

243. *Nectarinia minima* (Sykes)

Small Sunbird (Crimson-backed Sunbird)

Habitat and Status: Frequents evergreen and moist deciduous forests, adjacent plantations, gardens and homesteads. A common resident bird, endemic to Western Ghats.

Occurrence during the survey: Fairly common in the Park.

244. *Arachnothera longirostris longirostris* (Latham)

Little Spiderhunter

Habitat and Status: Inhabits evergreen and moist deciduous forests and adjacent plantations, up to about 1500m. Present at almost all sacred groves. Resident; common.

Occurrence during the survey: A few sightings in the Park.

Family ZOSTEROPIDAE White-eyes

245. *Zosterops palpebrosa nilgiriensis* Ticehurst

Oriental White-eye

Habitat and Status: Seen in evergreen and moist deciduous forests, mainly above 450m, but could be encountered at lower altitudes also in plantations, scrub jungles and gardens. Resident. Fairly common, locally.

Occurrence during the survey: Fairly common in the upper reaches of the Park.

Family FRINGILLIDAE Finches, Grosbeaks

246. *Carpodacus erythrurus roseatus* (Blyth)

Common Rosefinch

Habitat and Status: Open scrub and grass between sholas, open forest, plantations. Winter visitor, fairly common.

Occurrence during the survey: Not seen during the present survey; only earlier records.

247. *Emberiza melanocephala* Scopoli

Black-headed Bunting

Habitat and Status: Inhabits cultivation and grassland, often near wetlands. Winter visitor, fairly common.

Occurrence during the survey: Not seen during the present survey; only earlier records.

Family ESTRILDIDAE

Munias (Estrildid Finches)

248. *Lonchura striata striata* (Linnaeus)

White-rumped Munia (Whitebacked Munia)

Habitat and Status: Met with in open forests, forest clearings and edges, homesteads, gardens and cultivation. Resident.

Occurrence during the survey: Fairly common in the surveyed localities.

249. *Lonchura malabarica malabarica* (Linnaeus)

(Indian Silverbill) White-throated Munia

Habitat and Status: Dry scrub country, cultivated lands. Resident, Rare.

Occurrence during the survey: Not seen during the present survey; only earlier records.

250. *Lonchura punctulata punctulata* (Linnaeus)

Spotted Munia

Habitat and Status: Mainly around paddy fields in the midlands and coastal area. Resident, fairly common.

Occurrence during the survey: Sighted at the cultivated lands adjoining the Reserve.

251. *Lonchura malacca malacca* (Linnaeus)

Black-headed Munia

Habitat and Status: Paddy fields, grass and reed beds in the backwaters; mainly in the coastal area and midlands, occasionally in the hills too. Resident. Fairly common.

Occurrence during the survey: A few sightings from the Lakkavalli area of the Park

Order PASSERIDAE

sub Family PASSERINAE

Sparrows & Snowfinches**252. *Passer domesticus indicus* Jardine & Selby**

House Sparrow

Habitat and Status: A widespread resident in villages and towns of all the three physiographical zones of the country.

Occurrence during the survey: Uncommon in the Park, mostly seen near human inhabitations.

253. *Petronia xanthocollis xanthocollis* (Burton)

Yellow-throated Sparrow (Chestnut-shouldered Petronia)

Habitat and Status: Secondary jungle, cultivation, homesteads; in the coastal area and midlands mainly. Resident with local movements. Fairly common.

Occurrence during the survey: Not seen during the present survey; only earlier records.

Sub Family PLOCEINAE

Weavers**254. *Ploceus philippinus travancorensis* Whistler**

Baya Weaver

Habitat and Status: Seen around the paddy fields in the coastal plains and midlands. Resident with local movements.

Occurrence during the survey: Small flocks were seen frequenting the paddy fields in around the Park. Many hanging nests of the species also found on the electric lines close to the Paddy field at Muthodi in November 2007.

255. *Ploceus manyar flaviceps* Lesson

Streaked Weaver

Habitat and Status: Backwaters and paddy fields of the coastal area. Resident, locally common.

Occurrence during the survey: Not seen during the present survey; only earlier records.

Family **STURNIDAE**

Starlings & Mynas

256. *Sturnus malabaricus blythii* (Jerdon)

Blyth's Starling (Chestnut-tailed Starling)

Habitat and Status: Affects forests, well-wooded villages and towns, and areas of cultivation. The race *malabaricus* is a winter visitor seen from November to April while *blythii* is resident.

Occurrence during the survey: Uncommon in the Park.

257. *Acridotheres tristis tristis* (Linnaeus)

Common Myna

Habitat and Status: A widespread resident of the coastal plains, midlands and occasionally in higher altitudes also.

Occurrence during the survey: Rarely observed in the Park. Mainly seen near human inhabitations.

258. *Acridotheres fuscus mahrattensis* (Sykes)

Jungle Myna

Habitat and Status: Affects grasslands, paddy fields and open forests. Scarce and patchy in distribution at the coastal plains and midlands; replaces the Common Myna at higher elevations. Resident.

Occurrence during the survey: One of the most common Myna species in the Park.

259. *Gracula indica* (Cuvier)

Southern Hill-Myna

(*Gracula religiosa indica* (Cuvier) Southern Grackle)

Habitat and Status: Inhabits evergreen and moist deciduous forests and adjacent plantations. Resident.

Occurrence during the survey: Fairly common in the Park. An important member of the mixed hunting bird flocks in the Park. Large noisy flocks of up to 18 birds were noted at Muthodi in November 2007.

260. *Sturnus pagodarum* (Gmelin)

Brahminy Starling

Habitat and Status: Open forest, scrub jungle, secondary growth, cultivation, and villages. Resident. Locally common.

Occurrence during the survey: Not seen during the present survey; only earlier records.

Family ORIOLIDAE

Orioles

261. *Oriolus oriolus kundoo* Sykes

Eurasian Golden Oriole

Habitat and Status: Frequents evergreen and moist deciduous forests, well-wooded areas in all physiographical zones of the country. A winter visitor.

Occurrence during the survey: Fairly well distributed in the Park.

262. *Oriolus xanthornus xanthornus* (Linnaeus)

Black-headed Oriole

Habitat and Status: Seen around edges of evergreen forests, moist deciduous forests, house compounds and plantations. Resident.

Occurrence during the survey: Common oriole species in the Park.

263. *Oriolus chinensis* Linnaeus

Black-naped Oriole

Habitat and Status: Low country and hills up to about 1500m; regular winter visitor in small numbers.

Occurrence during the survey: A few observations from the Park.

Family DICRURIDAE

Drongos

264. *Dicrurus macrocercus* Viellot

Black Drongo

Habitat and Status: Affects open lightly wooded country, fallow lands, cultivation lands and homesteads. Resident.

Occurrence during the survey: Rarely seen in the Park.

265. *Dicrurus leucophaeus longicaudatus* Hay

Ashy Drongo (Grey Drongo)

Habitat and Status: Frequents edges of evergreen forests, moist deciduous forests and well wooded house compounds in towns and villages. A winter visitor.

Occurrence during the survey: A fairly common species of drongoes in the Park.

266. *Dicrurus aeneus aeneus* Vieillot

Bronzed Drongo

Habitat and Status: Affects evergreen and moist deciduous forests, cardamom and coffee plantations, well-wooded areas and sacred groves. Resident.

Occurrence during the survey: Fairly well distributed in the Park. Found associated with the mixed hunting flocks of birds.

267. *Dicrurus paradiseus paradiseus* (Linnaeus)

Greater Racket-tailed Drongo

Habitat and Status: Seen around evergreen and moist deciduous forests, adjacent plantations and well-wooded areas in the coastal plains and midlands.

Occurrence during the survey: Commonly seen in the Park. A major component in the mixed hunting bird flocks.

268. *Dicrurus hottentottus hottentottus* (Linnaeus)

Spangled Drongo

Habitat and Status: Evergreen forests, forest edges and clearings. Patchy. Resident, uncommon.

Occurrence during the survey: Not seen during the present survey; only earlier records.

Family ARTAMIDAE

Wood swallows

269. *Artamus fuscus* Vieillot

Ashy Wood Swallow (Ashy Swallow-Shrike)

Habitat and Status: Frequents open lands in the coastal areas and midlands and also in the highlands up to 1200m altitudes. Resident.

Occurrence during the survey: A few observations in the Park. Probably nesting in the holes of dead logs found in the Reservoir waters in March 2009.

Family CORVIDAE

Crows, Jays, Treepies, Magpies

270. *Dendrocitta vagabunda parvula* Whistler & Kinnear

Indian Treepie

Habitat and Status: Frequents semi-evergreen, moist deciduous and deciduous forests, secondary forests, house compounds and coconut groves from low country to hills (up to 1050m). Resident.

Occurrence during the survey: Fairly common in the Park.

271. *Dendrocitta leucogastra* Gould

White-bellied Treepie

Habitat and Status: Evergreen forest, adjacent plantations with large trees. Local and patchy in distribution. Resident. Endemic to Western Ghats.

Occurrence during the survey: A few sightings from the Park. Found associated with the Racket-tailed Drongo in the formation of mixed hunting bird flocks in the forests.

272. *Corvus splendens protegatus* Madarasz

House Crow

Habitat and Status: A widespread resident, inseparable from human habitations. Abundant.

Occurrence during the survey: Uncommon in the Park.

273. *Corvus macrorhynchos culminatus* Sykes

Jungle Crow

Habitat and Status: Prefers villages and well-wooded areas, compared to the preceding species; seen in the hills also. Resident; abundant.

Occurrence during the survey: Fairly common in the Park. A bird with unusually down-curved upper mandible was sighted at Lakkavalli area on 1st March 2009.

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MAMMALIA

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INTRODUCTION

Mammals are considered among the best-known groups in the animal kingdom. 4629 species of mammals are reported, the world over (Wilson & Reeder, 1993). In India 397 species are recorded, of which 41 are endemic to the country (Alfred *et al*, 2002 & 2005). In proportion to the land area, the abundance and endemism of mammalian species in the country are very high. Bhadra Tiger Reserve situated on the Western Ghats is rich in mammalian diversity.

Altogether 41 species of mammals have been reported from Bhadra Tiger Reserve. The mammalian composition of the Park comprises of 41 species under 35 genera belonging to 21 families under 9 orders. Endemic species such as Slender Loris (*Loris lydekkerianus*), Black-footed Langur (*Semnopithecus hypoleucos*), Brown Palm Civet (*Paradoxurus jerdoni*), Nilgiri Brown Mongoose (*Herpestes fuscus*), Stripe-necked Mongoose (*Herpestes vitticollis*), Dusky Striped Squirrel (*Funambulus sublineatus*) and Jungle Striped Squirrel (*Funambulus tristriatus*) recorded from the study area are found only in the Western Ghats and Sri Lanka- one of the important biodiversity hotspot regions of the world.

A systematic account of the species, incorporating information on habitat, distribution, conservation status etc. is provided. Out of the 41 species, 19 have been directly sighted during the study period. Rest of the species are included on the basis of indirect evidences (animal tracks such as pugmarks, scat, dung and pellets) and data available in literature (Prasad *et al*, 1978; Karanth, 1982, Gadgil, 1985; Karanth, 1986; Raju & Hegde, 1995; Ahrestani, 1999; Raju, 1999; Jathanna, 2000; Kumar, 2002; Hegde & Ramakrishna, 2006; Archana, 2006 and Kumar & Singh, 2007). The taxonomy and nomenclature followed here is in accordance with Wilson and Reeder (1993). Status of species wherever mentioned is based on the schedules of Indian Wildlife (Protection) Act, 1972, Appendices of the Convention on International Trade in Endangered Species of

Wild Flora and Fauna (CITES) and the revised Red Data Book (Alfred *et al*, 2006; IUCN, 2008).

SYSTEMATIC ACCOUNT

Class MAMMALIA

Order INSECTIVORA

Family SORICIDAE

1. *Suncus murinus* (Linnaeus)

Grey Musk Shrew

Distribution: Indian Subcontinent, China, S.E. Asia, Indonesia.

Conservation Status: Not protected under any of the schedules of Indian Wildlife (Protection) Act of 1972. Listed in the Least concern category of IUCN (2008).

Occurrence during the Survey: None; only earlier record.

Order CHIROPTERA

Family PTEROPODIDAE

2. *Cynopterus sphinx* (Vahl)

Short-nosed Fruit Bat

Distribution: Indian subcontinent, Sri Lanka, S.E. Asia, Indonesia.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-V. Listed in the Least concern category of IUCN (2008).

Occurrence during the Survey: Frequenting the coffee plantations adjacent to the Muthodi area of the Park.

3. *Pteropus giganteus* (Brunnich)

Indian Flying Fox/ Great Indian Fruit Bat

Distribution: Indian subcontinent.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-V. Listed in the Least concern category of IUCN (2008).

Occurrence during the Survey: Roost flights were noted at Lakkavalli and Muthodi area.

Family VESPERTILIONIDAE

4. *Pipistrellus coromandra* (Gray)

Indian Pipistrelle

Distribution: Ranges from Pakistan, India and Sri Lanka to Myanmar, China, Vietnam and northern Borneo.

Conservation Status: Not protected under any of the schedules of Indian Wildlife (Protection) Act of 1972. Listed in the Least concern category of IUCN (2008).

Occurrence during the Survey: Roost flights were observed at Lakkavalli damsite area.

Order PRIMATES

Family LORISIDAE

5. *Loris lydekkerianus* (Linnaeus)

Slender Loris

Distribution: South India.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-I; CITES: Appendix- II and Near Threatened under IUCN category (2008).

Occurrence during the Survey: None; only earlier records.

Family CERCOPITHECIDAE

6. *Macaca radiata* (Geoffroy)

Bonnet Macaque

Distribution: South India

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-I; CITES: Appendix- I and under Least concern category of IUCN (2008).

Occurrence during the Survey: Good populations of these Macaques were sighted at many places in the park including the higher reaches of Kemmanagundi.

7. *Semnopithecus entellus* (Dufresne)

Common Langur/ Hanuman Monkey.

Distribution: India, Sri Lanka, Nepal, southern Tibet.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-I; CITES: Appendix- I and under Vulnerable of IUCN (2002).

Occurrence during the Survey: Fairly common at many localities surveyed. Observed at Kesavae (10+), near Muthodi Forest Rest House (8+), enroute to Kavalaepura bungalow from Lakkavalli (25+), Sukhalahatti (8). Often found associated with Spotted Deer. Up to 23 animals were found in a troop. As per the new taxonomic revision (Brandon-Jones, 2004), the species found in the Park may be Black-footed Grey Langur (*Semnopithecus hypoleucos* Blyth), owing to its distinct coat colour and black foot. The species is generally shy and more dependant on forest cover.

Order CARNIVORA

Family CANIDAE

8. *Canis aureus* Linnaeus

Jackal

Distribution: S. E. Europe, N. & E. Africa, Middle East, C. Asia to Indian subcontinent, Myanmar and Thailand.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-II; CITES: Appendix- III and under Least concern category of IUCN (2008).

Occurrence during the Survey: Howling sound was noted around the Lakkavalli guest house at night.

9. *Cuon alpinus* (Pallas)

Indian Wild Dog / Dhole.

Distribution: India, Pakistan, Bangladesh, Myanmar, China, Russia, Korea, Mongolia and S.E. Asia.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-II; CITES: Appendix- II and Endangered under IUCN category (2008).

Occurrence during the Survey: Fairly common. Playful behavior of a pack of 6 wild dogs was noticed near Kundur Camp. One adult female dog caught a large Bull Frog (*Hoplobatrachus tigerinus*) from the pond and dragged and tossed all along the road with other dogs in a playful manner. Finally lost interest in the frog and moved into the forest. A small pack of 3 animals were also sighted near Jagra crossing the road on 16th Nov. 2007. Many places faecal matters were found including the higher reaches of Kemmanagundi, Bababudangiri hills, Mullayangiri.

Family URSIDAE

10. *Melursus ursinus* (Shaw)

Sloth Bear

Distribution: India, Sri Lanka, Bangladesh and Nepal

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-I; CITES: Appendix- I and Vulnerable under IUCN category (2008).

Occurrence during the Survey: Many droppings were found during the survey especially in the Tanigbyle range and Kattehollae area of the Park.

Family MUSTELLIDAE

11. *Lutra lutra* (Linnaeus)

Common/Eurasian Otter

Distribution: Eurasia, N.W. Africa to India, S.E. Asia and Sri Lanka.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-I; CITES: Appendix- I and Near Threatened category under IUCN (2008).

Occurrence during the Survey: Many regurgitation sites were observed near the stream and lake bed indicated the presence of otters in the Park. Fresh spoors and faecal matters were seen at Hebbae falls, Kuthira Abbae falls and the lake beds of Mosalaekavu and Mathikovu areas.

Family VIVERRIDAE

12. *Paradoxurus hermaphroditus* (Pallas)

Palm Civet/Toddy Cat

Distribution: India, Sri Lanka, Bangladesh, Bhutan Myanmar, S .E. Asia, Indonesia and Philippines.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-II; CITES: Appendix-Not listed and under Least concern category of IUCN (2008).

Occurrence during the Survey: None; only earlier records.

13. *P. jerdoni* Blanford

Brown Palm Civet/ Jerdon's Palm Civet

Distribution: Restricted to southern Western Ghats.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-II; CITES: Appendix- III and Least concern category of IUCN (2008).

Occurrence during the Survey: A lonely animal was sighted at Muthodi near Dormitory on the road at around 9.45pm on 14th November 2007. The animal was feeding on a small rodent. The white tip under the long tail of the civet was very conspicuous.

14. *Viverricula indica* (Desmarest)

Small Indian Civet

Distribution: India, Pakistan, Bangladesh, Bhutan, Sri Lanka, Myanmar, S. China and Indonesia.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-II; CITES: Appendix- III and Least concern category under IUCN (2008).

Occurrence during the Survey: None; only earlier records.

Family HERPESTIDAE

15. *Herpestes edwardsii* (Geoffroy)

Common Mongoose/ Indian Grey Mongoose

Distribution: E & C. Arabia to Indian subcontinent.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-II; CITES: Appendix- III and least concern category under IUCN (2008).

Occurrence during the Survey: Direct sightings from Kuthira Abbae fall, Singanamane area of the Park.

16. *H. fuscus* Waterhouse

Nilgiri Brown Mongoose/ Indian Brown Mongoose

Distribution: South India, Sri Lanka.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-II; CITES: Appendix- III and vulnerable under IUCN category (2008).

Occurrence during the Survey: None; only earlier records.

17. *H. vitticollis* Bennett

Stripe-necked Mongoose

Distribution: South India and Sri Lanka.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-II; CITES: Appendix- III and the Least concern category of IUCN (2008).

Occurrence during the Survey: A single animal was sighted crossing the road at Lalbaghkathri in Thanigebyle range on 2nd March 2009.

Family FELIDAE

18. *Panthera tigris* (Linnaeus)

Tiger

Distribution: Oriental region (except Borneo and Philippines), Siberia, Turkey, Iran and Afghanistan.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-I; CITES: Appendix- I and endangered under IUCN category (2008).

Occurrence during the Survey: Pugmarks and scats were noticed during the survey. A large Pug mark and scats were noted at Telabidri on 16th Nov. 2007, Pug marks were also noticed at Kudoor on 21st Nov. 2007, near Sukhalahatti Bungalow on 21st Nov. 2007, Mosalaekavu on 28th Feb. 2009 and Virupakshikhan on 22nd Nov. 2007. A scat containing the skin and claw remains of Monitor Lizard was noted near Kundoor camp on 2nd March 2009.

19. *P. pardus* (Linnaeus)

Leopard/Panther

Distribution: N. Africa, Middle East, N. Caucasia, Oriental region, Korea and N. China.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-I; CITES: Appendix- I and Near Threatened category of IUCN (2008).

Occurrence during the Survey: Many scats and pugmarks were noted from Hebbaegiri, Holaerayanahalla, Lalbhaghkathri in the Reserve.

20. *Prionailurus bengalensis* (Kerr)

Leopard Cat

Distribution: Siberia, Korea, N.E. China, Oriental region.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-I; CITES: Appendix- I and Least concern category under IUCN (2008).

Occurrence during the Survey: None; only earlier records.

21. *Felis chaus* Guldenstaedt

Jungle Cat

Distribution: N. Africa, Middle East, India, Sri Lanka, Myanmar, Thailand, Vietnam.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-II; CITES: Appendix- II and Least concern category under IUCN (2008).

Occurrence during the Survey: None; only early records. Many droppings were found from lake bed areas at Mossaelakovu and also from the Kuthira Abbae falls.

Order PROBOSCIDEA

Family ELEPHANTIDAE

22. *Elephas maximus* Linnaeus

Asian Elephant

Distribution: India, Bangladesh, Sri Lanka, Bhutan, Myanmar, S. China, S. E. Asia and Indonesia.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-I; CITES: Appendix- I and endangered under IUCN category (2008).

Occurrence during the Survey: Fairly well distributed. Many fresh and old dung were found in Madala, Kundur, Holaerayanahalla, Sukhalahatti, Kattaeholle, Mosalaekavu, Centralgudda during the survey. An adult female elephant was sighted on the lake bed of Mosalaekavu on 1st March 2009.

Order ARTIODACTYLA

Family SUIDAE

23. *Sus scrofa* Linnaeus

Wild Boar

Distribution: S. & C. Europe, N. W. Africa through Asia to Siberia, south to Sri Lanka, S. E. Asia, Indonesia.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-III. Listed in Least concern category under IUCN (2008).

Occurrence during the Survey: Fairly common along the edges of the Estates and human inhabitations. Also sighted at many places in the lake bed during the cruise through the Bhadra Reservoir on 1st March 2009.

Family TRAGULIDAE

24. *Moschiola meminna* (Erxleben)

Mouse Deer/ Indian Chevrotain

Distribution: India, Sri Lanka and Nepal

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-I, but Least concern category under IUCN (2008).

Occurrence during the Survey: Uncommon. A few hoof marks were observed within the evergreen forests.

Family CERVIDAE

25. *Cervus unicolor* Kerr

Sambar

Distribution: India, Bangladesh, Nepal, Sri Lanka, Myanmar, China, S.E. Asia to Philippines.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-III, but Vulnerable under IUCN category (2008).

Occurrence during the Survey: Fairly Common. Less gregarious than Spotted Deer and are often seen alone.

26. *Muntiacus muntjac* (Zimmermann)

Barking Deer/Muntjac

Distribution: Bangladesh; Bhutan; Cambodia; China; Hong Kong; India; Lao People's Democratic Republic; Myanmar; Nepal; Pakistan; Sri Lanka; Thailand; Viet Nam

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-III, and under Least concern category of IUCN (2008).

Occurrence during the Survey: Occasionally seen in the Park either solitarily or in pairs. Commonly seen around Muthodi Forest dormitory area.

27. *Axis axis* Erxleben

Spotted Deer

Distribution: Sri Lanka, Nepal, Bangladesh, Bhutan, India, and in small numbers in Pakistan.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-III, but Least concern category of IUCN (2008).

Occurrence during the Survey: Most seen and visible deer species of the Park. On a single day on a drive from Lakkavalli to Kavalaepura on 20th Nov. 2007, encountered 64 numbers of Spotted Deer. Maximum herd size noted from the Park was 36, sighted at Muthodi range on 15th Nov. 2007 consist of 6 stags, 3 in velvets and 4 fawns. On a full day cruise through the Bhadra reservoir on 1st March 2009, we could count about 120 Spotted Deers in 8 herds with a maximum herd size of 34 sighted at Mosalekavu.

Family BOVIDAE

28. *Bos gaurus* H. Smith

Gaur/Indian Bison

Distribution: India, Bangladesh, Nepal, Sri Lanka, Myanmar and S. E. Asia

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-I; CITES: Appendix- I and vulnerable under IUCN category (2008).

Occurrence during the Survey: Most common bovine species of the Park. One large bull was sighted near Kavalaepura region on 20.11.2007.

Order PHOLIDOTA

Family MANTIDAE

29. *Manis crassicaudata* Gray

Indian Pangolin

Distribution: India, Sri Lanka, Bangladesh and Pakistan

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-I; CITES: Appendix- II and Near Threatened under IUCN category (2008).

Occurrence during the Survey: None; only earlier records. Large burrows in the ground were noticed in the open areas at Lalbaghkathri.

Order LAGOMORPHA

Family LEPORIDAE

30. *Lepus nigricollis* F. Cuvier

Indian Hare/Blacknaped Hare

Distribution: India, Pakistan, Bangladesh, Nepal and Sri Lanka.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-IV; and Least concern under IUCN category (2008).

Occurrence during the Survey: Fairly common. Direct sightings from Kavalapura, Hebbaegiri and Kemmanagundi areas of the Park.

Order RODENTIA

Family SCIURIDAE

31. *Funnambulus palmarum* (Linnaeus)

Three-striped Palm Squirrel

Distribution: C. & S. India.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-IV, but Least concern under IUCN category (2008).

Occurrence during the Survey: Fairly common. Coat colour is paler and the call is shriller than its Kerala counterpart.

32. *F. sublineatus* (Waterhouse)

Dusky Striped Squirrel

Distribution: South India and Sri Lanka.

Conservation Status: Not protected under any of the schedule of Indian Wildlife Protection Act of 1972 but Vulnerable under IUCN category (2008).

Occurrence during the Survey: None; only earlier records.

33. *F. tristriatus* (Waterhouse)

Jungle Striped Squirrel

Distribution: Peninsular India (Western Ghats).

Conservation Status: Not protected under any of the schedules of Indian Wildlife (Protection) Act of 1972. Listed in the Least Concern under IUCN category (2008).

Occurrence during the Survey: Sighted at Telabidri and other areas of Muthodi range adjoining the coffee plantations. Also sighted at Hebbaegiri area of the Thanigebyle range.

34. *Petaurista philippensis* (Elliot)

Large Brown Flying Squirrel

Distribution: India, Sri Lanka. China, Taiwan and Java.

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-II, but Least Concern under IUCN category (2008).

Occurrence during the Survey: None; only earlier records.

35. *Ratufa indica* (Erxleben)

Indian Giant Squirrel

Distribution: Central and South India.*Conservation Status:* Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-II; Appendix-II of CITES and under Least Concern category of IUCN (2008).*Occurrence during the Survey:* Fairly common. Many sightings from the Park. Up to 6 squirrels were sighted on a tree near Muthodi forest range office on 12th Nov. 2010. Coorg race *benghalensis* is represented in the area characterized by its paler tail tip and coat colour.

Family MURIDAE

36. *Bandicota bengalensis* (Gray)

Indian Mole Rat/ Lesser Bandicoot Rat.

Distribution: India, Pakistan, Bangladesh, Sri Lanka, Myanmar and Indonesia.*Conservation Status:* Not protected under any of the schedules of Indian Wildlife (Protection) Act of 1972. Listed in the Least Concern under IUCN category (2008).*Occurrence during the Survey:* None; only earlier records.**37. *B. indica* (Bechstein)**

Bandicoot Rat/ Large Bandicoot Rat/ Pig Rat

Distribution: India, Nepal, Bangladesh, Sri Lanka, China, Vietnam and Indonesia.*Conservation Status:* Not protected under any of the schedules of Indian Wildlife (Protection) Act of 1972. Listed in the Least Concern under IUCN category (2008).*Occurrence during the Survey:* None; only earlier records.**38. *Rattus rattus* (Linnaeus)**

Common House Rat

Distribution: India, Bangladesh, Nepal, S.E. Asia.*Conservation Status:* Not protected under any of the schedules of Indian Wildlife (Protection) Act of 1972. Listed in the Least Concern under IUCN category (2008).*Occurrence during the Survey:* None; only earlier records.**39. *R. blanfordi* (Thomas)**

Blanford's Rat/ White-tailed Wood Rat

Distribution: C. & S. India.

Conservation Status: Not protected under any of the schedules of Indian Wildlife (Protection) Act of 1972. Listed in the Least Concern under IUCN category (2008).

Occurrence during the Survey: None; only earlier records.

40. *Mus musculus* Linnaeus

House Mouse

Distribution: Worldwide.

Conservation Status: Not protected under any of the schedules of Indian Wildlife (Protection) Act of 1972. Listed in the Least Concern under IUCN category (2008).

Occurrence during the Survey: None; only earlier records.

Family HYSTRICIDAE

41. *Hystrix indica* Kerr

Indian Porcupine

Distribution: Syria, Iraq, S. Arabia, Iran, Turkey, Tibet, Kazakhstan, India, Pakistan and Sri Lanka

Conservation Status: Indian Wildlife (Protection) Act (1972 as amended up to 2002): Schedule-IV and under Lower risk Least concern category of IUCN (2002).

Occurrence during the Survey: Fairly well distributed in the Park. Many droppings and quills were sighted at several localities in the Park.

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