

Fauna of Conservation Area Series 13

FAUNA
of
ERAVIKULAM
NATIONAL PARK



ZOOLOGICAL SURVEY OF INDIA

Fauna of Conservation Area Series 13

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of
ERAVIKULAM NATIONAL PARK

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Fauna of Eravikulam National Park

Conservation Area Series

No. 13

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FAUNA OF ERAVIKULAM NATIONAL PARK : AN OVERVIEW

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INTRODUCTION

Eravikulam National Park is the home of the Nilgiri tahr, *Hemitragus hylocrius* (Ogilby), a species of mountain goat restricted to the southern Western Ghats. This is the major protected area of high elevation Shola-grassland ecosystem in Kerala and perhaps the largest relatively undisturbed high elevation ecosystem in the entire Western Ghats.

The Eravikulam National Park was formerly part of the land of the Kannan Devan Hills produce company, at present of the Tata Tea, but declared as a sanctuary in 1975 and later elevated to the status of a National Park in 1978, primarily for the protection of the Nilgiri tahr. But even earlier, in the Kannan Devan Hills in the lands leased to J. D. Monroe by the Poonjar Raja in 1877, the 77 sq. km. Eravikulam plateau around the Anamudi peak was set apart as a game reserve by the Kannan Devan Hills produce company for its population of Nilgiri tahr. The protection given to the plateau which was unsuitable for tea planting by the company saved the most enchanting landscape in the High Range and the world's largest population of the endangered species of the mountain goat, the Nilgiri tahr.

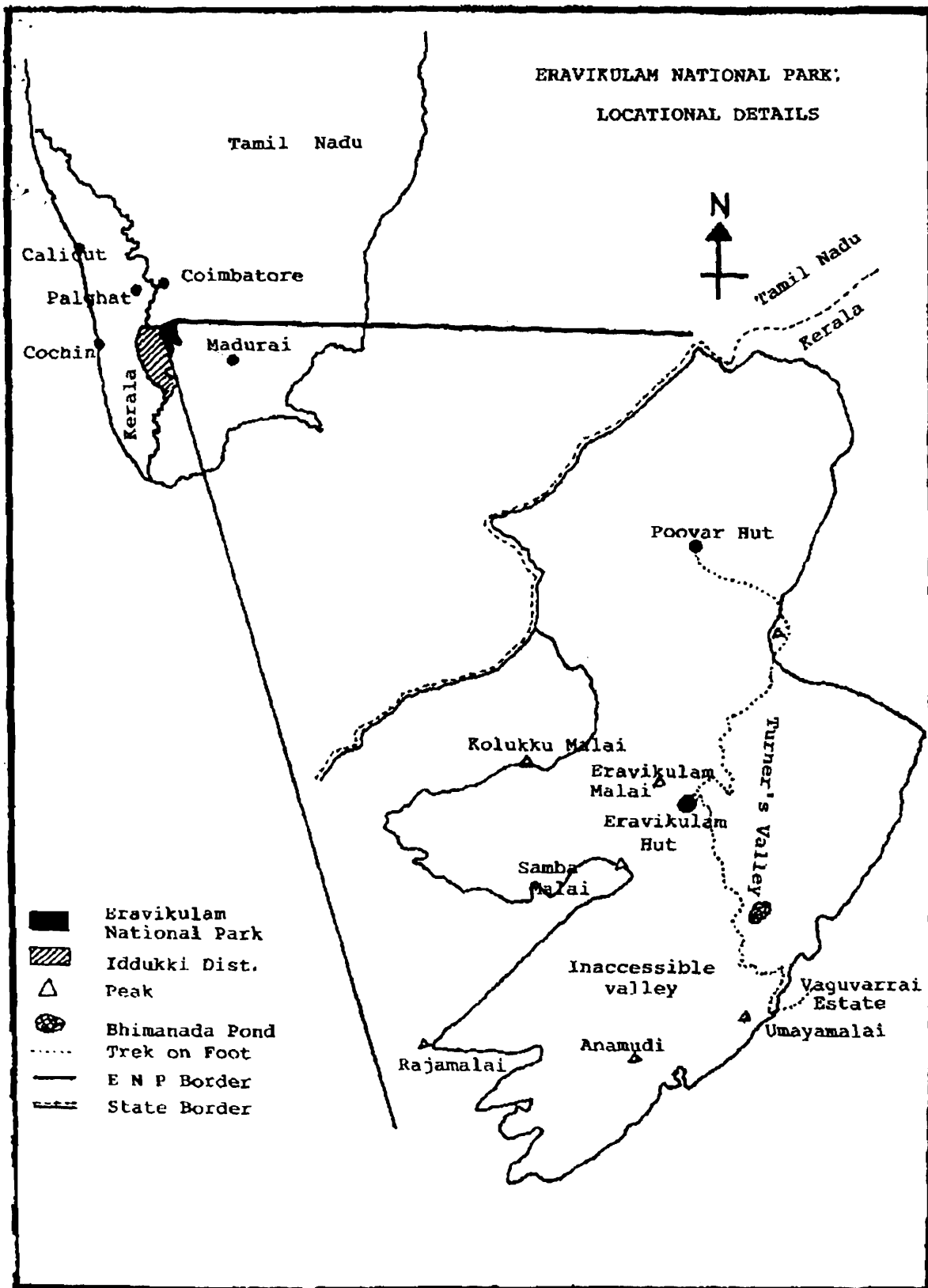
PHYSIOGRAPHY

Located between 10°8'N - 10°19'N latitude and 77°0'E - 77°8'E longitude, the park occupies an area of about 112 sq. km in the High Range of Western Ghats falling within the revenue district of Idukki in the Kerala state.

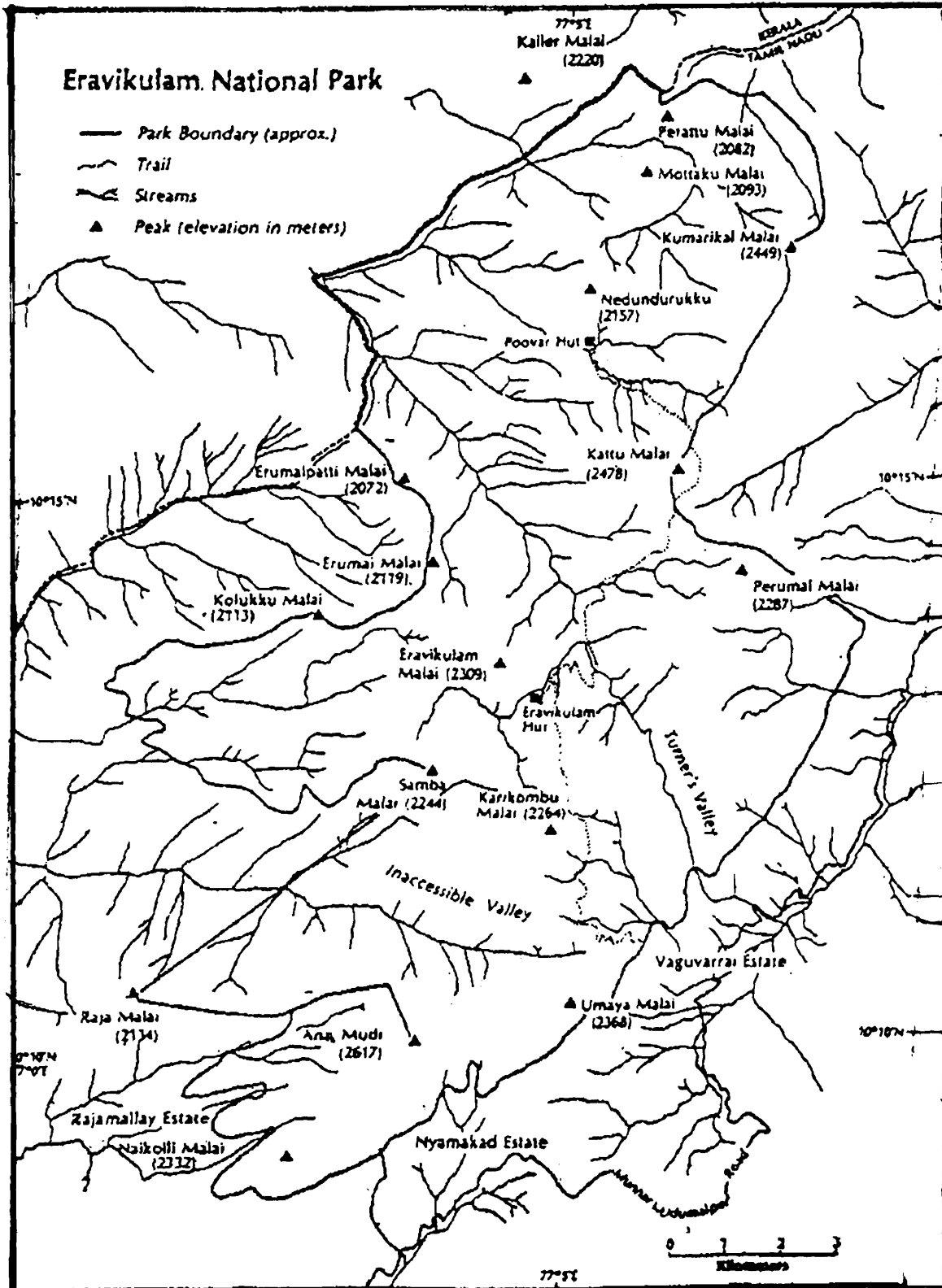
The ghat section in the Idukki district constitutes numerous mountains of varied configuration and associated uplands. These mountains together with the summit plateau form the High Range. The most prominent physiographic province in the state is the highlands which is also the most prominent orographic feature of the Peninsular India. The physiography of the High Range presents a succession of lofty hills with an average elevation of 2000m separated by deep valleys and several small plateaus. The widest reach of the Western Ghats in the Kerala state is the High Range which also forms the highest reach.

The main part of the park comprises of a high rolling plateau with a base elevation of about 2000m which is roughly cut in half from north west to south east by the Turner's valley which has within the park a maximum depth of approximately 600m. The National Park area ranges in elevation from about 1000m to 2695m above sea level at Anamudi, the highest point in Peninsular India, south of the Himalaya. The fringes of the plateau are generally precipitous and the park boundary is mostly coincident with the edge of the plateau.

The wetlands and marshes falling within the valleys act as potential source of water for a number of perennial streams in the National Park. They form the part of catchment for major rivers like Eravikulam, Chinnar and Pambar which flow in Tamil Nadu. However, Periyar and Pambar (Amaravathy) rivers form the main drainage basins.



Map 1. Eravikulam National Park : Location details



Map 2. Approximate boundary of Eravikulam National Park. From Rice 1986

VEGETATION

Four major types of vegetation are found within the Eravikulam National Park. They are the southern tropical hill forest, southern montane wet temperate forest, southern montane wet scrub and the southern montane wet grassland. However, most of the area is covered by southern montane wet grassland with small patches of montane wet temperate forests known as 'Sholas' confined to the hill folds. The Sholas are considered to be a relict of an evergreen forest climax now restricted to damper sites by the combined effects of fire, frost, grazing, clearance for agriculture and erosion of the soil. The ecosystem is considered a polyclimax with the Shola-grassland, a semiclimax.

WEATHER

The annual weather cycle of the area is dominated by the monsoon climate. The rainfall ranges from around 2000 to 5000mm. Besides heavy rainfall, mist, strong winds and cold conditions prevail most of the time. Annual temperature varies from -3°C in the winter to 29°C in summer. On the whole, the topography and the weather of the area present a picture of inaccessibility, heavy rainfall and harsh winter climate.

ECOLOGY

The stunted evergreen forests (Sholas) are restricted to hill folds and scattered discontinuously in a large number of small pockets. The largest of them may extend over a few hundred hectares while the smaller ones occupy miniscule pockets. Winter frost, dessicating wind and annual fires suppress regeneration of forests in the grassy crestline areas. The high amount of tannin present in the leaves and barks of some of the shola species and the low rate of activity of micro-organisms in these montane regions retard decomposition of litter as evidenced by the presence of huge deposits of undecomposed organic carbon in the form of 'peat' in many of the sholas. As a result the soil is impoverished which in turn prevents to

a large extend regeneration of native species. That means, any damage inflicted on these wooded areas would result in the disappearance of the shola vegetation to be followed by the spread of grasslands. Thus, ecologically, the habitat is extremely fragile.

BIOGEOGRAPHY

Peculiarities in the biogeography of the area is closely correlated with the major events of the geomorphological evolution of the Peninsular India and in particular with that of the Western Ghats. Biogeography of the Indian Peninsula and its faunal peculiarities have been discussed in detail by Mani (1974). The present day character fauna of the Peninsula comprises of the derivatives of the older Gondwanan fauna and the derivatives of the relatively younger faunas differentiated mainly in Asia further comprising of the Peninsular autochthonous elements and the greater majority of the extra-Peninsular Asiatic eastern and Mediterranean western intrusive elements. The outstanding peculiarities of the present-day distributional patterns of the character fauna of the Peninsula are concentration and isolation of its dominant elements in relatively small, often also widely separated areas, resulting in more or less marked discontinuity brought about by both the natural and within historical times, man-made factors. At present, the Western Ghats, the great horsts of the southern Block of the Peninsula, exhibit the most important concentration and isolation of the Peninsular faunal characteristics.

UNIT DIVISIONS OF THE PARK

For administrative and technical purposes, the park is divided into (A) Core zone : 65 sq. km.; (B) Buffer zone : 32 sq. km. and (C) tourism zone : 15 sq. km.

The tourism zone at Rajamalai is connected by road with the nearby Munnar, a small hill station township. Core area of the park can be reached on foot via the Vaguvarrai tea estate of the Tata-Tea. However, the long and uphill trek to the core area is strenuous.

FAUNAL EXPLORATIONS

Barring the extensive study on Nilgiri tahr by Rice (1986) and his observations on some of the mammals in the Park area, practically nothing is known in scientific literature on the fauna of the Eravikulam National Park. This was one of the primary urges for initiating faunal studies in the park by the Zoological Survey of India.

The forests that covered the entire Western Ghats in the past have so much been modified and interfered with, that only few areas now remain which represent the original condition that prevailed before. Extensive tea plantations that occupy every inch of land outside the park and on adjacent hill slopes can be cited as one of the most glaring examples of destruction of natural habitats, forcible introduction of monoculture and ultimately over exploitation of the available resources. Though the stability of the remaining natural forests are fast declining, the relict characters of the flora and fauna are largely preserved in such 'ecological islands'. The Shola forests represent such 'refugial pockets' in the Eravikulam National Park.

In order to assess the faunal composition of the park three faunistic surveys were undertaken jointly by the Western Ghats Field Research Station, Calicut and the Western Regional Station, Pune of the survey. The first survey was conducted from 19th February to 11th March 1993, the second from 31st March to 14th April 1994 and the third from 20th February to 13th March 1995.

Based on the taxonomic studies carried out on the fauna collected and observed at various localities pertaining to all the 3 unit divisions of the park, information on the following faunal groups has emanated.

Invertebrata : Odonta, Orthoptera, Hemiptera (aquatic and semi-aquatic), Lepidoptera, Chalcidoidea (Hymenoptera), Tephritidae (Diptera), Arachnida, Nematomorpha, Mollusca and Zooecidia.

Vertebrata : Pisces, Amphibia, Reptilia, Aves and Mammalia.

GENERAL OBSERVATIONS ON FAUNA

The faunal explorations made so far in Eravikulam National Park have been far from exhaustive. The studies hitherto made may constitute only a portion of its faunal wealth. Even so, the findings present an overall picture of the faunal composition of the area which was hitherto practically unknown. Majority of the species documented as a result of the surveys are new records for the area and a few species of parasitic Hymenoptera (Chalcidoidea) discovered are new to science.

Altogether, 262 species of various faunal groups have been documented (Table-A). The genus *Trimeresurus* of the ophidian (Reptilia) family viperidae is considered by some authors belonging to the Gondwanan faunal element and a phylogenetic relict. The genus is represented in the Park by the species *T. macrolepis* and *T. malabaricus*. Examples in the park for the Peninsular autochthonous, Drawidian endemic elements can be found among the Amphibian genera *Nyctibatrachus* and *Micrixalus*; Reptilian genera *Ristella*, *Salea*, *Dravidogecko*, *Uropeltis*, *Tetrurus* and *Xylophis* and Orthopteran genera *Zygophlaeoba* and *Deltomus*. The Amphibian genus *Rhacophorus* and the Lepidopteran genus *Euploea* represent the Peninsular autochthonous, Madagascan element. The intrusive elements in the fauna belong to the derivatives from the Indo-Chinese and Malayan subcentres and the Palaearctic element. Some of the examples for the Indo-Chinese derivatives found in the Park belong to the Lepidopteran genera *Appias*, *Graphium*, *Pachliopta* and *Cepora* and the Avian genera *Brachypteryx* and *Myiophonus*. Some examples for the Malayan derivatives among the mammals found in the park belong to the genera *Semnopithecus*, *Paradoxurus*, *Pteropus*, *Cynopterus* and *Elephas*. The typical Palaearctic element found in the park is the tahr, *Hemitragus*.

Table - A

Representative number of genera and species in the fauna of Eravikulam National Park.

Sl. No.	Faunal Group*	No. of Genera	No. of Species	
			Determined	Indetermined
1.	Odonata	7	7	
2.	Orthoptera	12	7	5
3.	Hemiptera (aquatic & semi-aquatic)	4	6	1
4.	Lepidoptera (Rhopalocera)	24	29	
5.	Chalcidoidea (Hymenoptera)	20	29	
6.	Tephritidae (Diptera)	9	9	
7.	Arachnida	15	5	11
8.	Nematomorpha	1	1	
9.	Mollusca	1	1	
10.	Pisces	4	4	
11.	Amphibia	7	9	2
12.	Reptilia	11	13	
13.	Aves	66	94	
14.	Mammalia	33	48	
	Total	214	262	19

REFERENCES

- Mani, M. S. 1974. Biogeography of the Peninsula, pp. 614-647 in Mani, M. S. ed. *Ecology and Biogeography in India*. W. Junk Publishers, The Hague. 773 pp.
- Rice, C. C. 1986. Observations of predators and Prey at Eravikulam National Park, Kerala. *J. Bombay nat. Hist. soc.*, **83**(2) : 283-305.

INSECTA : ODONATA

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INTRODUCTION

Our knowledge on Odonate fauna of Western Ghats dates back to the works of Fraser (1933, 1934 and 1936). In the recent past, Rao and Lahiri (1983) and Prasad and Varshney (1995) have reported approximately 138 species from this area. However, there is no specific record of any species of Odonata occurring in Eravikulam National Park, Kerala amongst these works.

Present study based on 34 specimens collected from the National Park comprises of 7 species from 7 genera under 2 families.

SYSTEMATIC ACCOUNT

Phylum ARTHROPODA

Order ODONATA

Sub Order ZYGOPTERA

Super Family COENAGRIONOIDEA

Family COENAGRIONIDAE

Sub Family PSEUDAGRIONINAE

1. *Pseudagrion decorum* (Rambur)

Sub Family ISCHNURINAE

2. *Ischnura aurora aurora* (Brauer)

Sub Order ANISOPTERA

Super Family LIBELLULOIDEA

Family LIBELLULOIDAE

Sub Family LIBELLULINAE

3. *Orthetrum sabina sabina* (Drury)

Sub Family SYMPETRINAE

4. *Crocothemis servilia servilia* (Drury)

5. *Diplacodes trivialis* (Rambur)

6. *Sympetrum fonscolombi* (Selys)

Sub Family TRITHEMISTINAE

7. *Tritthemis aurora* (Burmeister)

1. *Pseudagrion decorum* (Rambur)

1842. *Agrion decorum* Rambur. *Ins. Neurop.* : 258.

1938. *Pseudagrion decorum*, Fraser, *Fauna Brit. India, Odon.*, 1 : 286-289.

Diagnosis : This species can easily be distinguished from the other species of the genus by the light blue ground colour, thorax pale blue, with three fine black lines on mid-dorsal carinal ridge and a thick black humeral stripe. Superior anal appendages narrowly bifid at the apex. Inferior anal appendages short and half the length of superior.

Material examined and Locality : 1 ♂ : Along Eravikulam river, South of Eravikulam hut, 1993.

Distribution : Throughout continental India, Myanmar, Nepal and Sri Lanka.

Status & Habitat : Most Common species in India, found on permanent and temporary water bodies. Rarely seen near hill streams.

2. *Ischnura aurora aurora* (Brauer)

1858. *Agrion delicatum* Hagen. *Verh. zool-bot. Ges. Wien.* 7 : 479.

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

1949. *Ischnura aurora aurora*. Lifetinek. *Nova Guinea* (New Ser). 5 : 220.

Diagnosis : This species is the smallest in the genus *Ischnura*. Pterostigma kite shaped, rose-

*Western Regional Station Zoological Survey of India, Pune - 411 044.

red for its proximal half but hyaline in distal half. Abdominal segments 8 to 10, azure blue but 10th segment with a broad quadrate black dorsal spot.

Material examined and locality : 1 ♂ : 5 km. South of Eravikulam hut, 1993.

Distribution : Throughout India, Australia, China, Indonesia, Malaysia, Nepal, New Guinea, New Zealand, Papua, Philippines, Pacific Islands and Sri Lanka.

Status and Habitat : It is a most common species and occurs almost throughout year.

3. *Orthetrum sabina sabina* (Drury)

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

1987. *Orthetrum sabina sabina*. Lahiri. Rec. zool. Surv. India. Occ. Pap., No. 99 : 183.

Diagnosis : The extraordinary shape of the abdomen distinguishes it from the rest of the species of the genus.

Material examined and locality : 4 ♂ ♂, 6 ♀ ♀ ; 5 km. South of Eravikulam hut; Sambamalai; Bhimanada & 6 km. South East of Eravikulam hut, 1993; Bhimanada, 1994.

Distribution : Throughout India, Afghanistan, Algeria, Angola, Australia, China, Cyprus, Egypt, Hong Kong, Indonesia, Iran, Iraq, Laos, Malaysia, Micronesia, Myanmar, Most of the African continent, New Guinea, Nepal, Papua, Philippines, Samoa Islands, Singapore, Sri Lanka, Sudan, Thailand, Tunisia, Turkey and Vietnam.

4. *Crocothemis servilia servilia* (Drury)

1770. *Libellula servilia* Drury, III. Ex. Ins., 1 : 112.

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

Diagnosis : In males maximum portion of head, dorsum of thorax, abdomen and appendages are blood red, while in females these portions are yellowish in colour. Bases of all wings are marked with amber yellow.

Material examined and locality : 2 ♀ ♀ Bhimanada, 1994.

Distribution : Throughout India, Bangladesh, China, Indonesia, Iran, Iraq, Japan, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Taiwan and Thailand.

Status and Habitat : This species is one of the most common species in India. Adults are very common both, on permanent and temporary bodies.

5. *Diplacodes trivialis* (Rambur)

1842. *Libellula trivialis* Rambur, Hist. Nat. Ins. Newrop., 115.

1936. *Diplacodes trivialis*. Fraser. Fauna Brit. India. Odon., 3 : 336-338.

Diagnosis : Small sized species, apices of wings hyaline (clear), deep pruinescens in adult stage and appendages creamy-white.

Material examined and locality : 2 ♂ ♂, 2 ♀ ♀ ; Bhimanada, 6 km. South East of Eravikulam hut, 1993; Anamudi, 1994; Meenthotti Gravel Banks, 1995.

Distribution : Throughout India, Australia, China, Fiji, Hong Kong, Indonesia, Iraq, Japan, Laos, Malaysia, Myanmar, Nepal, New Guinea, Pacific Islands, Papua, Philippines, Ryukyu, Seychelles, Sri Lanka, Thailand and Vietnam.

Status and Habitat : It is one of the most common dragonflies found in India. Occurs both at permanent and temporary water bodies. It also wanders far from water and settles at bare spots, foot paths in open spaces. Found most commonly in post monsoon seasons near swampy grasslands.

6. *Sympetrum fonscolombi* (Selys)

1837. *Libellula flaveola* (nom. Preoc.) Fonscolombi. Ann. Soc. Ent. France. 6 : 144.

1936. *Sympetrum Fonscolombi*. Fraser. Fauna Brit. India. Odon., 3 : 377-379.

Diagnosis : Upper surface of femora and tibiae yellow. Base of hind wing with well defined yellow marking. Legs black, with a fine-yellow line on upper surface.

Material examined and locality : 15 ♂ ♂, 2 ♀ ♀ ; 5 km. South of Eravikulam hut, along Eravikulam

river, 1993; Kolukkumalai and Bhimanada 1994; around Eravikulam hut and Turner's Valley, 1995.

Distribution : India (Jammu and Kashmir, Nilgiri Hills and Western Ghats), British Isles across Europe, whole of Africa in temperate areas and middle Asia.

Status and Habitat : It occurs throughout the year but most commonly found during November to March.

7. *Trithemis aurora* (Burmeister)

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

1936. *Trithemis aurora*, Fraser, *Fauna Brit. India. Odon.*, 3 : 383-385.

Diagnosis : Thorax and abdomen violaceous crimson, small reddish-brown spot present at the base of hindwing, neuration of wing crimson.

Material examined and locality : Bhimanada, 1994.

Distribution : Throughout India, China, Hong Kong, Indonesia, Japan, Kampuchea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Taiwan, Thailand, Tibet and Vietnam.

Status and Habitats : One of the most common species and can easily be distinguished by its crimson coloured abdomen. Found near stagnant pools and perched on the twigs of vegetation on the banks.

REFERENCES

- Fraser, F. C. 1933. *Fauna of British India, Odonata*. Publ; Taylor & Francis, London, 1 : 1 + 423.
- Fraser, F. C. 1934. *Fauna of British India, Odonata*. Publ; Taylor & Francis, London, 2 : 1 + 398.
- Fraser, F. C. 1933. *Fauna of British India, Odonata*. Publ; Taylor & Francis, London, 3 : 1 + 461.
- Prasad, M. and Varshney, R. K. 1995. A check list of the Odonata of India, including data on larval studies, *Oriental Ins.* 29 : 385-428.
- Rao, K. R. and Lahiri, A. R. 1983. First records of Odonates (Arthropoda : Insecta) from the Silent Valley and New Amarambalam Reserve Forests. *J. Bombay nat. Hist. Soc.* 79 : 557-562.

INSECTA : ORTHOPTERA

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INTRODUCTION

An inventory of the Orthoptera species collected from Eravikulam National Park is presented here.

There being no earlier record of grasshoppers available from Eravikulam National Park, all the species in the present study are newly recorded from the area. It was observed that the collection contained a good number of nymphs. It was not possible to work them out down to the species level. In such cases genus is recorded. Details of synonyms, diagnostic characters and distribution pertain to that particular genus. In other cases this information relates to the species.

SYSTEMATIC ACCOUNT

- Order ORTHOPTERA
Suborder CAELIFERA
Superfamily ACRIDOIDEA
Family ACRIDIDAE
Subfamily ACRIDINAE
Genus *Zygophlaeoba* Boliver, 1902.
1. *Zygophlaeoba* sp.
Subfamily EYPREPOCNEMIDINAE
Genus *Tylotropidius*
2. *Tylotropidius varicornis* (Walker)
Subfamily OXYINAE
Genus *Oxya* Serville, 1831
3. *Oxya hyla hyla* Seville
Genus *Chitaura* Bolivar, 1918
4. *Chitaura indica* Uvarov

- Subfamily CATANTOPINAE
Genus *Mesambria* Stal
5. *Mesambria* sp.
Subfamily CYRTACANTHACRIDINAE
Genus *Cyrtacanthacris* Walker, 1870
6. *Cyrtacanthacris tatarica* (Linn.)
Superfamily TETRIGOIDEA
Family TETRIGIDAE
Subfamily CLADONOTINAE
Genus *Deltonotus* Hancock, 1904
7. *Deltonotus gibbiceps* (Bolivar)
Suborder ENSIFERA
Superfamily TETTIGONIOIDEA
Family TETTIGONIIDAE
Subfamily MECOPODINAE
8. *Mecopoda elongata* (Linn.)
Subfamily PHANEROPTERINAE
9. *Ducetia japonica* (Thumb)
Genus *Elimaea* Stal
10. *Elimaea* sp.
Subfamily PSEUDOPHYLLINAE
Genus *Phyllozelus* Pictet & Saussure
11. *Phyllozelus* sp.
Subfamily CONOCEPHALINAE
Genus *Conocephalus* Thumberg
12. *Conocephalus* sp.

1. *Zygophlaeoba* sp.

1902. *Zygophlaeoba* Bolivar. *Annls. Soc. ent. Fr.*, **70** : 591.

1914. *Zygophlaeoba* : Kirby, *Fauna Brit. India*, Orthopt. : 105.

Diagnostic characters : Head not ascending; foveolae of vertex visible from above, triangular, extended to the apex of fastigium; tegmina and wings rudimentary.

Material examined and locality : Rajamalai Meenthotti 6.4.1994 Coll. K. C. Gopi Party; Meenthotti, Cruswel Bank, 27.2.95 Coll. R. M. Sharma, 1 ex.

Distribution : The genus is distributed in India region only.

2. *Tylotrypidius varicornis* (Walker)

1870. *Heteracis varicornis* Walker. *Cat. Derm. Sati. Brit. Mus.*, **4** : 667

1914. *Tylotrypidius varicornis* : Kirby, *Fauna British India*, Orthopt. (Acridiidae) : 265.

Diagnostic characters : Prosternal tubercle compressed, truncate, and bifid at apex, tegmina and wings longer than abdomen but shorter than posterior femora; tegmina with a row of triangular whitish spots upon the radial stripe in the costal area; wings bluish hyaline; hind femora thickened at the base, very slender towards the tip; hind tibiae and tarsi dull blue; supra-anal plate of male elongate-triangular sulcated; cerci straight, slightly compressed, acuminate.

Material examined and locality : Kolukkumalai, 24.2.1993, 2 ex; 26.2.1993, 1 ex; Rajamalai, 4.3.1993, 1 ex; All Coll. M. S. Pradhan & party; Rajamalai; Naikollimalai, 4.4.1994, 3 ex; Rajamalai, Meenthotti, 6.4.1994, 3 ex; All Coll. Gopi and party.

Distribution : India (Andhra Pradesh, Goa, Himachal Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu and West Bengal); Myanmar and Sri Lanka.

3. *Oxya hyla hyla* Serville

1831. *Oxya hyla* Serville, *Ann. Sci. nat. (Zool)*, **22** : 287.

1971. *Oxya hyla hyla* : Hollis. *Bull. Br. Mus. nat. Hist. (Ent.)*, **26**(7) : 282.

Diagnostic characters : Anterior margin of tegmina with a dense row of short bristles extended from costal bulge to apex of tegmina; ventral surface of subgenital plate with two longitudinal ridges extending forwards from posterior margin, these ridges often toothed.

Material examined : Meenthotti, Cruswel Bank, 27.2.1995, Coll. R. M. Sharma, 1 ex.

Distribution : Africa, Madagascar, Oriental region of Indo-Burmese border.

4. *Chitaura indica* Uvarov

1929. *Chitaura indica* Uvarov. *Revue suisse Zool.*, **36** : 533.

1975. *Chitaura indica* : Hollis. *Bull. Br. Mus. nat. Hist. (Ent.)* **31**(6) : 205.

Diagnostic characters : Antenna fairly thick, longer than head and pronotum together; face oblique, punctate; fastigium of vertex almost horizontal, from above, rounded triangular, as long as or almost as long as wide; pronotum smooth; prosternal tubercle transverse flatly pressed, at apex enlarged with three very blunt teeth; tegmina reach upto the apex of 1st tergite, front margin rounded, hind margin straight; cerci longer than the supra-anal plate, thick; subgenital plate small, bluntly conical.

Material examined : Shola near forest staff quarters, Rajamalai, 2.3.1995, Coll. R. M. Sharma, 2♂♂.

Distribution : South India (Karnataka and Kerala).

5. *Mesambria* sp.

1878. *Mesambria* Stal. *Bih. Svensk. Akad. Handb.*, **5**(4) : 28. 72.

1914. *Mesambria* : Kirby, *Fauna Brit. India*, Orthopt., 220.

Diagnostic Characters : Fastigium separated from the frontal carina by a distinct ridge or angle; pronotum longer than the head; tegmina reduced to a short narrow strip; hind femora thick, as long as abdomen, hind tibiae without external spine at apex, with 6 to 8 strong spines.

Material examined : Rajamalai 26.2.1995, 2 ex. Anamudi 28.2.1995, 1 ex. coll. R. M. Sharma; Rajamalai Anamudi, 5.4.1994, coll. K. C. Gopi & party, 2 ex.

Distribution : The genus is distributed in India, Sri Lanka, Celebes and Madagascar.

6. *Cyrtacanthaeris tatarica* (Linn.)

1758. *Gryllus Locusta tatarica* : Linnaeus. *Sys. Nat.* (10th ed.). 1 : 432.

1923. *Cyrtacanthaeris tatarica* : Uvarov. *Bull. ent. Res.* 14 : 39.

Diagnostic characters : Body size large; prosternal tubercle strongly curved backwards and almost touching mesosternum; pronotum moderately tectiform, with a broad velvety blackish-brown band on both sides above; costal area of tegmina with coarse net-like reticulation and transverse oblique fasciae; wings lemon-yellowish.

Material examined : Bhimanada, 12.4.1994, Coll. K. C. Gopi & party, 1 ex.

Distribution : India (Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Delhi, Goa, Haryana, Himachal Pradesh, Jammu & Kashmir, Kerala, Madhya Pradesh, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal); Africa (except N. Africa) and Sahara; Bangladesh; Hainan; Indonesia; Madagascar; Myanmar; Nepal; Philippines; Seychelles, Sri Lanka; Sumatra and Thailand.

7. *Deltonotus gibbiceps* (Bolivar)

1902. *Poecilotettis gibbiceps* Bolivar. *Anals. Soc. ent. Fr.* 70 : 580.

1906. *Deltonotus gibbiceps* : Hancoc. *Gen. Ins. Orth. Tetrigidae* : 14.

Diagnostic characters : Antennae filiform; frontal costa forked between the ocelli, the rami strongly divergent; pronotum acutely tectiform, with distinct black spot on each side; tegmina and wings absent.

Material examined : Rajamalai, Meenthotti, 6.4.1994, coll. K. C. Gopi & party, 3 ex.

Distribution : South India (Kerala and Tamil Nadu).

8. *Mecopoda elongata* (Linn.)

1758. *Gryllus (Tettigonia) elongatus* Linn. *Syst. Nat.* (10th ed.) 1 : 429.

1966. *Mecopoda elongata* : Beier. *Orthop. Catalog.* part 9 : 298.

Diagnostic characters : Body very large; colour brown to dry leaf colour; head more or less rounded, antennae slightly margined; prosternum with a pair of long spines; pronotum wide at posterior margin; lateral lobes of pronotum dark-brown at least on upper margin; wings fully developed hind; femora and tibiae very large; male subgenital plate bifurcated, apex pointed and tegmina with 4-6 white spots in the middle.

Material examined : Rajamalai, 24.2.1993 coll. M. S. Pradhan & party, 2 exs.

Distribution : India (Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Himachal Pradesh, Karnataka, Maharashtra, Meghalaya, Orissa, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal); China; Australia; Celebes; Aru-island; Buru-island; Japan; Malacca; Moluccas; New Guinea; Philippines; Sunda-islands; Taiwan and Tonkin.

9. *Ducetia japonica* (Thumb)

1815. *Locusta japonica* Thunberg. *Mem. Acad. Sci. St.-Petersb.* 5 : 282.

1961. *Ducetia japonica* : Range. *Bull. Br. Mus. nat. Hist. (Ent.)* 10(5) : 182.

Diagnostic characters : Radius of tegmina with 4-6 closely parallel branches; hind wings well developed; cerci with internoventral ridge at apex; subgenital plate deeply bifurcate with continuous lobes.

Material examined : Rajamalai, 24.2.1993, coll. M. S. Pradhan & party.

Distribution : This species is found throughout Indonesia, extending eastwards to the Solomon Islands and southwards to northern Australia (Ragge). In India, it is recorded from Andaman & Nicobar Islands, Arunachal Pradesh, Assam.

Bihar, Jammu & Kashmir, Kerala, Madhya Pradesh, Meghalaya, Mizoram, Tamil Nadu and West Bengal.

10. *Elimaea* sp.

1874. *Elimaea* Stal. *Rec. Orth.* 2 : 1. 27.

1923. *Elimaea* : Karny. *Journ. Malayan Branch. R. Asiat. Soc.*, 1 : 134.

Diagnostic characters : Head short and rounded; prosternum lacks spine; auditory organs usually covered; scrobes weakly margined; wings extend beyond tegmina; anterior tibiae flattened dorsally; anterior femora curved; tibial tympanum covered by a conchate fold of integument on both sides; 1st and 2nd tarsal segments not laterally grooved.

Material examined : Rajamalai, 6.4.1994, coll. R. M. Sharma, 1 ex.

Distribution : The genus is distributed from India to Sunda Islands and Philippines.

11. *Phyllozelus* sp.

1892. *Phyllozelus* Pictet & Saussure, *Icon. Saut. Vertes* : 11.

1962. *Phyllozelus* : Beier. *Das Tierreich.* 73 : 100-101.

Diagnostic characters : Medium sized, generally dark-brown; head short and rounded; scrobes strongly raised margins; prosternum with two long spines; pronotum arched and generally granulated hind margin rounded; Tegmina acuminate anal field with parallel transverse veins; wings well developed; front femora dorsally keeled, ventral inner margin spined; hind femora ventrally strongly spined on both sides.

Material examined : Anamudi, 28.2.1995, coll. R. M. Sharma, 1 ex.

Distribution : The genus is distributed in South-Asia, Malay Archipelago and Sri Lanka.

12. *Conocephalus* sp.

1815. *Conocephalus* Thunberg. *Mem. Acad. Sci. St. Petersb.*, 5 : 214.

1980. *Conocephalus* : Pitkin. *Bull. Br. Mus. nat. Hist. (Ent.)*, 41(5) : 315. 321.

Diagnostic characters : Small to medium sized; head cone-shaped; antennae inserted between the eyes; scrobes weakly margined; pronotum not produced backwards to cover stridulatory file; prosternum bispinose; tegmina long and narrow; wings fully developed; anterior tibiae lack terminal dorsal spines; hind tibiae with one or two dorsal spines; male cerci with one internal spine.

Material examined : Rajamalai, Naikollimalai 4.4.1994, coll. K. C. Gopi & party, 3 exs; Anamudi 28.2.1995, 1 ex. and Rajamalai, Naikollimalai, 1.3.1995, coll. R. M. Sharma, 1 ex.

Distribution : The genus is world wide in distribution between approximately 60°N and 45°S.

SUMMARY

Collection of Orthoptera from Eravikulam National Park, when worked out taxonomically could be distinctly identified belonging to 7 species. In addition, identification up to generic level was possible in 5 cases. Collection data for all the specimens examined is provided.

REFERENCES

- Beier, M. 1962 Orthoptera Tettigoniidae (Pseudophyllinae). *Das Tierreich*, 73 : x 1 + 468 pp.
- Hancock, J. L. 1906 Orthoptera, Fam. Acrididae, Subfam. Tetriginae. *Genera Insectorum* Brussels, fasc. 48 : 1-19.
- Hollis, D. 1971. A preliminary revision of the genus *Oxya* Audinet - Serville (Orthoptera : Acridoidea). *Bull. Br. Mus. nat. Hist. (Ent.)*, 269 : 343.

- Hollis, D. 1975 A review of the subfamily Oxyinae (Orthoptera : Acridoidea). *Bull. Br. Mus. nat. Hist. (Ent.)*, **31**(6) : 191 234.
- Karny, H. H. on Malayan Katydid (Gryllacrididae and Tettigoniidae) from the Raffles. Museum, Singapore. *Journ. Malay Branch R. Asiat. Soc.* **1** : 116 193.
- Kirby, W. F. 1914. *The fauna of British India, including Ceylon and Burma*, Orthoptera (Acrididae), Taylor & Francis Co. London 1 x + 276 pp.
- Pitkin, L. M. 1980. a revision of the Pacific species of *conocephalus* Thunberg (Orthoptera : Tettigoniidae). *Bull. Br. Mus. nat. (Ent.)*, **41**(5) : 315 355.
- Uvarov, B. P. 1923. Notes on Locusts of economic importance with some new data on the periodicity of locusts invasion, *Bull. ent. Res. London*, **14** : 31 39.

INSECTA : HEMIPTERA (Aquatic and Semiaquatic)

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INTRODUCTION

Notwithstanding 35 genera and 58 species of aquatic and semi-aquatic Hemiptera known from the state of Kerala, information available on the group are from north of Palghat gap (Thirumalai 1986; Thirumalai and Radhakrishnan, 1998). The present study is based on a small collection from various aquatic habitats of Eravikulam National Park, which is situated in Iddukki district, south of Palghat Gap. Under each species the citation for the original description and other accompanying work necessary to understand the species and their occurrence are given.

SYSTEMATIC ACCOUNT

- Order HEMIPTERA
Suborder HETEROPTERA
Infraorder GERROMORPHA
Superfamily GERROIDEA
Family GERRIDAE
Division GERRIFORMES
Subfamily GERRINAE
Tribe GERRINI
1. *Aquarius adelaidis* (Dohrn)
Subfamily EOTRECHINAE
2. *Onychotrechus rhexenor* Kirkaldy
3. *Onychotrechus spinifer* Andersen
Subfamily HALOBATINAE
Division HALOBATIFORMES
Tribe HALOBATINI
4. *Metrocoris communoides* Chen and Nieser

5. *Metrocoris indicus* Chen and Nieser
6. *Metrocoris* sp.

- Infraorder NEPOMORPHA
Superfamily NOTONECTOIDEA
Family NOTONECTIDAE
Subfamily NOTONECTINAE
Tribe NOTONECTINI

7. *Enithares triangularis* (Guerin-Meneville)

1. *Aquarius adelaidis* (Dohrn)

1860. *Gerris adelaidis* Dohrn. Stettin. ent. Zig, 21 : 408.
1896. *G. spinloae* Lethierry & Severin. Cat. Gen. Hempl., 3 : 63.
1990. *Aquaris adelaidis* (Dohrn) : Anderson. Steenstrupla. 16 : 61.
1994. *A. adelaidis* (Dohrn) : Thirumalai. Rec. zool. Surv India, Occ. Pap. No. 165 : 36.

Diagnosis : The first antennal segment is the longest. The head, rostrum, pronotum and forelegs are black, while the hind margin of pronotum brownish yellow and forewings brown. A very prominent large triangular tubercle on ventral surface of male 8 the abdominal segment separates this from all known Indian species.

Material examined : Locality : Kolukkumalai (alt. 2167 m), Winged 1 female, 10.iv.1994, K. C. Gopi.

Distribution : India (Andhra Pradesh, Karnataka, Kerala, Maharashtra, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal); Bangladesh; China; Indonesia; Malaysia; Myanmar; Nepal; Philippines; Sri Lanka; Thailand; Vietnam.

Habitat : A very common species found in lentic habitat and often recorded from permanent water bodies in India.

Remarks : This species has a tropical distribution, confined to South and Southeast Asia. Micropterous, brachypterous and macropterous forms are common. Out of 15 species so far known, two species are from India.

2. *Onychotrechus rhexenor* Kirkaldy

1903. *Onychotrechus rhexenor* Kirkaldy, Entomologist, 36 : 44.
 1903. *O. rhexenor* Kirk : distant. Fauna British India, 2 : 183.
 1980. *O. rhexenor* Kirk : Anderson, Steenstrupis, 6 : 128.
 1989. *O. rhexenor* Kirk : Thirumalai, Rec. zool. Surv. India, Occ. Pap. No. 118 : 44.

Diagnosis : Darker in colour; short brown sublateral stripes on mesonotum in wingless forms; male front femur tapering towards apex, elongate patch of dark spinules on inner surface.

Material examined : Locality : Turner's Valley (alt. 600 m), winged 1 male, 1 female, 11.iv.1994, K. C. Gopi; Anamudi (alt. 2617 m), winged 2 females, 5.iv.1994, K. C. Gopi; Rajamalai (alt. 2134 m), winged 1 male, 26.ii.1995, R. M. sharma; winged 4 females, 28.ii.1995, R. M. Sharma.

Distribution : India (Karnataka, Kerala, Maharashtra, Rajasthan, Tamil Nadu); Africa.

Habitat : *O. rhexenor* lives on inclined rock faces close to mountain streams, rock splashed by waterfalls and similar habitats.

Remarks : This species is the most common member of the genus found in Western Ghats between 900 to 1400 Mts. above the sea level. In the present study, it has been recorded at an altitude of 2617 m.

3. *Onychotrechus spinifer* Anderson

1980. *Onychotrechus spinifer* Anderson, Steenstrupia, 6 : 138.

Diagnosis : Yellowish brown in colour; male front femur distinctly armed with a black spine on

ventral margin before apex; female with irregular pale stripes on mesonotum reaching its hind margin.

Materials examined : Locality : Turner's Valley (alt. 600 m); winged 1 male, 11.iv.1994; K. C. Gopi.

Distribution : India (Karnataka, Kerala, Maharashtra).

Habitat : Moss covered damp cavities of rocks along mountain streams.

Remarks : Predominantly found in Western Ghats, not capable of climbing on wet rocks.

4. *Metrocoris communoides* Chen and Nieser

1993. *Metrocoris communoides* Chen and Nieser, Steenstrupia, 19 : 51.

Diagnosis : Smaller species (less than 5.0 mm); outer margin of male fore femur straight parameres not prominently curved, apex rounded.

Material examined : Locality : Rajamalai (alt. 2134 m); Apterous 1 male and 9 females, 3.iv.1994 & 4.iv.1994, K. C. Gopi; Turner's Valley (alt. 600 m); Apterous 3 male, 9 females and 3 immature stages, 11.iv.1994, K. C. Gopi; Kolukkumalai (alt. 2115 m), Apterous 1 female, 10.iv.1994, K. C. Gopi; Anamudi (alt. 2617 m), Apterous 3 females and 1 nymph, 5.iv.1994, K. C. Gopi.

Distribution : India (Kerala and Tamil Nadu).

Habitat : Prefers head water streams and streamlets of uplands.

Remarks : Recorded for the first time from Western Ghats.

5. *Metrocoris indicus* Chen and Nieser

1993. *Metrocoris indicus* Chen and Nieser, Steenstrupia, 19 : 48.
 1965. *Metrocoris stali* (Dohrn) : Den Boer, Zool. Verh., 74 : 8
 1989. *M. stali* (Dohrn) : Thirumalai, Rec. zool. Surv. India, Occ. Pap. No. 118 : 46.
 1994. *M. stali* (Dohrn) : Thirumalai, Rec. zool. Surv. India, Occ. Pap.No. 165 : 37.

Diagnosis : Dark with yellow markings; size more 5.5 to 6.5 mm; fore femur incrassate in male, slender in female; paramere with apex bifid; female posterior 7th abdominal segment is produced into a broad lobe.

Material examined : Locality : Meenthotti (alt. 1820 m), winged 1 male, 1 female, apterous 3 females and 3 immature stages, 6.iv.1994, K. C. Gopi; Bhimanada (alt. 1820 m), 2 males, 3 females and 5 immature stages, 12.iv.1994, K. C. Gopi; Rajamalai (alt. 2134 m), 2 males, 1 female and 7 immature stages, 26.ii.1995, R. M. Sharma; Bhimanada (alt. 1820 m), apterous 1 male, 6.iii.1995, R. M. Sharma.

Distribution : India (Kerala and Tamil Nadu).

Habitat : Lentic and lotic.

Remarks : A common species known from Southern India and known to occur in upland upto an altitude of 2400 meters. Specimens earlier identified from Southern India as *Metrocoris stali* (Dohrn) belong to *M. indicus* (Chen & Nieser, 1993). Most common genus of Gerrid occurring in mountain and high altitude habitats.

6. *Metrocoris* sp.

Confirmation of this species was not possible due to want of adult specimen.

Material examined : Locality : Naikollimalai (alt. 2332m), 6 immature stages, 4.iv.1994, K. C. Gopi; Eravikulam river (alt. 1980m), 12 immature stages, 4.iii.1995; Turner's Valley (alt. 600m), 11

immature stages, 5.iii.1995; Eravikulam malai (alt. 2362m), 6 immature stages, 7.iii.1995, R. M. Sharma.

7. *Enithares triangularis* (Guerin-Meneville)

1844. *Notonecta triangularis* Guerin-Meneville. I. Con. Reg. Anim., 354.

1906. *Enithares triangularis* (G-M) : Distant. Fauna British India, 3 : 44.

1968. *E. triangularis* (G-M) : Lansbury. Pacl. Insecta. 10 : 369.

1995. *E. triangularis* (G-M) : Thirumalai, Rec. zool. Surv. India, Occ. Pap. No. 165 : 13.

Diagnosis : Size 13 to 15 mm; the median length of metaxyphus 2 times longer than its basal width.

Materials examined : Locality : Anamudi (2617 m), 1 female, 28.ii.1995, R. M. Sharma.

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

Habitat : Lentic waters.

Remarks : In Southern India, this species is confined to Western Ghats. Members of this genus are not known from plains.

DISCUSSION

The present faunal study though based on a very small collection from Eravikulam National Park may serve as base line data for comparison with other habitats. Many species of aquatic bugs are predators. They are also preyed upon by fishes, amphibians, water snakes and birds.

REFERENCES

- Andersen, N. M. 1980. Hygropterid water striders of the genus *Onychotrechus* Kirkaldy with description of a related genus (Insecta : Hemiptera : Gerridae). *Steenstrupia* 6(10) : 113-146.
- Andersen, N. M. 1990. Phylogeny and taxonomy of water striders, genus *Aquarius* Schellenberg (Insecta, Hemiptera, Gerridae) with a new species from Australia. *Steenstrupia*, 16(4) : 37-81.
- Chen, P. P. and N. Nieser, 1993. A taxonomic revision of the Oriental water strider genus *Metrocoris* Mayr (Hemiptera, Gerridae) I & II. *Steenstrupia*, 19(1) : 1-43 & (2) : 45-82.
- Den Boer, M. H. 1965. Revisionary notes on the genus *Metrocoris* Mayr (Heteroptera, Gerridae), with descriptions of four new species. *Zool. Verh.*, 74 : 1-38.

- Distant, W. L. 1903. The fauna of British India including Ceylon and Burma. *Rhynchota*. **2** : 167
191.
- Dohrn, A. 1860. Zur Heteroptern-Fauna Ceylon's Stett. *Ent. Zeit.*, **21** : 399 409.
- Kirkaldy, G. W. 1903. Miscellanea Rhynchotalia No. 6. *Entomologist*, **36** : 44 45.
- Leitherry, J. and G. Severin. 1896. *Catalogue General des Hemipteres*, **3** : 275 pp.
- Thirumalai, G. 1986. On Gerridae and Notonectidae (Heteroptera : Hemiptera : Insecta) from Silent Valley, Kerala. *Rec. zool. Surv. India*, **84**(1-4) : 9 33.
- Thirumalai, G. 1989. Aquatic and semi-aquatic Hemiptera (Insecta) from Javadi Hills, Tamil Nadu, *Rec. zool. Surv. India, Occ. Pap. No.*, **118** : 1 63.
- Thirumalai, G. 1994. Aquatic and semi-aquatic Hemiptera (Insecta) of Tamil Nadu. I. Dharampuri and Pudukkottai districts. *Rec. zool. Surv. India, Occ. Pap. No.*, **165** : 1 45.
- Thirumalai, G. and C. Radhakrishnan. 1998. Aquatic Hemiptera (Insecta) of Kasaragod District, Kerala State. *Rec. zool. Surv. India*, **97** : 1 18.

INSECTA : HYMENOPTERA : CHALCIDOIDEA

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INTRODUCTION

The superfamily Chalcidoidea commonly called 'Chalcids' is one of the 10 superfamilies of parasitic hymenoptera. Most members of the group are parasitic on major insect orders like Diptera, Lepidoptera, Coleoptera, Orthoptera and Hemiptera. Phytophagous species like gall causers, seed eaters and true plant pollinators (Fig wasps) are also known in the family. Being the natural enemies of several economically important insect pests. Chalcids play a prominent role in biological control of pests in nature. Chalcids are worldwide in distribution and according to the most recent classification the superfamily is divided into 21 families and nearly 19,000 described species under 2000 genera (Noyes, 1990). The Chalcidoid fauna of India is very rich but the taxonomy of this group is still in infancy except for some families like Chalcididae, Encyrtidae and Eurytomidae. Though the group is fairly well known from Kerala, they are very poorly collected from places of higher elevations. Among the workers who reported few species of Chalcids from the high ranges of Kerala, the names of Mani (1989), Noyes & Hayat (1994) and Narendran (1989, 1994) are worth mentioning. The Chalcid fauna of Eravikulam National Park is practically unknown and the present account forms the first report of the group from the area.

The paper lists a total of 29 species of Chalcidoidea (Hymenoptera : Insecta) belonging to 20 genera and 6 families. Three species belonging to the family Pteromalidae described

here are new to science. The new taxa are *Stictomischus turnei* sp. nov., *Systasis nigra* sp. nov., and *Trichomalus keralensis* sp. nov.

All the material studied are deposited in the faunal holdings of Western Ghats Field Research Station, Zoological Survey of India, Calicut.

ABBREVIATIONS

POL	Posterior ocellar distance
OOL	Ocell-ocular distance
F1-F6	Antennal funicular segments First to Sixth
Smv	Sub marginal vein
MV	Marginal Vein
Pmv	Post marginal vein
Stv	Stigmal vein
T1-T6	Gastral tergites one to sixth

SYSTEMATIC ACCOUNT

Order	HYMENOPTERA
Superfamily	CHALCIDOIDEA
Family	CHALCIDIDAE

1. *Brachymeria euploae* (Westwood, 1837)

1837. *Chalcis euploae* Westwood, *Trans. Ent. Soc. London*, 2 : 6, F. India.

1982. *Brachymeria (B) flavotibialis* Husain & Agarwal, *Oriental Ins.* 16 : 505. F. India, Pilibhit. Narendran, 1989 : 251, new synonymy.

Material examined : 1 Female, 1 Male. Rajamalai, 24.ii.1993. coll. M. S. Pradhan & party.

Distribution : India (Kerala, West Bengal, U.P., Tamil Nadu); N. Borneo; Sumatra; Java and Philippines.

Remarks : Fairly common species attacking various Lepidoptera and Diptera.

2. *Hockeria atra* Masi, 1929.

1929. *Hockeria atra* Masi. *Boll. Lab. Ent. Bologna*. 2 : 180. F. India. Orissa.

1982. *Hockeria vulgaris* Husain & Agarwal, *Oriental Ins.* 16 : 321. F. India : Aligarh. Narendran 1989 : 106. new synonymy.

1984. *Hockeria dehradunensis* Roy & Farooqi, *Mem. ent. soc. India* : 10 : 34, F. India : Dehra Dun, Narendran, 1989 : 106. new synonymy.

Material examined : 1 Female, Kolukumalai, 4.iii.1993, coll. P. M. Sureshan.

Distribution : India (Kerala, Orissa, U.P.); Philippines, Java.

Remarks : An uncommon species parasitising Lepidoptera.

Family EURYTOMIDAE

3. *Prodecatoma cheriani* Narendran, 1994

1994. *Prodecatoma cheriani* Narendran, *Zool. Monograph. Dept. zool. Calicut* : India : Kerala.

Material examined : 3 Females, 1 Male, Rajamalai, 26.ii.95. coll. C. Radhakrishnan & party.

Distribution : India (Kerala); Taiwan.

Remarks : This is an uncommon species known only from Taiwan and India. This forms the first record of it from High ranges of Kerala.

4. *Eurytoma dentata* Mayr, 1878.

1878. *Eurytoma dentata* Mayr. *Verh. zool. bot. Ges. wein.* 28 : 308. F. Europe.

1910. *Eurytoma nesiotis* Crawford, *Proc. U.S. natn. mus.* 38 : 129. F. Philippines, Narendran : 229. new synonymy.

1919. *Eurytoma denticoxa* Gahan, *Proc. U.S. Natn. Mus.* 56 : 515. F. India, Coimbatore, Narendran, 1994 : 229, new synonymy.

1919. *Eurytoma dentipectus* Gahan, *Proc. U.S. Natn. Mus.* 56 : 515. M. F. India, Coimbatore, Narendran, 1994 : 229, synonymy.

Material examined : 1 Female, Rajamalai, 26.ii.95; coll. C. Radhakrishnan & party.

Distribution : India (Kerala); Asia, Europe.

Remarks : An uncommon species parasitic on *Asphondylia sesami* (Cecidomyiidae) from Gingly galls and maize seeds.

5. *Eurytoma agalica* Narendran, 1994.

1994. *Eurytoma agalica* Narendran, *Zool. monograph. Dept. Zool. Calicut* : 239. F. India, Kerala.

Material examined : 1 Female, Bhimnada, 1.iii.93, 1 female, Turner's hill, 2.iii.93. Coll. P. M. Sureshan.

Distribution : India (Kerala, Tamil Nadu).

Remarks : Rare species known only from Kerala and Tamil Nadu.

6. *Eurytoma punctigastra* Narendran, 1994.

1994. *Eurytoma punctigastra* Narendran, *Zool. monograph. Dept. Zool. Calicut* : 230. F. India : Kerala.

Material examined : 1 female, Turner's hill, 2.iii.93. coll. M. S. Pradhan & party.

Distribution : India (Kerala).

Remarks : Rare species endemic to Kerala.

7. *Eurytoma rajeevi* Narendran, 1994.

1994. *Eurytoma rajeevi* Narendran, *Zool. monograph. Dept. Zool. Calicut* : 240. F. India : Kerala.

Material examined : 2 females, Bhimnada, 1.iii.93; 1 female, Kolukumalai, 4.iii.93, coll. M. S. Pradhan & party.

Remarks : This is a fairly common species hyper-parasitic on Lepidoptera through *Apanteles*, *Microgaster* and *S. micevillei*.

8. *Eurytoma robusta* Mayr, 1878.

1878. *Eurytoma robusta* Mayr, *Verh. zool. bot. Ges. Wien.* 28 : 309.

Material examined : 2 females, 2 males, Rajamalai, 2.iv.1994 & 3.iv.1994. coll. R. M. Sharma. Swept over Eupatorium plants heavily infested with galls caused by fruitflies (Tephritidae).

Distribution : India (Kerala, H.P.).

Remarks : This is a rare species Parasitising many species of fruitflies found in galls and heads of plants. This forms the first record of it from Kerala.

Family TORYMIDAE

9. *Torymoides kiesenweteri* (Mayr), 1874.

1874. *Holaspis kiesenweteri* Mayr, *Verh. zool. bot. Ges. wien.* **24** : 83. S. Europe.

1916. *Dimeromicrus longicauda* Masi, *Annal. de mus. civ. stor. Nat. Gen.* **47** : 67 68.

Material examined : 12 females, 2 males Rajamalai, 24.ii.93, 3.iv.94 and 26.ii.95. coll. M. S. Pradhan & party, P. M. Sureshan and R. M. Sharma; 9 females, Turner's hill, 2.iii.93. coll. P. M. Sureshan; 4 females, Bhimnada, 1.iii.93; coll. M. S. Pradhan & party; 2 females, Sambamalai, 28.ii.93, coll. P. M. Sureshan; 41 females, 23 males, Rajamalai, 26.ii.95, coll. R. M. Sharma.

Distribution : India (Kerala); Europe.

Remarks : A common parasite of fruitflies (Tephritidae) forming galls. Specimens were reared from stemgalls on Eupatorium plant caused by *Procecidocharis utilis* Stone (Tephritidae : Diptera). The other recorded host from India is *Acanthophilus helianthi* (Tephritidae : Diptera).

Family ENCYRTIDAE

10. *Echthrogonatopus nigricornis* (Hayat) 1980.

1980. *Metapterencyrtus nigricornis* Hayat, *J. Nat. Hist.:* **14** : 644 F. India : Aligarh.

Material examined : 2 females, Turner's hill, 27.ii.93. coll. P. M. Sureshan.

Distribution : India (Aligarh, Kerala).

Remarks : This forms the first record of the species from Kerala.

11. *Copidosoma clavatum* Myartseva, 1982.

1982. *Copidosoma clavatum* Myartseva, *Ser. Biol. Nauk.* **1** : 26. F. Turkmenia.

Material examined : 1 female, Bhimnada, 1.iii.93, coll. M. S. Pradhan & party.

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

Remarks : The species is also distributed in palaeartic region.

12. *Copidosoma lacidum* Kazmi & Hayat, 1998.

1998. *Copidosoma lacidum* Kazmi & Hayat, *Oriental Ins.* **32** : 310, F. Tamil Nadu (India).

Material examined : 1 female, Sambamalai, 28.ii.93. coll. P. M. Sureshan.

Distribution : India (Karnataka, Tamil Nadu, Kerala).

Remarks : A rare species having limited distribution in India originally described in 1998.

13. *Copidosoma remotum* Sharkov, 1988.

1988. *Copidosoma remotum* Sharkov, *Ent. obozr.* **67** : 840. F. Russia.

Material examined : 1 female, Bhimnada, 1.iii.1993, coll. M. S. Pradhan & party.

Distribution : India (Kerala).

Remarks : The species is reported for the first time from India (Kazmi & Hayat, 1998) based on the single specimen collected from the Eravikulam National Park.

14. *Copidosoma notatum* Kazmi & Hayat, 1998.

1998. *Copidosoma notatum* Kazmi & Hayat, *Oriental Ins.* **32** : 315, F. Tamil Nadu (India).

Material examined : 2 females, Turner's valley, 24.ii.93, coll. M. S. Pradhan & party.

Distribution : India (Kerala, Tamil Nadu).

Remarks : It is a rare species endemic to South India, originally described from Ootacamund (Tamil Nadu).

Family APHELINIDAE

15. *Aphelinus humilis* Mercet, 1928.

1928. *Aphelinus humilis*, Mercet, *Boln. R. Soc. Espanola Hist. Nat.* **28** : 240. F. Spain : Cercedilla.

Material examined : 1 female, Turner's valley, 27.ii.93. coll. P. M. Sureshan.

Distribution : India (U.P., West Bengal, Kerala).

Remarks : This forms the first record of the species from Kerala.

Family PTEROMALIDAE

16. *Propicroscytus mirificus* (Girault), 1915.

1915. *Arthrolysis mirificus* Girault, *Mem. Od. Mus.* **4** : 1915 : 191. Australia : Queensland.

Material examined : 1 female, Turner's hill, 2.iii.93, coll. P. M. Sureshan.

Distribution : India, Sri Lanka, Australia, South China, East Malaysia.

Remarks : A very common species, parasitising gall midges (Diptera) in rice and stems of other grasses.

17. *Trichomalopsis apanteloctena* (Crawford), 1911.

1911. *Trichomalopsis apanteloctena* Crawford, *Proc. U.S. Natn. Mus.* **39** : 618, M. F., Japan : Konosu.

1919. *Eupteromalus parnarae* Gahan, *Proc. U.S. Natn. Mus.* **56** : 522. F. India, Karvetnagar.

Material examined : 1 female, Eravikulam, 25.ii.95, 1 female, Meenthotti, 27.ii.95. coll. C. Radhakrishnan & party.

Distribution : India (Kerala, Karnataka, Tamil Nadu); Bangladesh, Korea, Malaysia, China, Japan, Taiwan, Philippines and Formosa.

Remarks : This is a rather common species mainly parasitising rice paddy pests belonging to the order Lepidoptera.

18. *Dinarmus maculatus* (Masi), 1924.

1924. *Sphaerakis maculatus* Masi, *Ann. Mus. Civ. Stor. Nat. Giacomo Doria*, **51** : 157. Burma.

Material examined : 1 female, Rajamalai, 26.ii.95, coll. C. Radhakrishnan & party.

Distribution : India (Kerala, West Bengal); Burma.

Remarks : An uncommon species parasitising Bruchids (Coleoptera).

19. *Dinarmus acutus* (Thomson), 1878.

1878. *Dinarmus (Dinarmus) acutus* Thomson, *Hym. Scand.* **5** : 56, F. Boheman.

Material examined : 1 female, Kolukumalai, 4.iii.93. coll. M. S. Pradhan & party.

Distribution : India (Kerala), Europe, N. America.

Remarks : A common species parasitising various bruchid beetles (Coleoptera).

20. *Pteromalus semotus* (Walker) 1834.

1834. *Eutelus semotus* Walker, *Ent. mag.* **2** : 367. F.

Material examined : 3 females, Bhimnada, 1.iii.93, 2 females, Sambamalai, 28.ii.93; coll. P. M. Sureshan; 2 females, Rajamalai 26.iii.95, coll. C. Radhakrishnan & party; 1 female, Kolukumalai, 4.iii.93; 4 females, Turner's hill, 2.iii.93. coll. M. S. Pradhan & party.

Distribution : India (Kerala, Delhi, Punjab), Europe.

Remarks : A widely distributed species parasitise various lepidoptera in pods of leguminous plants. This forms the first record of it from Kerala.

21. *Pteromalus puparum* (Linnaeus), 1758.

1758. *Ichneumon puparum* Linnaeus, *Syst. Nat.* **1** : 567. M. F. London.

Material examined : 1 female, Eravikulam, 25.ii.95, coll. C. Radhakrishnan & party.

Distribution : Cosmopolitan.

Remarks : A common species parasitising pupae of various butterflies.

22. *Mokrzeckia menzeli* Subba Rao, 1981.

1973. *Mokrzeckia indica* Subba Rao, *Oriental Ins.* 7 : 358, ex parte.

1981. *Mokrzeckia menzeli* Subba Rao, *Proc. Indian Acad. Sci. (As)* 90 : 479. M. F. India (Dehra Dun).

Material examined : 2 females, Sambamalai, 28.ii.93. & 4.iii.93, coll. P. M. Sureshan; 1 female; Rajamalai, 26.ii.95, coll. C. Radhakrishnan & party.

Distribution : India (Kerala, U.P.).

Remarks : Uncommon species endemic to India. Hyperparasitic on *Hyblaea purea* through *Apanteles melevolus* Wilkinson and on *Hapalia machaeralis* Walker through *Miocolus dubius* Oll. This forms the first record of the species from South India.

23. *Sphigigaster anamudiensis*

Sureshan & Narendran, 1997. (Figs. 1-5)

1997. *Sphigigaster anamudiensis* Sureshan & Narendran, *Entomon* 22(3&4) : 194. F. India, Kerala.

Material examined : 1 female, Anamudi, 28.ii.95. coll. C. Radhakrishnan & party (Holotype).

Distribution : India (Kerala).

Remarks : This is a species endemic to Eravikulam National Park, newly described by Sureshan & Narendran. It closely resembles *S. brunneicornis* Ferriere but differ from it in having a longer gaster, forewing with Pmv much shorter than Mv, shorter Stv and in colouration.

24. *Cyrtogaster clavicornis* Walker, 1833.
(Figs. 6-8).

1833. *Cyrtogaster clavicornis* Walker, *Entomol. mag.* 1 : 383 : F.

Material examined : 2 females, Eravikulam, 25.ii.95. coll. P. M. Sureshan; 2 males, Bhimnada, 1.iii.93. coll. P. M. Sureshan.

Distribution : India (Kerala : ENP); Europe; North America.

Remarks : This species is a parasite of puparia of various dipterous leaf minnes and stem borers. It is widely distributed in the colder areas of Europe and North America. The biology of this species is interesting because of the strong aquatic associations of its known hosts. The present collection forms the first record of the species from the Oriental Region and the further extension of the distributional range outside palearctic and nearctic regions.

25. *Syntomopus rajamalaiensis*

Sureshan & Narendran 1999 (Fig. 22-26)

1999. *Syntomopus rajamalaiensis* Sureshan & Narendran, *Rec. zool. surv. India* 97(4) : 83-89

Material examined : 1 female, Rajamalai, 5.iv.94, coll. K. C. Gopi & party.

Distribution : India (Kerala).

Remarks : This species is endemic to Eravikulam National Park.

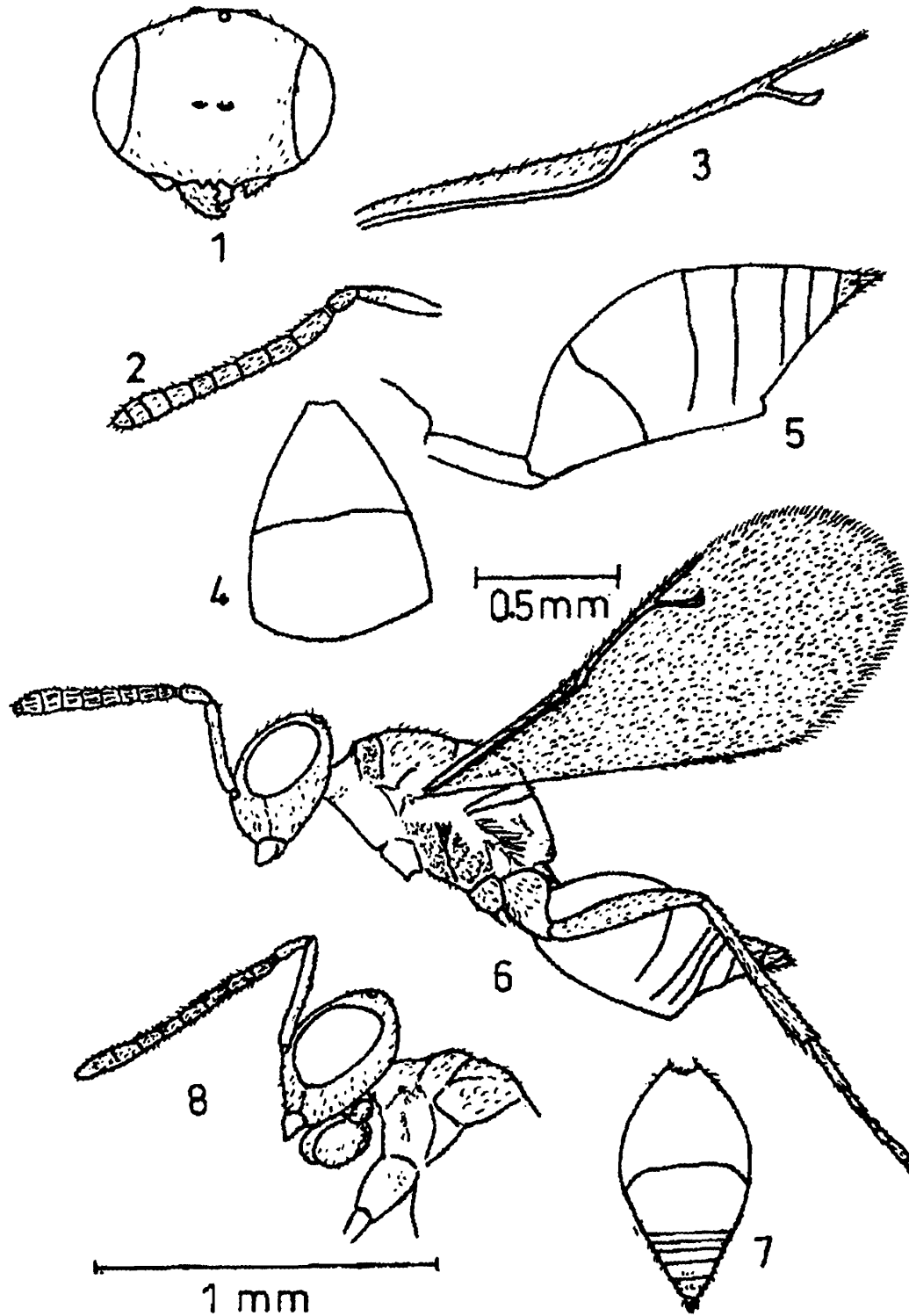
26. *Storeya minuta* Sureshan 1999
(Figs. 12-14)

1999. *Storeya minuta* Sureshan, *ZOOSPRINT* 1-XIV (3-12) : 157-158

Material examined : 1 male, Sambamalai, 28.ii.1993. coll. P. M. Sureshan.

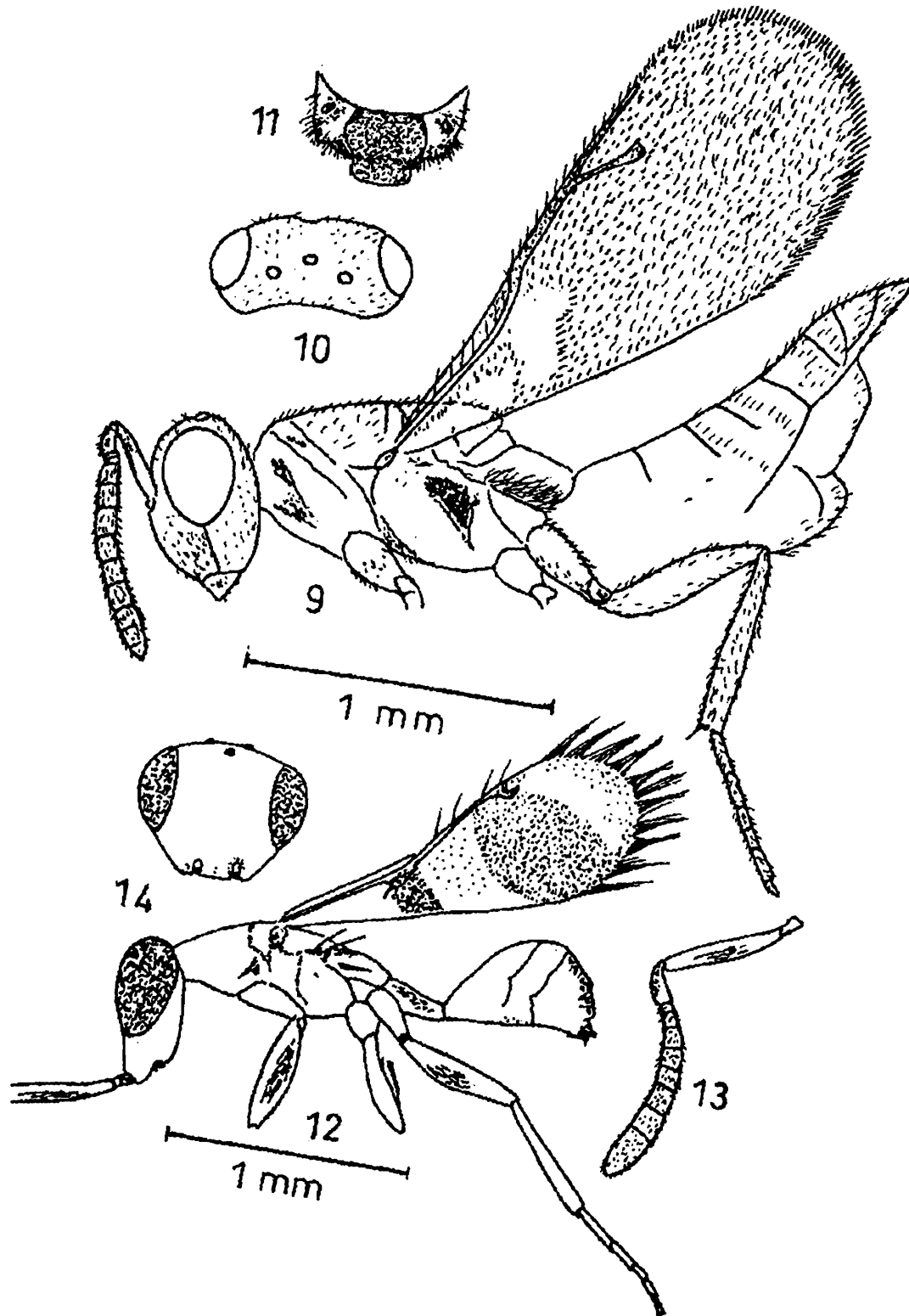
Distribution : India (Kerala).

Remarks : This forms the first record of the subfamily Storeyinae (Pteromalidae) from India. This species closely resembles *S. paradoxa* Boucek, the only known species under the subfamily in general morphology but differs in having antenna with first funicular segment very short, broader fore wing, length 2.4x width with a tuft of narrower scales at parastigma and in general colouration of the body including gaster dark brown and body without violet hue. (in *S.*



Figs. 1-5. *Sphegigaster anamudiensis* Sureshan & Narendran. Female : 1. Head in front view; 2. Antenna; 3. Forewing venation; 4. Gaster in dorsal view T1 and T2; 5. Gaster with petiole in profile.

Figs. 6-8. *Cyrtogaster clavicornis* Walker. Female. 6. Body in profile; 7. Gaster in dorsal view; 8. Male head and part of thorax in profile.



Figs. 9-11. *Trichomalus keralensis* sp. nov. Female. 9. Body in profile; 10. Head in dorsal view; 11. Propodeum in dorsal view.

Figs. 12-14. *Storeya minuta* Sureshan. Male. 12. Body in profile; 13. antenna; 14. Head in front view.

paradoxa first funicular segment is not distinctly shorter than others; forewing more narrow, length 2.8x width with a tuft of broad scales at parastigma. In addition, its body is pale honey yellow, with faint violet hue in places and gaster dark green to cupreous.

27. *Stictomischus turneri* sp. nov.

(Figs. 15-17)

Holotype Female : Length 2.5 mm. Body bright metallic blue with golden reflection on face, vertex and dorsal part of thorax; gaster brownish on sides and ventral part; eyes chocolate brown; antennae dark brown with basal part of scape paler; coxae concolorous with thorax, remainder of legs testaceous with tips of tarsi brown; tegulae brown; wing membrane hyaline; veins and pubescence brown.

Head : (Figs. 15, 16) Moderately reticulate, finer on vertex and lower face; pubescence small and sparse on lower face; vertex with long brown bristles; clypeus almost smooth with two sharp teeth. Relative measurements : head in dorsal view length : Width 26 : 11.5; in front view width; height 26 : 19.5; temple length 0.4x eye length (2.8 : 7.5); POL : OOL = 5 : 4; malar distance 0.5x eye height; eye height 1.4x width (in profile); eyes separated by 1.4x their height, breadth of oral fossa 1.9x malar distance; antennal toruli separated from eyes by 1.9x their distance apart. Antennae inserted middle of face; toruli equidistant from anterior margin of clypeus and median Ocellus; scape 0.6x eye height; pedicel shorter than F1; anelli transverse; F2 and F3 equal; F4 shorter than F3; F5 and F6 shorter than F4; club little longer than two preceding segments combined.

Thorax : (Fig. 15) Pronotum with dorsal part of collar transversely striated, lateral panel reticulate with sparse brown bristles dorsally, anterior edge rounded. Mesoscutum with mid lobe reticulate punctate with dense brown pubescence, side lobes transversely striated with meshes in between reticulate; notauli complete. Scutellum finely reticulation, pubescence only on anterior half; frenal groove distinct, slightly angulate; posterior margin of Scutellum angulate. Dorsellum broad, shiny. Propodeum (Fig. 17) medially

convex and shiny, almost smooth, lateral part finely reticulate; median carina distinct but fine; spiracles large, oval, close to posterior margin of metanotum; post-spiracular groove reaching posterior margin. Prepectus large, horizontally as long as tegula, finely reticulate with sharp anterior carina, Mesepisternum reticulate punctate; upper mesepimeron shiny, lower mesepimeron and metapleuron almost shiny with feeble reticulation. Fore wing (Fig. 15) with relative lengths of Smv, Mv, Pmv and Stv as 28 : 16 : 20 : 9; stigma strongly capitate. Legs slender, coxae finely reticulate, coarser on hind coxae.

Gaster : (Fig. 15) Petiole rugulose-reticulate, dorsally somewhat depressed, little longer than twice as long as broad, sides in anterior third converging; gaster little shorter than thorax (excluding petiole); T1 covering more than half of gaster.

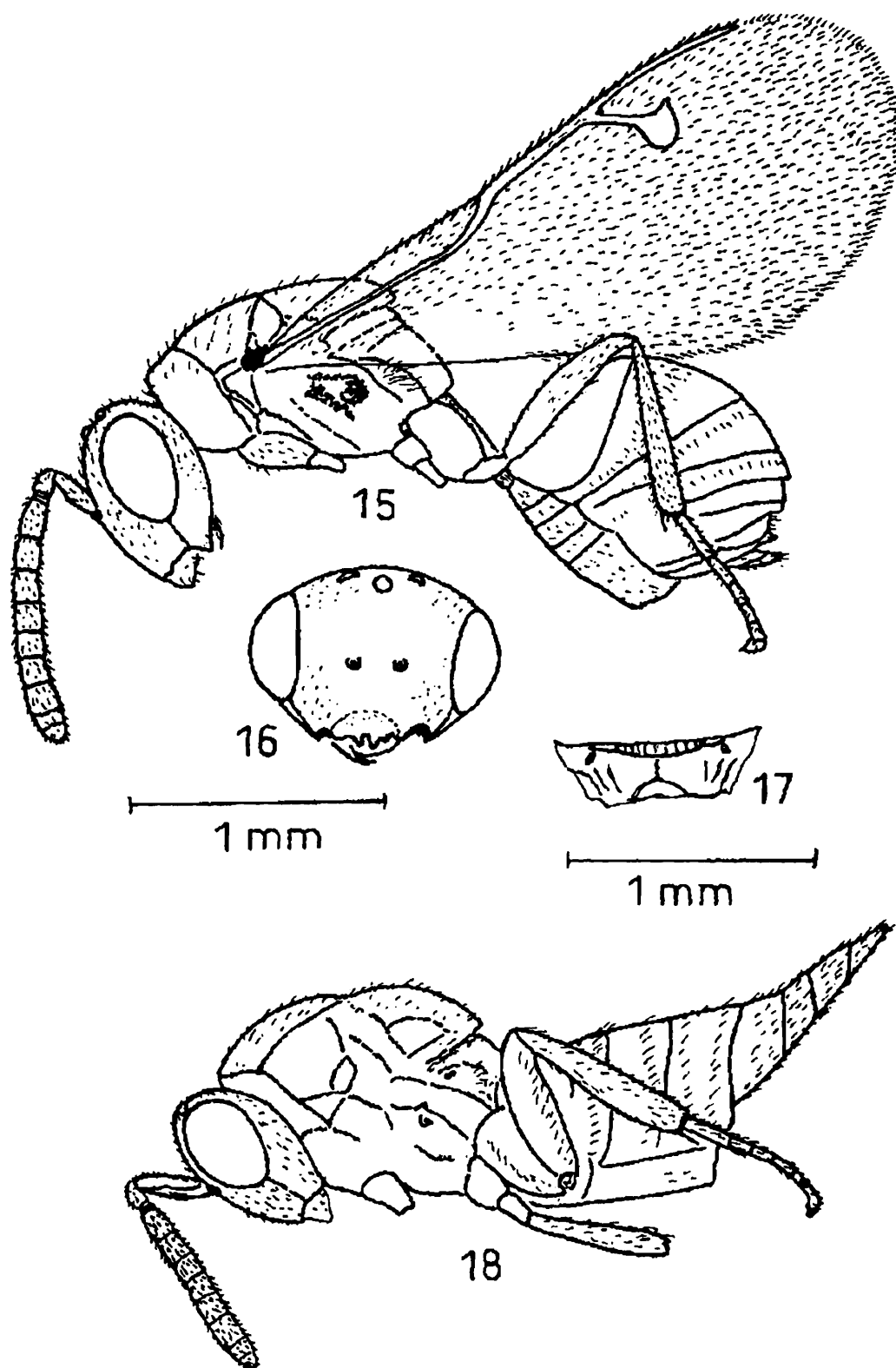
Male : Unknown.

Holotype : Female : India : Kerala. ENP; Turner's hill; 2.iii.93. coll. M. S. Pradhan & party.

Remarks : This Pteromalid genus, belongs to the subfamily Miscogasterinae is well known from Europe by 12 species, Japan by 6 species and Australia (New Guinea) by one species. This is the first record of the genus from the Oriental Region. Members of this genus are parasites of small Diptera mining herbaceous plants.

This species shows close resemblance to *S. remotus* Boucek from Papua New Guinea but differs from it in having prepectus finely reticulate; horizontally as long as tegula; gaster with T1 not covering more than half length, T2 distinctly more than half of T1 and distinctly shorter than rest of the gaster and sculpture on thoracic dorsum not superficial, but distinct and scutum with piliferous punctures not noticeable. (in *S. remotus* prepectus shiny, horizontally longer than tegula; gaster with T1 covering more than half length, T2 less than half of the first and longer than rest of the gaster; sculpture on thoracic dorsum more superficial, weak and piliferous punctures noticeable on scutum).

It also closely resembles *S. lamprosomus* Graham but differs from it in having scutellar



Figs. 15-17. *Stictomischus turneri* sp. nov. Female. 15. Body in profile; 16. Head in front view; 17. Propodeum in dorsal view.

Fig. 18. *Systasis nigra* sp. nov. Female. Body in profile.

frenum without costulae, propodeum with nuchal area not produced backwards; gaster with hypopygium reaching well beyond middle; antennae with F1 1.6x and F6 1.4x as long as broad; mesoscutum moderately reticulate and colour of scape brown, fore femora not banded black medially and body length 2.5 mm. (in *S. lamprosomus* scutellar frenum with some longitudinal costulae; propodeum with nuchal area produced beyond bases of hind coxae; gaster with hypopygium situated about half way along the gaster; F1 2-2.2x and F6. 1.6-1.75x as long as broad; reticulation very fine on mesoscutum and scape testaceous, fore femora medially banded black, length 3-3-2 mm.

28. *Systasis nigra* sp. nov.
(Figs. 18-21)

Female : Length 2.8 mm. Body blackish brown with golden yellow reflection on face, dorsal part of thorax and gaster; antennae dark brown with lower side of scape paler; legs with coxae and femora concolorous with thorax; tibiae dark brown with tips paler; tarsi testaceous with tips brown; tegulae concolorous with thorax; wings hyaline, veins pale brown.

Head : (Figs. 18, 19) Distinctly and umbilicately punctate, with interstices closely reticulate. In dorsal view width 2.2x length and in front view width 1.3x height; temple length 0.28x eye length; eye height 1.3x width (in profile); POL 3.8x OOL (15 : 4); Clypeus microreticulate with anterior margin straight; malar distance 0.5x eye height; malar groove distinct. antennae (Fig. 18) inserted above lower margin of eyes; scape reaching median ocellus, length 0.7x eye height; pedicel plus flagellum length equal to head width; anelli transverse; club as long as 2.5 preceding segments combined.

Thorax : (Figs. 18, 19) Length 1.3x width, closely raised reticulate with scattered deep punctures. Pubescence sparse. Pronotum with collar very narrow in the middle and deeply emarginate behind. Mesoscutum width 1.5x length. Scutellum length 1.1x width. Propodeum (Fig. 21) width 5x median length with strong median and lateral carinae; spiracles large and oval, close to the hind margin of metanotum; callus with pubescence less distinct. forewing (fig.

20) with basal part bare, pubescence otherwise less prominent. Relative lengths of Smv, Mv, Pmv and Stv as 26 : 19 : 8 : 6.

Gaster : (Figs. 18, 21) Elongatedly ovate, dorsally collapsing, length 2x width; tergites micro reticulate; hypopygium little beyond reaching hind margin of T4.

Male : Not Known.

Material examined : Holotype : Female : India : Kerala : ENP : Rajamalai, 1.iv.94. coll. P. M. Sureshan.

Paratype : 1 Female : same data as that of holotype.

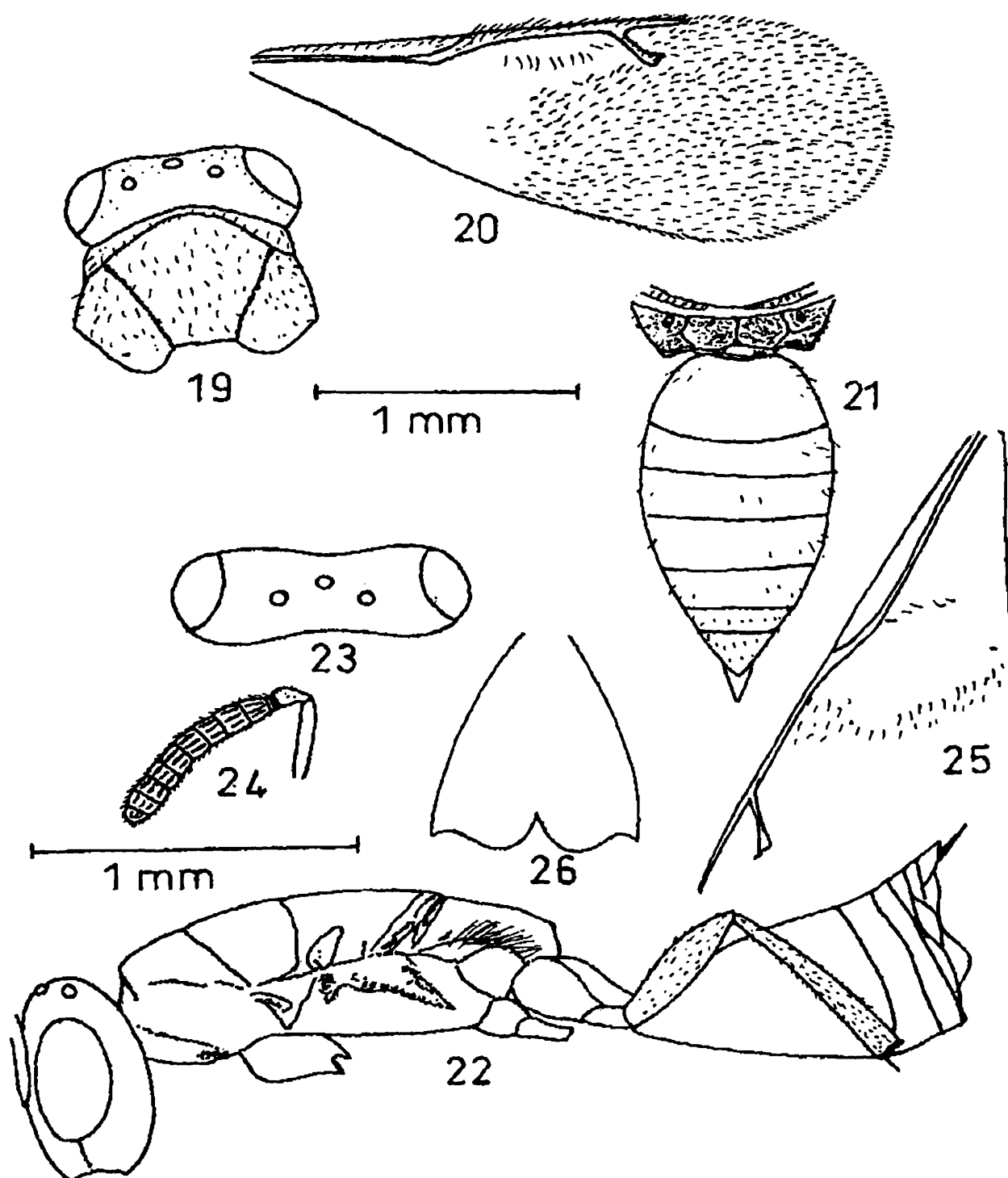
Remarks : This species resembles *S. (S) aquila* Heyden in colouration, body sculpture and general morphology but differs in having longer gaster, length 2x width, 1.2x combined length of head and mesosoma and hypopygium extending little beyond half length; POL 3.7x OOL and; fore wing with basal vein bare, admarginal setae in single row and larger size (2.8 mm) (in *aquila* gaster chordate, length only 1.4x width and only 0.86-0.95x combined length of head and mesosoma and hypogium extending only 0.37x length of gaster; POL 2.7x OOL; basal vein of forewing with a row of four setae, admarginal row of setae in more than one row and smaller size of the body i.e. 2.5 mm).

This species differs from all the Oriental species in its larger size, body colour, and other combination of characters. This is the fifth species described from the oriental region.

29. *Trichomalus keralensis* sp. nov.
(Figs. 9-11)

Female : Length 2.3mm. Body brownish black with bronzy reflection on dorsal part; gaster dark brown. Antennae dark brown; eyes chocolate brown. Legs with coxae concolorous with thorax, remainder of legs dark brown except trochanters, bases and tips of femora, tibiae and base of mid and hind tarsi testaceous. Tegulae dark brown, wings hyaline, veins pale brown.

Head : (Figs. 9,10) Moderately reticulate, reticulation finer on lower face, genae with white



Figs. 19-21. *Systasis nigra* sp. nov. Female. 19. Head and part of thorax in dorsal view; 20. forewing; 21. Propodeum and gaster in dorsal view.

Figs. 22-26. *Syntomopus rajamalaiensis* Sureshan & Narendran. Female. 22. Body in profile; 23. Head in dorsal view; 24. Antenna; 25. forewing venation; 26. T1 of gaster in dorsal view.

sparse pubescence; clypeus striated, anterior margin slightly emarginate. Antenna (Fig. 9) with toruli equidistant from anterior margin of clypeus and median ocellus; scape reaching the level of vertex. Head 1.2x as broad as mesoscutum, in dorsal view width 2x length, in front view width 1.2x height; temple length almost half of eye length (0.4x); POL 1.8x OOL; malar distance half that of eye height; scape slightly shorter than eye; combined length of pedicel and flagellum 1.2x that of head width; pedicel half as long as F1; F1-F4 equal; F5 and F6 slightly shorter; club slightly shorter than three preceding segments combined.

Thorax : (Fig. 9) Uniformly and moderately raised reticulate with sparse long pubescence on dorsal part of pronotum, mesoscutum and scutellum. Pronotal collar with sharp anterior carina. Mesoscutum width 1.6x length; notauli reaching more than half length of mesoscutum. Scutellum length 1.25x width. Propodeum (Fig. 11) width 1.2x maximum length; median area 1.1x as broad as long; nucha well developed; median carina reaching up to base of nucha; plicae distinct; callus with long hairs. Forewing length 2.4x width; costal cell completely hairy towards the tip; speculum open below; basal vein setate. Relative lengths of Smv, Mv, Pmv and Stv as 19 : 11 : 10.5 : 6.5.

Gaster : (Fig. 9) Elongatedly ovate. Length 1.3x that of thorax; hind margin of tergites entire; hypopygium reaching hind margin of T4; gaster 1.8x as long as broad. shorter than head plus thorax combined.

Male : Unknown.

Material examined : Holotype : Female : India : Kerala, ENP, Rajamalai; 26.ii.95., coll. C. Radhakrishnan & party.

Remarks : This species resembles *T. corphye* (Walker) in having scape reaching level of vertex; forewing with basal cell hairy, combined lengths of pedicel plus flagellum greater than breadth of head; median area of propodeum 1.1x as broad as its median length; gaster ovate, shorter than head plus thorax; temples more convergent and in colouration. But it differs from *T. corphye* in

having forewing with basal cell more hairy, having more than 13 hairs, bare only on one third lower part; propodeal nucha occupying less than half of median length of propodeum (in *T. corphye* basal cell of forewing less hairy (5-13 hairs), scattered over its distal half only and nucha occupying half the median length of propodeum).

The genus *Trichomalus* Thomson is well represented in Europe and from the Oriental region it is known only by one described species *T. kannurensis* Sureshan & Narendran and the present species forms the second one described from the region.

DISCUSSION

29 species of Chalcidoidea (Hymenoptera : Insecta) belonging to 20 genera and 6 families are reported for the first time from Eravikulam National Park, Kerala. 3 species of Pteromalidae viz. *Stictomischus turneri*, *Systasis nigra* and *Trichomalus keralensis* are new to science. In addition to this *Sphegigaster anamudiensis* Sureshan & Narendran, *Synotomopus rajamalaiensis* Sureshan & Narendran and *Storeya minuta* Sureshan were described as new from the park earlier. The genus *Stictomischus* Thomson hitherto known only from Europe and Australia and the species *Cyrtogaster clavicornis* Walker hitherto known from Europe and N. America only are reported for the first time from the Oriental region. The subfamily Storeyinae Boucek (Pteromalidae) comprising the single genus *Storeya* Boucek has been discovered from Eravikulam National Park represented by one new species *S. minuta* Sureshan. The subfamily Storeyinae is known only from Queensland and Nepal. The species *Copidosoma remotus* Sharkov (Encyrtidae) is reported for the first time from India and the species *Mokrzeckia menzeli* Subba Rao and *Pteromalus sequester* Walker (Pteromalidae) are recorded for the first time from Kerala. Discovery of the species *Cyrtogaster clavicornis* Walker and the genus *Storeya* Boucek (Pteromalidae) from the cold climatic zones of the Eravikulam National Park is of ecological and biogeographical significance since they were known to occur only in similar climatic zones in Zoogeographical regions outside that of ours.

REFERENCES

- Boucek, Z. 1988. Australasian Chalcidoidea (Hymenoptera). C.A.B. *International Inst. Ent. London*. pp. 832.
- Kazmi, S. I. & Hayat, M. 1998. Revision of the Indian Copidosomatini (Hymenoptera : Chalcidoidea). *Oriental Ins.* **32** : 287-362.
- Mani, M. S. 1989. The fauna of India and the adjacent countries. Chalcidoidea (Hymenoptera). Part. I & II. *Zool. Surv. India* pp. 1067.
- Narendran, T. C. 1989. Oriental Chalcididae (Hymenoptera : Chalcidoidea). *Dept. Zool. Uni. Calicut*, pp. 440.
- Narendran, T. C. 1994. Torymidae and Eurytomidae of Indian sub-continent (Hymenoptera : Chalcidoidea). *Dept. Zool. Uni. Calicut*. pp. 500.
- Noyes, J. S. 1990. The number of described chalcidoid taxa in the world that are currently regarded as valid. *Chalcid forum* **13** : 9-10.
- Noyes, J. S. & Hayat, M. 1994. Oriental Mealybug parasites Anagyrini (Hymenoptera : Encyrtidae) C.A.B. *International Inst. Ent. London*. pp. 481.

INSECTA : LEPIDOPTERA : RHOPALOCERA

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INTRODUCTION

Biogeographical evolution and the resultant distributional pattern of the Butterfly (Insecta : Lepidoptera : Rhopalocera) fauna in India have been analysed by Holloway (1974). Accordingly, the Butterfly fauna of Southern India is dominantly derived from south east Asian tropical centres. A few have been derived from the African Savannah regions via the Middle East and some developed by the subsequent speciation in isolation. Consequently, specific endemism is low in south India and there is no generic endemism or evidence of generic centres. The Oriental species in southern India comprise of a high proportion of wide spread species of dry lowland forest and associated habitats, and species with more marked wet rainforest preferences found in the wetter regions of the western Ghats.

The butterfly fauna of the high hills and plateau in the Southern Western ghats has been studied by Larsen (1987, 1988) with particular reference to the Nilgiris.

The butterfly fauna of Eravikulam National Park in the High Range of Western Ghats has never been studied in the past barring an observation on a single species by Kunhikrishnan (1998). The present study enumerating 29 species belonging to 24 genera spread over 6 families, therefore, forms the first comprehensive and consolidated account of the butterfly fauna occurring in the Eravikulam National Park. The study is chiefly based on the butterfly collection made in the tourism, buffer and core zones of the park primarily from the sholas and grasslands at

Rajamalai, Naikollimalai, Anamudi, Umayamalai, Bhimanada, Sambamalai, Eravikulammalai, Kolukkumalai areas and Turner's valley in part.

Description depicting the diagnostic features of the species dealt with are excluded from this account as access to such details can be had from the works of Evans (1910, 1932), Talbot (1939, 1947) and Wynter-Blyth (1957). The nomenclature followed in this account is after Varshney (1993, 1994).

SYSTEMATIC ACCOUNT

- | | |
|-------------|---------------|
| Order | LEPIDOPTERA |
| Suborder | RHOPALOCERA |
| Superfamily | PAPILIONOIDEA |
| Family | PAPILIONIDAE |
| Subfamily | PAPILIONINAE |
| Tribe | LEPTOCIRCINI |
1. *Graphium sarpedon* Linn.
Tribe PAPILIONINI
 2. *Papilio demoleus* Linn.
 3. *Papilio helenus* Linn.
Tribe TROIDINI
 4. *Troides minos* Cramer
 5. *Pachliopta aristolochiae* (Fab.)
Family PIERIDAE
Subfamily PIERINAE
Tribe PIERINI
 6. *Cepora nerissa* Fabr.
 7. *Pieris canidia* Sparrman

8. *Appias albina* Boisduval
 9. *Appias lalage* (Doubleday)
 Tribe COLOTINI
 10. *Ixias marianne* Crammer
 Subfamily Coliadinae
 11. *Catopsilia pomona* Fabr.
 12. *Colias nilagiriensis* C & R Folder
 13. *Eurema hecabe* (Linne.)
 Family DANAIDAE
 Subfamily DANAINAE
 14. *Parantica aglea* Stoll.
 15. *Parantica nilgiriensis* Moore
 16. *Tirumala limniace* Crammer
 17. *Euploea core* Crammer
 Family SATYRIDAE
 Subfamily SATYRINAE
 Tribe MELANTINI
 18. *Melanitis leda* Linn.
 Tribe MYCALESINI
 19. *Mycalesis oculus* Marshall
 Tribe YPTHIMINI
 20. *Ypthima ypthimoides* Moore
 21. *Ypthima hubneri* Kirby
 Tribe LETHINI
 22. *Lethe rohria* Fabr.
 Family NYMPHALIDAE
 Subfamily ARGYNNINAE
 Tribe ARGYNNINI
 23. *Argyreus hyperbius* Linn.
 Subfamily NYMPHALINAE
 Tribe VANESSINI
 24. *Junonia hierta* Fabricius
 25. *Junonia orithya* Linn.
 Tribe NEPTINI
 26. *Neptis hylas* Linn.
 Subfamily BIBLIDINAE
 27. *Ariadne ariadne* Linn.

- Family LYCAENIDAE
 Subfamily POLYOMMATINAE
 Tribe POLYOMMATINI
 28. *Lampides boeticus* Linn.
 29. *Neopithecops zalmora* Moore.

OBSERVATIONS

The ecological observations on the butterfly fauna of the Park and their zoogeographical affinities are presented below :

1. *Graphium sarpedon* Common Blue Bottle

Covering practically all of the Oriental Region, the species is met with in small numbers in the park emerging from and retreating in to the Shola forests while visiting flowers and damp patches. The park population appears to be a resident of the Sholas.

2. *Papilio demoleus* Lime Butterfly

An oriental species with a primary distribution from India to Malaya and Southern China and a secondary distribution in the Australian region. Primarily being an open-plains species, it is considered a visitor to the park.

3. *Papilio helenus* The Red Helen

Its range covers almost the entire Oriental Region and the Southern fringes of Palaearctic Region in china and Japan. Though common in the subtropical evergreen forests, the species is also found on the plateau. It occurs well outside of natural forests and is often met with in tea plantation. The species is considered a visitor to the park from the surrounding tea plantations.

4. *Troides minos* Southern Birdwing

The species is endemic to Southern India and the Western Ghats. Though mainly a species of lowland evergreen habitat, wandering specimens

are often met with on the plateau. As the species can not breed in plateau vegetation, it is considered a visitor to the park area.

5. *Pachliopta aristolochiae*

Common Rose

Found practically throughout the Oriental Region, the species can be met with in most types of habitats barring dense, wet forests. It occurs on the plateau as a straggler and is considered a visitor to the park.

6. *Cepora nerissa*

The Common Gull

Covering practically the entire Oriental Region it is a butterfly of the drier lowland habitat. As the species has strong migratory tendencies it is also met with on the plateau. It is considered a visitor to the park.

7. *Pieris canidia*

The Indian Cabbage White

This palaeartic butterfly found from the Himalaya east to Japan and the tropics in suitable localities is also found on the higher south Indian mountains. The species is common on the plateau presumably the edges of the Sholas functioning as its original habitat. The park population of the species is considered a resident of the park.

8. *Appias albina*

The Common Albatross

The distribution covers Sri Lanka and Western Ghats through suitable habitats in Peninsular India to Sikkim and further east to practically the entire Oriental Region, New Guinea and North East Australia. It is a migratory species dwelling in the drier parts of the lowland evergreen forest. The species is considered a visitor to the park area.

9. *Appias lalage*

The Spot Puffin

A hill-species found from Simla to Assam and Myanmar and hills of South India. The species has been reported from Palni Hills in the past

and Kalakkad, Idukki and Eravikulam National Park recently in south India. A good population reportedly occur along the slopes of Anamudi in the park and presumably is a resident of the park.

10. *Ixias marianne*

The White Orange Tip

Restricted to India and Sri Lanka, the species is common in the mixed deciduous forest and normally met with in open scrubland. The species is migratory in habits. It is considered a visitor to the park.

11. *Catopsilia pomona*

The Lemon Emigrant

Occurring in the entire Oriental region, New Guinea, parts of Australia and Pacific, it is chiefly a butterfly of the drier lowland formations. It is strongly migratory in habits and breeds practically anywhere in its distributional range except on the high plateau. The species is considered a visitor to the park.

12. *Colias nilagiriensis*

The Nilgiri Clouded-Yellow

A South Indian endemic species of Palaeartic origin found commonly on the plateau in and around the sholas. The population is considered a resident of the park.

13. *Eurema hecabe*

The Common Grass Yellow

A species with a vast range covering the entire old world tropical zone from Africa and Arabia to India, and the Oriental Region to New Guinea, Australia, Japan, Fiji and Tonga, is very common in habitats modified by man. Though the species is a known migrant, some appear to breed in the park and can be considered a resident.

14. *Parantica aglea*

The Glassy Tiger

The distribution covers Sri Lanka and South India, and from level of Jammu to Hong Kong

and Malaysia. The species is known to occur in dense forest, open country and Shola forest. Considered a resident of the park.

15. *Parantica nilgiriensis*
The Nilgiri Tiger

The species is endemic to the higher mountains of Southern India. A montane butterfly, basically of the evergreen Sholas found in more open country and descending to subtropical evergreen forests. The park population of the species is considered a resident of the park area.

16. *Tirumala limniace*
The Blue Tiger

Found in most of the Oriental Region, the species is migratory and may occasionally be met with on high plateau where breeding possibilities are doubtful. Considered a visitor to the park.

17. *Euploea core*
The Common Indian Crow

The species is found from Sri Lanka to most of the Oriental Region and Australia to the Pacific. Abundant at lower and middle elevations in all kinds of terrain, the species is strongly migratory in habits. Though a regular visitor to the plateau, it is not considered a resident.

18. *Melanitis leda*
The Common Evening Brown

Covering all of Africa, Southern Arabia, the Oriental Region, the Papuan Subregion, the Pacific and many remote ocean islands, the species can be found anywhere from low to high altitudes. Being a grass breeder and very common in the park area, the population is considered a resident of the park.

19. *Mycalesis oculus*
The Red-disc Bush Brown

Endemic and common to the high elevation hills of Western Ghats south of the Nilgiris. Being a grass breeder, the population is considered a resident of the park.

20. *Ypthima ypthimoides*
The Palni Four Ring

A common species endemic to the hills south of the Nilgiris. breeds on grasses and always found in grassy places of the park. The park population is considered a resident of the park area.

21. *Ypthima hubneri*
Common Fourring

Found through most of India extending in to Indo-China and Malaysia, the species is common in the evergreen forests, deciduous formations and open plains. In the park, the species in every probability breeds on grasses and they can very frequently be met with on the grassland areas. The park population of the species is considered a resident of the Park area.

22. *Lethe rohria*
The Common Treebrown

Distributional range of the species covers Sri Lanka, South India, suitable areas in the Indian Peninsula, then east to China and Bali bypassing Malaysia. More adapted to the hills the species is common in subtropical evergreen and moist deciduous forests. Known to breed on bamboo and grass, the population is considered a resident of the park.

23. *Argyreus hyperbius*
The Indian Fritillary

A palaeartic butterfly found in the montane zones of Ethiopia, South India, Plains of India in winter, Sri Lanka, Malaysia, Sumatra, Sulawesi and New Guinea. In Western Ghats, the species appear to be confined to the plateau on moist grasslands and in sholas. The population observed is considered a resident of the park.

24. *Junonia hierta*
The Yellow Panay

A most widely distributed common Palaeotropical species found in Thailand, Myanmar, India and Pakistan. Though chiefly a

species of the open scrubland, it is also found visiting mountainous terrain. The species is migratory. considered a visitor to the park.

25. *Junonia orithya*

The Blue Pansy

The species is Palaeotropical in distribution covering the Papuan subregion, most of the Oriental Region, Arabia, all of Africa and occasionally as far north as Jordan. Being a migratory common plains butterfly, it is considered a visitor to the park.

26. *Neptis hylas*

The Common Sailer

Covering most of the Oriental Region, its distribution penetrates the Palaeartic Region in East Asia. Frequently found towards the lower elevation areas within the park, the population is considered a resident of the park area.

27. *Ariadne ariadne*

The Angled Castor

Found practically throughout the Oriental Region the species is migratory. It is not common in the park and its occurrence in the Shola-

grassland habitats in the plateau is attributable to its migratory habits. Considered a visitor to the park.

28. *Lampides boeticus* Linn.

Distributed right through the tropics of the old world, entering well in to the Palaeartic region during summer the species tends to be migratory. Found towards the lower elevation areas within the park and more abundant at lower altitudes outside the park area, the species is considered a visitor to the park.

29. *Neopithecops zalmora* Moore.

Covering Sri Lanka, Western and Eastern Ghats and further from Kumaon east to practically the whole of the Oriental Region, the species is common to the lowland evergreen forests in regions of heavy rainfall. The species is one of the weakest on wings. Probably introduced by wind currents the species is considered a non-resident of the park.

DISCUSSION

Of the 29 species recorded in this study, populations of 14 species met with in the park

TABLE - I

Status of Butterfly Populations in the Eravikulam National Park

Resident	Non-Resident/Visitors
1. <i>Graphium sarpedon</i>	1. <i>Papilio demoleus</i>
2. <i>Pieris canidia</i>	2. <i>Papilio helenus</i>
3. <i>Appias lalage</i>	3. <i>Troides minos</i>
4. <i>Colias nilagiriensis</i>	4. <i>Pachliopta aristolochiae</i>
5. <i>Eurema hecabe</i>	5. <i>Cepora nerissa</i>
6. <i>Parantica aglea</i>	6. <i>Appias albina</i>
7. <i>Parantica nilgiriensis</i>	7. <i>Ixias marianne</i>
8. <i>Melanitis leda</i>	8. <i>Catopsilia pomona</i>
9. <i>Mycalesis oculus</i>	9. <i>Tirumala limniace</i>
10. <i>Ypthima ypthimoides</i>	10. <i>Euploea core</i>
11. <i>Ypthima hubneri</i>	11. <i>Junonia hierta</i>
12. <i>Lethe rohria</i>	12. <i>Junonia orithya</i>
13. <i>Argyreus hyperbius</i>	13. <i>Ariadne ariadne</i>
14. <i>Neptis hylas</i>	14. <i>Lampides boeticus</i>
	15. <i>Neopithecops zalmora</i>

are considered resident in the park area and 15 non-resident visitors (Table-I). It is well known that the main element in the Butterfly fauna of India is the Oriental element (Holloway, 1974); nevertheless, the presence of Palaearctic elements (though as insignificant component in the character fauna of the peninsula) in the higher mountains of Western Ghats present certain interesting problems of distribution (Mani, 1974). The Palaearctic element found in the butterfly fauna of Eravikulam National Park are *Pieris*, *Colias* and *Argyreus*. Yet another interesting feature is the occurrence of Oriental montane species such as *Colias nilagiriensis*, *Parantica nilgiriensis*, *Ypthima ypthimoides* and *Mycalesis oculus* in the park presumed to have evolved in isolation in the Western Ghats. Rest of the

members recorded in this study show affinity in general to the Malayan and Indo-Chinese Subcentres of the Oriental Region.

The number of butterfly species recorded from the Eravikulam National Park may not be significant as opposed to the study in the Nilgiris (Larsen, 1987, 1988) since the study area is dominated only by Shola and grassland vegetations contrary to a variety of forest habitats that occur around Nilgiris. However, consistent with the observations in Nilgiri plateau *per se* the Eravikulam plateau also appear to have a limited number of species of varied composition, the most noticeable, though not many, being the disjunct palaearctic elements and the Oriental montane species.

REFERENCES

- Evans, W. H. 1910. List of butterflies of the Palni Hills, *J. Bombay nat. Hist. Soc.* **20** : 380-392.
- Evans, W. H. 1932. The identification of Indian Butterflies. *Bombay nat. Hist. Society*, Bombay.
- Holloway, J. D. 1974. The biogeography of Indian Butterflies : 473-499 in Mani, M. S. ed. *Ecology and biogeography in India*, W. Junk. publishers, The Hague.
- Kunhikrishnan, E. 1998. The butterfly missed in the High Ranges. *Biodiversity India, ISCB Newsletter* 1996-98. **3-7** : 15.
- Larsen, T. B. 1987. The butterflies of the Nilgiri Mountains of Southern India. (Lepidoptera : Rhopalocera). *J. Bombay Nat. Hist. Soc.* **84**(1) : 26-54; **84**(2) : 291-316 and **84**(3) : 560-584.
- Larsen, T. B. 1988. The butterflies of the Nilgiri Mountains of Southern India. (Lepidoptera : Rhopalocera) *Ibid* **85**(1) : 26-43.
- Mani, M. S. 1974. Biogeography of the Peninsula : 614-647 in Mani, M. S. ed. *Ecology and Biogeography in India*, W. Junk publishers, The Hague.
- Talbot, G. (1939, 1947) *Fauna of British India including Ceylon and Burma. Butterflies I & II*. Taylor & Francis, London.
- Varshney, R. K. 1993. Index Rhopalocera Indica Part III Genera of butterflies from India and neighbouring countries Lepidoptera : (A) Papilionidae, Pieridae and Danaidae. *Oriental Ins.* **27** : 347-372.
- Varshney, R. K. 1994. Index Rhopalocera Indica Part III Genera of butterflies from India and neighbouring countries Lepidoptera : (B) Satyridae, Nymphalidae, Libytheidae and Riodinidae. *Ibid*, **28** : 151-198.
- Wynter-Blyth, M. A. 1957. *Butterflies of the Indian Region*. Bombay Natural History Society, Bombay.

INSECTA : DIPTERA : TEPHRITIDAE

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INTRODUCTION

Tephritidae commonly known as fruit flies are represented in all zoogeographical regions except Antarctica. Barring very few species, almost all the fruit flies of which biology is known have phytophagous larval stages. The larvae complete their development while feeding in developing ovaries of fruits and seeds or while mining leaf, stem or root tissues and also forming galls in host plants. Many species of fruit flies are host specific. Most fruit flies have a limited natural distribution probably due to physical, climatic, vegetational and host-specificity factors. However, species that infest a variety of vegetables and fruits (non-host specific) are usually widespread in distribution.

About 4000 species arranged in 500 genera are included in the family Tephritidae of which about 839 species are known from the Oriental Region which include about 320 species from the Indian subcontinent. So far 201 species of fruit flies are known (Kapoor, 1993; Radhakrishnan, 1993 & 1998) from various parts of India. These are included based on White & Elson-Harris (1992) in 3 subfamilies, 11 tribes and 75 genera.

Tephritidae of Western Ghats, with particular reference to Nilgiri Biosphere Reserve has been studied by Radhakrishnan (1998, in press).

The Eravikulam National Park in the High Range of Western Ghats have never been surveyed for Tephritidae in the past and the present account dealing with 9 species under 9 genera and 2 subfamilies forms the first report of Tephritidae pertaining to this Park. Diagnostic

features of the species dealt with in this account are not presented here as a key to the taxa of Indian species of Tephritidae is available in the work of Kapoor (1993).

SYSTEMATIC ACCOUNT

Family TEPHRITIDAE
Subfamily DACINAE
Tribe CERATITINI

1. *Xanthorrhachis annandalei* Bezzi.

Subfamily TEPHRITINAE
Tribe TEPHRELLINI

2. *Sphaeniscus atilius* (Walker)

3. *Oxyaciura xanthotricha* (Bezzi)

Tribe TEPHRITINI

4. *Rhabdochaeta bakeri* Bezzi

5. *Scedella spilopectera* (Bezzi)

6. *Sphenella sinensis* Schiner

7. *Dioxyna sororcula* (Wiedemann)

8. *Trupanea asteria* (Schiner)

9. *Procecidochares utilis* Stone

OBSERVATIONS

Taxonomic and zoogeographic observations of the species recorded from Eravikulam National Park are presented below.

1. *Xanthorrhachis annandalei* Bezzi.

The species is known to occur in Myanmar, Thailand, Vietnam (Hardy, 1973) and India (Radhakrishnan, 1984; Hardy, 1988). In South India, the species has previously been reported

only from Anamalai Hills. In Eravikulam National Park, the specimen inhabit a short variety of bamboo vegetation found in comparatively lower elevation areas. Members of this genus are presumed to breed in bamboo (Hardy, 1973). Formerly considered belonging to the subfamily Trypetinae the genus according to a recent taxonomic treatment (Hancock, 1986; White & Elson-Harris, 1992) is placed under the tribe ceratitini of the subfamily Dacinae.

Material examined : 1 example from Bhimanada.

2. *Sphaeniscus atilius* (Walker)

Widespread over the Oriental and Pacific Regions, these flies infest the flower heads of an assortment of species of Labiatae and Asteraceae. Removed from the subfamily Trypetinae the genus is currently placed under the subfamily Tephritinae (Hancock, 1990).

Material examined : 2 examples from Bhimanada and Turner's valley.

3. *Oxyaciura xanthotricha* (Bezzi)

Synonymised under the genus *Oxyaciura* (Hancock, 1990), the species was formerly placed under the genus *Indaciura*. The species occur in India, Myanmar, Thailand, Vietnam, Java and Sri Lanka. In India, the species is known from Garhwal in Uttar Pradesh and Kashmir. The present report from Eravikulam National Park forms the first record of the species from Peninsular India.

Material examined : 3 examples from Eravikulam hut and Turner's valley.

4. *Rhabdochaeta bakeri* Bezzi

Recorded from India, Laos, Philippines, Thailand and Vietnam, within Indian limits the species was known only from Arunachal Pradesh (Radhakrishnan, 1984). Its occurrence in Eravikulam National Park forms the first record of the species from Peninsular India. The genus was formerly placed under the subfamily Schistopterinae but currently enjoy placement

under the subfamily Tephritinae (Hancock, 1990).

Material examined : 9 examples from Eravikulammalai, Sambamalai, Kolukkumalai, Eravikulam hut and Turner's valley.

5. *Scedella spilopectera* (Bezzi)

Known to occur in India and Sri Lanka. The species presumably breeds in the flowerheads of Asteraceae.

Material examined : 15 examples from Naikollimalai, Rajamalai, Anamudi, Sambamalai, Eravikulammalai, Kolukkumalai, Eravikulam hut and Turner's valley.

6. *Sphenella sinensis* Schiner

The species is wide spread over the Oriental Region and S. China.

Material examined : 11 examples from Bhimanada, Sambamalai, Eravikulam hut and Turner's valley.

7. *Dioxyna sororcula* (Wiedemann)

Widespread throughout the tropics and subtropics of the world, the species is a seed infestor, living in the flower heads of members of the plant family Asteraceae.

Material examined : 17 examples from Naikollimalai, Rajamalai, anamudi, Sambamalai, Eravikulammalai, Kolukkumalai and Turner's valley.

8. *Trupanea asteria* (Schiner)

The species is known from India and Java. *Trupanea* is a large worldwide genus which infests flower heads, principally of Asteraceae.

Material examined : 5 examples from Eravikulam hut and Turner's valley.

9. *Procecidochares utilis* Stone

A native of Mexico, the species was introduced in Hawaii, New Zealand, Australia, India and Nepal for the control of Crofton weed,

Eupatorium trapezoideum. Though introduction of the fly in Hawaii resulted in a grand success in eradication of the weed, in India the fly inspite of establishing itself sufficiently well has not been effective due to heavy attack on its larvae and pupae by Hymenopteran parasites. In Eravikulam National Park, the larvae and pupae of the fly have been observed to be parasitised by *Eurytoma robusta* Mayr (Eurytomidae : Hymenoptera) and *Torymoides kiesenwetteri* (Mayr) (Torymidae : Hymenoptera) respectively. The genus formerly placed under the subfamily Trypetinae has subsequently been transferred to the subfamily tephritinae (Hancock, 1990; White and Elson-Harris, 1992).

Material examined : 9 examples from Naikollimalai, Rajamalai, Kolukkumalai and Turner's valley.

DISCUSSION

Nine species of Tephritidae are reported for the first time from Eravikulam National Park. *Oxyaciura xanthotricha* (Bezzi) and *Rhabdochaeta bakeri* Bezzi are new records for Peninsular India.

Numerically, the Tephritid fauna of the park

is poor in species content. Dominated by cecidogenous species (gall formers), fruit-infesting Tephritidae are totally absent in the park. The Shola forests do not apparently support many fleshy fruit bearing plant species. The grasslands that cover major part of the park is not a congenial habitat biome for the Tephritidae to breed. However, plants belonging to the families, Asteraeaceae and Labiatae growing interspersed in the grassland and the periphery of the shola forests are utilised by the majority of the species occurring in the park. The temperate climate prevailing during most of the seasons in the park also appears to act as an inhibitory factor in the spread of most of the typical tropical species.

Though there is a paucity of cecidogenous species in the tropics as exemplified by the lack of any indigenous genus in the Oriental Region, the species of typical cecidogenous genera occurring in the tropics favour high altitudes (Freidberg, 1984). Obviously, in such areas the flies enjoy climatic conditions comparable to those prevailing in temperate regions. Therefore, as can be expected, there is a predominance of cecidogenous members of Tephritidae in the high land areas of the Eravikulam National Park.

REFERENCES

- Freidberg, A. 1984. Gall Tephritidae (Diptera) in : *Biology of gall insects*, ed : T.N. Ananthakrishnan, Oxford & IBH publishing Co., New Delhi.
- Hancock, D. L. 1986a. Classification of the Trypetinae (Diptera : Tephritidae), with a discussion of the Afrotropical fauna. *J. ent. soc. sth. Afr.* : 49(2) : 275-305.
- Hancock, D. L. 1990. Notes on the tephrellini Aciurini (Diptera : Tephritidae), with a checklist of the Zimbabwe species. *Tans. Zimbabwe scient. Ass.*, 64(5) : 41-48.
- Hardy, D. E. 1973. The fruitflies (Tephritidae - Diptera) of Thailand and bordering countries. *Pacif. Ins. Monogr.* 31 : 1-353, pls. 8.
- Hardy, D. E. 1988. Fruitflies of the subtribe Gastrozonina of Indonesia, New Guinea and the Bismarck and Solomon islands (Diptera, Tephritidae, Trypetinae, Acenthonevrini). *Zool. Scr.* 17(1) : 77-121.
- Kapoor, V. C. 1993. *Indian fruitflies* (Insecta : Diptera : Tephritidae), Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
- Radhakrishnan, C. 1984. Tephritidae (Diptera : Insecta) of Namdapha. *Rec. zool. Surv. India*, 81(3&4) : 49-65.

- Radhakrishnan, C. 1993. New record of *Dietheria fasciata* Hardy (Tephritidae : Diptera : Insecta) from India and its biogeographical affinities. *Hexapoda*, 5(1) : 67-70.
- Radhakrishnan, C. 1998. Tephritidae (Diptera : Insecta), in : *Faunal inventory of Nilgiri Biosphere reserve*. Zoological Survey of India, Calcutta (*in press*).
- Radhakrishnan, C. 1998. (Tephritidae : Diptera), in : *Faunal diversity in India*, Envis centre, Zoological Survey of India, Calcutta.
- White, I.M. and Elson-Harris, M.M. 1992. *Fruitflies of economic significance; their identification and bionomics*. CAB international, London.

ARANEAE : ARACHNIDA

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INTRODUCTION

The Arachnid fauna of India has been dealt with by Tikader (1980, 1982, 1987). The present study reveals the occurrence of 9 different families of Araneae in the Eravikulam National Park (ENP). These records hitherto are the first from the area.

SYSTEMATIC ACCOUNT

INVERTEBRATA

- Phylum ARTHROPODA
Superclass CHELICERATA
Class ARACHNIDA
Order ARANEAE
Family ARANEIDAE (True-orb-weaving-spiders)
1. *Neoscona rumpfi* (Thorell)
 2. *Neoscona* sp.
 3. *Cyclosa* sp.
 4. *Zygeilla* sp.
 5. *Araneus* sp.
 6. *Parawixia dehaanii* (Doleschall)
Family TETRAGNATHIDAE
 7. *Tetragnatha mandibulata* Walckenaer
Family SALTICIDAE
 8. *Salticus* sp.
 9. *Zygoballus* sp.
Family HERSILIDAE (Hunting spiders)
 10. *Hersilia savignyi* Lucas

Family HETEROPODIDAE
(Giant Crab spiders)

11. *Heteropoda* sp.

Family GNAPHOSIDAE

12. *Drassodes lubrica* Tikader & Gajabe

Family THOMISIDAE (Crab-spiders)

13. *Thomisus* sp.

Family THERIDIIDAE
(Comb-footed spiders)

14. *Theridion* sp.

Family LYCOSIDAE (Wolf-spiders)

15. *Evippa* sp.

Family SCYTODIDAE (spitting spiders)

16. *Scytodes* sp.

1. *Neoscona rumpfi* (Thorell)
(Orb-weaving spiders)

1887. *Araneus rumpfi* Thorell, *Annals Mus. Civ. Genova*.
13 : 296.

1982. *Neoscona rumpfi* Tikader, *Fauna of India. Araneae*
Vol. II : 253-255.

Material examined & Locality : 10♂, 1♀, 200
Immature, Kolukkumalai, ENP.

Diagnostic characters : Abdomen sub-triangular, epigynal scape narrow and long with moderate constriction. Cephalic region without V marks, lateral lobes of epigyne distinct.

Distribution : India (Orissa, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu), Burma, Sri Lanka, Pakistan, Malaysia.

Habitat : Mostly resting on medium sized, well-designed web amongst grasses, bushes and small trees.

Remarks : Even though recorded from Ootacamund and around, this is the first record from ENP and at an altitude above 1000 MSL.

2. *Parawixia dehaanii* (Doleschall)

1859. *Epiara dehaanii* Doleschall, *Act. Sec. Ind. Neerl.* 5(5) : 33.

1982. *Parawixia dehaanii* Tikader, *Fauna of India, Araneae*, Vol. II : 212-214.

Material examined & Locality : 1 ♂, ENP area.

Diagnostic characters : Granular cephalic region bulging behind ocular region, abdomen triangular with two shoulder humps pointed on posterior end, epigyne with stout beak-like scape bent at right angle to the base.

Distribution : India (Karnataka, Sikkim and West Bengal, now in Kerala), Tharravaddy, Bhamo, Tenassesrim, Burma, Austro-Malaysia, Java, Sumatra, Polynesia, Japan.

Habitat : Mostly through undisturbed forested areas. Found on webs.

Remarks : This genus is reported rarely from India.

3. *Tetragnatha mandibulata* Walckenaer

1837. *Tetragnatha mandibulata* Walckenaer, *Ins. apt.* 2 : 211.

1977. *Tetragnatha mandibulata* Tikader *Rec. Zoological Survey of India.* 72 : 153-212.

Material examined & Locality : 50 ♂, 30 ♀, 10 Immature Kolumkumalai, ENP.

Diagnostic characters : At once recognised by its thin elongated body and robust chelicerae with powerful fangs and denticulation on inner margins of basal segment. Abdomen elongated, decorated with silvery reticulation on dorsal surface. Female epigyne simple tubular type while males with much elongated male palp provided

with bulbous apparatus ending in pointed terminal apophysis.

Distribution : India (Kerala, Karnataka, Tamil Nadu, Orissa, Maharashtra, West Bengal, Bihar, Assam, Sikkim, Andaman Islands), Nepal, Burma.

Habitat : Generally seen in tall grasses along Wetlands waiting patiently on regular snares for prey.

Remarks : Common species around wetlands.

4. *Hersilia savignyi* Lucas

1836. *Hersilia savignyi* Lucas, *Mag. Zool.* 8 : 10.

1977. *Hersilia savignyi* Tikader *Rec. Zool. Survey India.* 72 : 153-212.

Material examined & Locality : 1 ♂, ENP.

Diagnostic characters : Greyish body with whitish patches, much flattened body with one pair of elongated spinnerets.

Distribution : India (Kerala, Tamil Nadu, Karnataka, Maharashtra, Uttar Pradesh, Bihar, Assam, West Bengal and Andaman Islands), Sri Lanka, Burma.

Habitat : Normally found moving on tree barks and rarely met with on the grounds; very much camouflaged with tree barks; at once recognised by its elongated speedy movements on trunks.

Remarks : Common spider of wood lands.

5. *Drassodes lubrica* (Simmon)

1905. *Malicymnis lubrica* Simon. *Ann. Soc. Ent. Fr.* 74 : 169.

1982. *Drassodes lubrica* Tikader & Gajbe *Fauna of India : Araneae*, Vol. II : 406-408.

Material examined & Locality : 20 ♂, ENP.

Diagnostic characters : Smaller in body size; body smooth covered with soft hair; carapace without radial exterior pair of spinnerets smaller; female epigyne typically double lobed and reddish in colour.

Distribution : India (Pondichery, Tamil Nadu now in Kerala).

Habitat : Normally found under smaller stones and boulders, preparing smaller irregular snares.

Remarks : This species is known only from Southern parts of India.

DISCUSSION

The Arachnid fauna of India belongs to 10 orders. They are known to occur even in adverse habitats of high altitudes upto 8500m in the Himalaya. However, the present collection from Eravikulam National Park represents only 1 order. Therefore, more surveys would be required in the park for a better judgement of its Arachnid diversity.

REFERENCES

- Tikader, B.K. 1980. *Fauna of India, Araneae*, Vol. I, (1 & 2) : 1-443.
- Tikader, B.K. 1982. *Fauna of India, Araneae*, Vol. II, (1 & 2) : 1-518.
- Tikader, B.K. 1987. *Hand book, Indian spiders*, : 1-251.

GORDIOIDAE : NEMATOMORPHA

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INTRODUCTION

The Phylum Nematomorpha (Gordioacea) derives its name from the thread-like appearance of its members. Called horse hair worms, hair worms or hair snakes they are free living as adults but parasitic as juveniles. They occur all over the world in varied aquatic habitats including streams at high altitudes. The phylum comprises of about 80 species grouped in two orders, the Gordioidea and the Nectonematoidea. Members of Gordioidea (*Gordius*, *Paragordius*, *Chordodes* etc.) live in fresh water or moist soil as adults. They may be seen coiled about the leaves of aquatic plants or in a tangled mass at the bottom of the water bodies. The animal is extremely long and thread-like usually with a uniform diameter and with the tips bluntly rounded. In different species, the length varies from 10mm to 1 meter or more and the diameter from 0.3 to 2.5 mm. The body is opaque and colouration ranges from yellowish buff to dark brown or black. Females lay innumerable number of eggs in strings in water or in moist soil. The young worm usually penetrate an arthropod (Beetles, Cockroaches, Grasshoppers, Crickets, Centipedes and Millipedes), but may also form cysts to be engulfed by an appropriate host. The young worm on penetrating the host make their way to the body cavity or fat bodies where they start to

mature. During their stay in the insect body, they may castrate their host. Just prior to reaching maturity, the worm escapes from the body of its host possibly with the help of a digestive enzyme (Noble & Noble, 1982).

The order, Nectonematoidea comprises of only one genus, *Nectonema* so far known only by a single species, *N. agile*. This is a marine pelagic worm, the larvae of which parasitise hermit-crabs and true crabs.

The family Gordioidae of the order Gordioidea includes the single genus, *Gordius* enjoying a cosmopolitan distribution. The genus derives its name from the tangled, string-like appearance of its members suggesting a gordian knot.

During the course of the survey, a number of specimens were observed in streams and other water bodies of the Eravikulam National Park and its outskirts both at Bhimanada and Vaguvarrai. The largest specimen in the collection measures 29.5 cms in length. The specimen studied is a male, its tail end being spirally coiled and strongly forked. The species has been identified as *G. robustus* based on the description given by Kotpal (1980-81). Presence of a distinct V-shaped post-anal ridge and absence of pre-anal bristle tract are the diagnostic characters of the species exhibited by the specimen studied.

REFERENCES

- Kotpal, R. L. 1980-81. Zoology Phylum books-9 : *A text book of Minor Phyla*. pp : 72-99., Rastogi Publications, Meerut, India.
- Noble, E. R. & Noble, G. A. 1982. *Parasitology, the biology of animal Parasites*. pp. : 386-387, Lea & Febiger, Philadelphia, U.S.A.

MOLLUSCA

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INTRODUCTION

Mollusca is the second largest phylum in the species composition of the invertebrate fauna. They are known to colonise land, freshwater and marine environment. There are several species which are of socio-economic importance. Some function as an intermediate host for a number of disease causing parasitic helminths and some serve as a food reserve for men and in duckeries.

The faunal collection from Eravikulam National Park reveals the existence of only one species of Mollusca, *Lymnaea truncatula* Mueller belonging to the family Lymnaeidae. As such there is no information on this species from Peninsular India.

Taxonomic and Zoogeographical details of the species studied are presented below.

SYSTEMATIC ACCOUNT

Phylum	MOLLUSCA
Class	GASTROPODA
Subclass	PULMONATA
Order	BASOMMATOPHORA
Family	LYMNAEIDAE
Genus	LYMNAEA
Species	TRUNCATULA

Lymnaea Truncatula (Mueller)

1774. *Buccinum truncatula* Mueller, Veriu Terr Fluv. Hist. 2 : 130 Type Locality.

1925. *Limnaea truncatula* Annandale and Rao. Rec. Indian. Mus., 27 : 161 fig. V 3,4,5

1968. *Lymnaea truncatula* : Rajagopal and Subba Rao. Proc. Symposium. Mollusca pt. 1 P. 108.

Diagnostic characters : The animal posses a univalve spiral shell, usually dextrally coiled enclosing the visceral mass and foot when retracted; operculum absent; umbilical pore more prominent and not occluded by fold; columeller axis typically twisted; animal with triangular tentacles; whorls slightly shouldered and spire longer in relation to body whorl.

Habit and habitat : The species can lead an amphibious life and is generally found in mud.

Material examined : 30 exs, coll : R. M. Sharma, dt. 28.2.1995.

Locality : Eravikulam river.

Distribution : India : Kashmir, alt. 2730m. to 3365m., Leh, Chitral, alt. 3000m. It is mainly a Palaearctic species having distribution in Europe and extending to Ethiopian Region, North-Western Africa, Egypt, East Africa and South Africa (Brown, 1980; Subba Rao, 1989).

Remarks : Closely related to *L. andersoniana*, but differing in the umbilical pore being more prominent and not occluded by columellar fold. the snail serves as an intermediate host of *Fasciola hepatica*. The species is recorded for the first time from Eravikulam National Park, Peninsular India. The present report of this Palaearctic species from the high hills of Western Ghats is of biogeographical significance.

REFERENCES

- Brown, David. S, 1980. Freshwater Snails of Africa and their Medicinal Importance. Taylor and Francis London PPIX + PI 407.
- Subba Rao N. V., 1989. Handbook of Freshwater Mollusca of India. Edited by Director, Zoological Survey of India, Calcutta. PP. 289.

ZOOCECIDIA (PLANT GALLS)

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INTRODUCTION

Plant galls are known from very early times. They are very conspicuous in size, shape and numerous in kinds. The galls are induced both by plant and animal parasites. Those induced by plant parasites are called 'Phytocecidia' whereas animal induced galls are known as 'Zoocecidia'. The animals that induce galls are called 'Cecidozoa'.

Among cecidozoa perhaps the eriophid mites are one of the most prolific. Approximately 15,000 gall inducing insects have been recorded from the world, of which majority belong to thysanoptera (thrips), Homoptera (Psyllids, aphids and coccids); Coleoptera (Curculionids); Hymenoptera (cynipids, chalcids); Lepidoptera (moths) and Diptera (Cecidomyiids, Tephritids and Agromyzids) (Rohfrisch and Short House 1982).

Plant galls are structural abnormalities accompanied by hyperplasy (over growth) of tissues in response to the feeding activity of a parasite on the host plant. Galls may arise on any part of a plant and differ widely in size, shape and structure specific to the gall maker. The high degree of specificity in the association between a cecidozoan and host plant together with gall characters are very useful tools in taxonomy.

Despite the assiduous collection of plant galls from the forests of South India by various workers in the past, there is no record of any plant gall from Eravikulam National Park (ENP). A perusal of the monumental volume 'Plant Galls of India' by Mani (1973) revealed no record of plant gall from that area. Thus the present study is intended

to place on record the hitherto unrecorded Zoocecidia from the Shola forests in the high ranges of Kerala State.

EXOMORPHIC DESCRIPTION OF ZOOCECIDIA

The gall bearing plants are listed under their respective Natural orders followed by name/group of the gall maker.

LAURACEAE

1. *Litsea wightiana* Bell : *Aceria litseae* Kieffer (Acari : Eriophyidae)

Leaf gall. Epiphyllous, irregularly globose, non-localised, unilocular cephaloneon pouch galls, many times agglomerated; gall cavity with whitish erineum when young and brown as grows old.

Size 3-5 mm in diameter. a number of galls per leaf. This gall is practically identical with Gall No. 55 of Mani (1973).

Distribution : Nilgiri hills (Tamil Nadu), Anaimudi (Eravikulam N.P.), Kerala, R. M. Sharma 5.4.94.

2. *Cinnamomum zeylanicum* Breyn. *Pauropsylla depressa* Craw (Homoptera : Psyllidae).

Leaf gall Epiphyllous, globose/subglobose, glabrous, mostly along the larger veins; unilocular galls, measuring about 2-3 mm high and 2-3 mm thick. Pale green when young, turns reddish brown

as grows old. A number of galls arise on a single leaf. Ostiole (exit hole) hypophyllous. This gall is practically similar to Gall no. 510 of Mani (1973) but differs only in its smaller size.

Distribution : Travancore (Kerala), Eravikulam National Park (core zone), R. M. Sharma, 02.iii.1993.

ASTERACEAE

3. *Ageratina adenophora* (Spreng) King & Robinson (*Eupatorium adenophorum* Spreng); *Procecidochares utilis* Stone (Diptera : tephritidae).

Stem/shoot axis gall elongated, subglobose, fusiform or ovoid, swellings of tender branches; solid, hard, woody, tomentose, solitary or two to three galls joined together; indehiscent, persistent gall; greenish or reddish when young, becomes brown or dark brown as grow old. Gall cavity unilocular enclosing a single larva inside. Exit hole circular. Pupation takes place inside the gall. Size 4-9 mm long and 3-5 mm thick. Many galls may arise on a single twig.

This exotic weed has invaded the entire National Park area and almost all the plants were found to be heavily infested. The fruitfly larvae were found to be parasitized by atleast two chalcid parasites viz. *Torymoides Kiesenwetteri* (Mayr) and *Holaspis* sp. This gall is similar to Gall no. 689 of Mani (1973).

Distribution : Nilgiri, Anamalai Hills and other parts of South India, Eravikulam N. P. (buffer and core zones), R. M. Sharma, 2.iv.94 & 2.iii.95.

MYRTACEAE

4. *Syzigium calophyllifolium* Walp: Unknown psyllidae (homoptera) New Gall.

Leaf Gall. Ephiphyllous, pustuloid, hemispherical, sessile, smooth greenish yellow, unilocular, pouch gall; hard and dehiscent when old. size 3-6 mm in diameter. a perusal of Mani (1973) revealed no record of gall on this plant species. Thus it appears to be a new host record

for a psyllid. This gall is rare in the park.

Distribution : Anaimudi (E. N. P. Core area), R. M. Sharma 5.iv.94.

RUBIACEAE

5. *Psychotria johnsonii* H. Hook. Unknown insect, New Gall.

Leaf gall Epi-hypophyllous, simple, sessile, more pronounced on lower side, pustuloid or irregular, non-localised, mostly along midrib, smooth, shining, succulent, unilocular pouch-gall. Young galls greenish in colour, sometimes crowded together. Size 1-2 mm in diameter. Ostiole hypophyllous. Unfortunately, I failed to rear the causative agent from this gall on all the three occasions. This is an addition to the Indian plant galls.

Distribution : Eravikulam National Park (core zone), R. M. Sharma, 10.iii.1993, 10.iv.1994 & 7.iii.1995.

ACANTHACEAE

6. *Strobilanthes sesilis* Nees. Unknown Cecidomyiid (diptera), New gall.

Leaf/petiole/stem gall. epi-hypophyllous, hirsute, echinate, gall, non-localised, greenish when young, number of galls may arise on a single leaf, at times whole leaf rolled into a gall. Profuse galling was observed in core zone of National park. Gall cavity unilocular containing single maggot inside. Ostiole hypophyllous. A chalcid parasitize the gall maker. This gall is an addition to the Indian plant galls.

Distribution : Eravikulam N. P. (buffer and core zones), R. M. Sharma 3.iii.95.

PIPERACEAE

7. *Piper betle* Linn. *Gynaikothrips pallipes* Karny (Thysanoptera)

Leaf roll-gall. Upward inrolling and swelling of the leaf margin from either side of the midrib towards the middle, rugose and crinkled; the gall

is hard and unrolled with difficulty. The gall cavity encloses all stages of the thrips. This gall is similar to the Gall no. 340 of Mani (1973). It is very rare in buffer zone.

Distribution : Wynad (Kerala), Eravikulam N. P. (Meenathutti) and Java. R. M. Sharma 27.ii.95.

8. *Piper betle* Linn. Unknown insect.

Stem gall. Hard, woody, irregular, cortical gall. One or two galls on a single branch. About 10 mm long and 5-8 mm thick. Efforts at rearing the causative agent failed.

Distribution : Eravikulam National Park (buffer zone), R. M. Sharma 27.ii.95.

POACEAE

9. *Eragrostis* sp. *Contarinia* sp. (Diptera : Cecidomyiidae).

Inflorescence gall. As a matter of fact the attack of the gall midges on inflorescence of grasses does not result in any marked deformity. Out of twenty species of grasses occurring in the entire park, *Andropogon* and *Themida* are the dominant ones. In general grasses were free from infestation of gall midges, which are otherwise very common in the Kerala State.

Distribution : Anaimudi Eravikulam National Park, R. M. Sharma, 5.iv.94.

GALLS ON UNDETERMINED PLANTS

10. A tree. An Eriophid mite

Leaf gall Epiphyllous, sessile, solitary or

agglomerated masses of verrucose or rugose subglobe pouch-galls; scattered in large numbers on the blade; reddish-brown in colour; Ostiole large, open and hypophyllous, gall cavity specious with erineal hairs.

Distribution : Eravikulam National Park (core zone), R. M. Sharma, 4.iii.95.

11. A climber. Unknown insect.

Leaf/petiole gall Hypophyllous, non-localised but mostly on one of the veins, irregular swellings; glabrous; light green in colour; petiole gall, spindle-shaped; and unilocular. a few galls may arise on a single leaf.

Distribution : Eravikulam National Park (core zone), R. M. Sharma. 7.iii.95.

DISCUSSION

Altogether eleven Zooecidia from eleven different host plants were recorded during the course of faunistic survey in ENP of which two are eriophid galls, three dipterous, two homopterous, one thrips and three are caused by unknown insects. Out of eleven galls recorded three appear to be new to the Indian Plant galls.

The unique feature of the park is its shola grass land ecosystem. As inclement weather prevails throughout the year in the park area influencing the growth of the plants and its associated faunal communities, the cecidozoan fauna in the park is poor.

REFERENCES

Mani, M. S. 1959. Cecidotheca Indica Agra Univ. *J. Res.* 8(2) : 91-280.

Mani, M. S. 1973. Plant Galls of India. Macmillan India, 354 pp.

Rohfritsch, O. and Shorthouse J. D. 1982. Insect Galls. In Molecular Biology of plant tumors ed. : *Güntes Kahl and J. S. Schell*, Academic Press : 131-152.

PISCES

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INTRODUCTION

The Eravikulam National Park (ENP) in Kerala is an integral part of the High Range—biogeographically, one of the prime biodiversity rich tracts in the Western Ghats, in perspective of its varied and complex ecological systems and communities. Its zoogeographical significance is also outstanding; no other zoogeographic territory in the entire Western Ghats is known for its fish fauna as rich and diverse as that of the High Range. It is well reflected in the works of Hora & Law (1941), Silas (1951), Zacharias *et al* (1996), Jayaram (1999) etc. Many of the species from this highland area are endemic to Western Ghats, and yet a few of these endemics are exclusively restricted to certain water bodies (local endemics) within the High Range water-shed system (Raj, 1941 a, b; Menon, 1996; Gopi, 2001). The Habitat diversity of the High Range in Kerala is such that every conceivable aquatic habitat is likely to have the representation of a good number of native fish species in its faunal composition.

The Eravikulam National Park despite being a part of the High Range, its aquatic habitat is considerably devoid of indigenous fish fauna, which is quite an intriguing feature considering the Park's proximity to the biodiversity—rich High Range of the southern Western Ghats. The conspicuous low diversity of Park's ichthyofauna was observed during the explorations of its aquatic habitats.

The Park's aquatic habitat system is constituted by innumerable number of perennial streams (head streams of first and second order) originating from

the shola forests in the hill-folds and joining to form moderately large stream channels. These stream channels, while meandering through hill basins and valleys, form occasional pools and marshy wet-land puddles along their course. At the Park's periphery, they take more or less a cascading course down along the abruptly steep gradient of the ENP plateau to join with the highland waters of the east flowing rivers of Eravikulam, Chinnar and Pambar (Tamil Nadu) and the west flowing river of Periyar (Kerala).

This paper while dealing with the available fish fauna of the park waters, attempts to correlate the paucity of the ichthyofaunal resources of the Park with the various attributes of ecological conditions, both abiotic and biotic, influencing the aquatic habitat system of ENP.

SYSTEMATIC ACCOUNT

- | | |
|--|----------------|
| Class | ACTINOPTERYGII |
| Division | TELEOSTEI |
| Order | CYPRINIFORMES |
| Family | CYPRINIDAE |
| Subfamily | CYPRININAE |
| 1. <i>Horallabiosa joshuai</i> Silas | |
| Subfamily | GARRINAE |
| 2. <i>Garra hughi</i> Silas | |
| Family | BALITORIDAE |
| Subfamily | NEMACHEILINAE |
| 3. <i>Oreonectes (Indoreonectes) keralensis</i> Rita & Nalbant | |

Order SALMONIFORMES
Family SALMONIDAE

4. *Salmo gairdnerii gairdnerii* Richardson

1. *Horlabiosa joshuai* Silas

1953. *Horlabiosa joshuai* Silas, *Rec. Indian Mus.*, **51(1)** : 30, text fig. and pl. 5 (type-locality: Singampatty, Tinnevely dist., Tamil Nadu).

Diagnostic characters : A deep and well defined rostral groove separating the upper lip from the rostrum. Lower lip closely adnate to lower jaw. Post-labial groove broadly interrupted in the middle. A post-labial callous pad (not a suetorial disc) in the mental region. Barbels two pairs, both the rostral and maxillary pairs well developed.

Material examined : None collected in the survey; however, reported by Raju Thomas *et al.*, (1999) from ENP.

Distribution : India : Headwaters of Tamaraparni river (Kalakad Wildlife Sanctuary, Tirunelveli dist., Tamil Nadu) and headwaters of Pambar river (Chinnar Wildlife Sanctuary and Eravikulam National Park, Idukki dist., Kerala), Western Ghats.

Habitats : Hillstreams (Headwaters of Tamaraparni and Pambar rivers).

Remarks : Talwar and Jingran (1991) treated *H. joshuai* as a synonym of *Garra mullya*. Rema Devi (1992) based on a large collection of specimens (598 exs.) redescribed the species confirming its validity as *H. joshnai*, which was vouched by Jayaram (1999).

2. *Garra hughii* Silas

1955. *Garra hughii* Silas, *Rec. Indian Mus.*, **52(1)** : 2, pl. 4, figs 1-4 (type-locality : Lower Vaguvarrai Estate, High Range, Travancore-Cochin (Idukki dist.), Kerala State).

Diagnostic characters : Body elongate and slender. Snout broadly rounded and smooth with no tubercles on it, and without a proboscis or lateral lobes. Barbels two pairs, shorter than the eye-diameter. Dorsal fin inserted almost midway between tip of snout and caudal fin base. Lateral

line with 36 to 38 scales. Scales generally absent on the back along a mid-dorsal streak. Naked breast and belly.

Material examined : None collected in the survey; however, reported by Raju Thomas *et al.*, (1999) from ENP.

Distribution : Peninsular India : Cardamon and Palni Hills, Western Ghats.

Habitats : Streams in the High Range of Kerala.

Remarks : Specimens of *G. hughii* from Chinnar Wildlife Sanctuary (collection, Zoological Survey of India, Calicut) and from ENP (collection, Raju Thomas *et al.*, 1999) were observed to have scales on the back as against the absence of scales along the mid-dorsal streak in the specimens mentioned in the original description of this species.

3. *Oreonectes (Indoreonectes) keralensis*
Rita & Nalbant

1978. *Oreonectes (Indoreonectes) keralensis* Rita & Nalbant, *Trav. Mus. Hist. natn. Grigore Antipa*. **19** : 185 (type-locality : Pampadampara, Kerala).

1987. *Noemacheilus keralensis* : Menon, *Fauna of India, Pisces*. **4** : 193, pl. 10, fig. 2.

1991. *Nemacheilus keralensis* : Talwar & Jingran, *Inland fishes of India and Adjacent Countries*, vol. **1** : 484.

Diagnostic characters : A small subcylindrical loach with anterior nostrils prolonged into nasal barbels. Upper lip not interrupted in the middle. Caudal fin rounded. Dorsal fin with 7 branched rays, nearer caudal base than tip of snout. Pelvic fins inserted in advance of that of dorsal. Ill-defined black streaks or spots on body; a narrow black stripe, often interrupted, on base of caudal fin.

Material examined : 5 exs., Rajamalai, 26.ii.95. Coll. R. M. Sharma; 2 exs., Naikoli Malai, 1.iii.95. Coll. R. M. Sharma.

Distribution : India : Western Ghats (High Range), Kerala.

Habitat : High elevation hills streams in Kerala.

Remarks : Jayaram (1999) has dealt the species

in its original nomenclature in the light of *Oreonectes* Gunther being currently treated as a valid genus, in accordance with the latest classification.

4. *Salmo gairdnerii gairdnerii* Richardson

Common name : Rainbow Trout

1836. *Salmo gairdnerii* Richardson, *Fauna boreali Amer.*, Fish (3) : 221 (type-locality : Columbia river at Port Vancouver).

1982. *Salmo gairdnerii gairdnerii* : Tilak and Sharma. *Game fishes of India and Angling* : 150, fig. 56 b.

Diagnostic characters : Fish having a smooth, small adipose dorsal fin inserted above mid-anal. Sides of body above lateral line, dorsal and caudal fins profusely covered with small, black spots. Back bluish and the side often with a longitudinal pinkish streak or rainbow iridescence.

Material examined : 1 ex., Meenthotti (Rajamalai), 6.iv.94. Coll. K. C. Gopi & R. M. Sharma.

Distribution : Atlantic coast of North America from South Alaska to Mexico; introduced into India (fresh waters of Nilgiris and High Range (Western Ghats), Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh (Western Himalaya); Pakistan and Sri Lanka.

Remarks : Rainbow Trout is basically an anadromous fish (living in the sea, but spawning in fresh water). But, the trout population in ENP waters have lost their migratory instinct and become permanent fresh water forms.

OBSERVATION & DISCUSSION

The salient features of the Park's aquatic habitat observed during the explorations can be summarised into the following : i. the dominance of the exotic Rainbow Trout, *Salmo gairdnerii gairdnerii* Richardson in the Park waters, ii. poor diversity of ichthyofauna and iii. the sublevel productivity of the Park's aquatic habitat.

The explorations of aquatic habitats of ENP yielded only fish samples of two species viz., the

exotic Rainbow Trout, *Salmo gairdnerii gairdnerii* Richardson and the hillstream loach, *Oreonectes (Indoreonectes) keralensis* Rita & Nalbant.

The Rainbow Trout (*S. gairdnerii gairdnerii*) is the most dominant and the ubiquitous species in the aquatic system of the Park. This exotic trout introduced into the country in the year 1869 as game and food fish, and experimentally stocked in the cold water systems of ENP for its wide spread propagation, is now successfully thriving in the Park waters.

The favourable habitat conditions that enable trouts' survival and perpetuity are clear and unpolluted cold water gushes with low sediment feature and cold temperate montane climate. Further, the trouts in the Park waters virtually face no competition with native fish species. The abundance of the trout enemies such as crabs predated on fries and fingerlings or larvae of odonata and aquatic hemiptera, both destructive to fertilized ova and fries of the fish is also poor in the aquatic system and, therefore, could hardly make an impact on the trout population. Besides, trouts' are predaceous, known to feed on a variety of small organisms, the larger individuals tending to become piscivorous. Thus, trouts always dominated in the Park's aquatic habitats to the extent of possibly affecting the existence of other aquatic fauna including native fish species.

Another exotic trout fish, the Brown Trout, *Salmo trutta fario* Linn., is also said to be present in the Park waters. But, our efforts to collect a sample specimen of this species was in vain. This trout species is either absent in the Park waters or, if present, its population is obviously at a very low density, definitely sublevel to that of the Rainbow Trout. It appears as pointed out by Tilak & Sharma (1982) that naturalisation of Brown Trout population is not as much a success as that of the Rainbow Trout which is better adapted to comparatively warmer waters of high-elevation temperate-montane-zone like ENP where the Brown Trout fails to breed being constrained by lacking the requisite breeding conditions that are available in the colder and higher reaches of the snow-fed rivers in the Himalaya.

Oreonectes (Indoreonectes) keralensis, a hill stream loach found only in high elevations and also endemic to the Western Ghats, seems to have sporadic distribution with thin population in the Park's streams. Other than these two species, the fish sample collections from ENP waters did not represent any other fish species especially native forms which are likely to be present in the headwaters associated with the High Range water shed system. There may be other fish species also in the Park's aquatic habitats, particularly in the stream-habitat areas exhibiting riparian features in the valleys harbouring southern tropical hill forests. Very recently, in addition to the above two species, another two fish species namely, *Garra hughi* Silas and *Horallabiosa joshui* Silas, have also been reported from ENP (Raju Thomas et al, 1999). Thus, altogether four fish species are occurring in the Parkwaters. With the exception of the exotic Rainbow Trout, the remaining three native species reported from E.N.P. are endemic to Western Ghats, 'South of Palakkad Gap'

The inference from the explorations of aquatic habitats of ENP is that there is perceptible decrease in the diversity of not only the native fish species, but also the other aquatic faunal communities, a feature quite unlikely to observe in the aquatic habitats found outside the Park, within the High Range water shed system.

The ecological conditions taken in their sum-total tend strongly to favour the poor diversity and abundance of the aquatic faunal elements including native fish forms. The influence of the abiotic factors related to the physiography, climate, vegetation and hydro-edaphic factors are well conceivable.

Physiographically, the high elevated plateau of ENP with lofty hills and peaks, in fact, forms the vertex of the High Range with the difficulty of accessibility. Since the plateau periphery is naturally curved into precipitous and abruptly steep gradient on almost all sides, it is in effect, a one-way geographical barrier checking the upstream migration of fish and other aquatic fauna to the Park, at the same time passively influencing the aquatic faunal exit from the Park. Thus, there is a higher probability of aquatic faunal drain

from the Park rather than the faunal intake to it from the downstreams outside the Park.

The cold water system and the cold temperate montane climate may be congenial for the survival and perpetuity of exotic Rainbow Trout, but the same could be critical for many of the native fish species.

Vegetation restricted to sholas and rolling grasslands tends to minimise the aquatic habitat diversity limiting the feeding and breeding ground for fish even during the seasonal flooding period.

The aquatic faunal impoverishment in the Park is further linked with the combined habitat features: lotic and lentic nature of stream channels, poor substrate-features and debris in the aquatic system including inadequate riparian features such as overhangs and vegetation.

Heavy seasonal rainfall (upto the maximum of 5000 mm) and the consequent heavy discharge of water during monsoon result in high flushing rate in stream channels, which does not favour colonisation of phyto and zooplanktonic communities. At the same time, the rapid and spatey discharge of water disturbs and dislodges not only the substrate and the nutrient sediment but also the available micro organisms (nutrient releasers) and standing crops of plankton communities upon which depend the other aquatic invertebrate and vertebrate fauna. And, during off season, the lotic (flowing) phase of stream channels transforms to somewhat lentic (static) environment with small pools and wetlands in its course. Slower changes in discharge with less turbulence, substrate accretion and nutrient inputs etc., once again initiate the growth and build up of primary productive communities. This perennial fluctuating phases of growth and destruction of primary productive communities in the Park's aquatic habitat system is a unique feature of the ecology of the Park's aquatic habitats characterising its sublevel productivity.

The biotic factors that seem to have influenced the faunal impoverishment of the aquatic habitats in the ENP are the negative impacts from the man made habitat modification and the naturalisation of exotic Rainbow Trout population.

Since very long time back itself, habitat modification in the form of tea plantation on extensive land coverage surrounding the Park area had come into being, after the alteration of natural habitats, mostly forests. Alteration of forest habitat greatly affects the riparian features by bringing about drastic changes in the stream courses and energy inputs, which in turn affect the fish and other aquatic communities resulting in the depletion of their diversity and abundance. Pressure on fish life influenced by habitat modification as well as the ever-increasing anthropogenic activities in this area since the beginning of tea plantations, must have been strong reasons for poor ichthyofaunal diversity in and around ENP.

The biotic influence of the exotic Rainbow Trout population on fish and other aquatic faunal diversity and richness, appears to be very conspicuous in the aquatic habitats of ENP. The dominance and ubiquity of this predatory and very agile game fish in the Park waters reveal that it has very successfully established itself in the aquatic system outcompeting the other aquatic faunal communities including native fish fauna, possibly contributing to the loss or depletion of their diversity to the present low density levels. Tilak and Sharma (op. cit.) have reported a parallel phenomenon in the 'Bringi' Valley in Kashmir wherein conspicuous absence of endemic native fish species was observed following the introduction of Brown Trout, *S. trutta fario*.

REFERENCES

- Gopi, K.C. (2001) : *Garra Periyarensis*, a new cyprinid fish from Periyar Tiger Reserve, Kerala, India. *J. Bombay nat. Hist. Soc.*, **98** (1) : 80-83.
- Hora, S. L. & Law, N. C. (1941) : The fresh water fish of Travancore. *Rec. Indian Mus.*, **43** : 233-256.
- Jayaram, K. C. (1999) : *The freshwater fishes of the Indian Region*. Narendra Publishing House, Delhi. xxvii + 551, pls. XVIII.
- Menon, A. G. K. & Jacob P. C. (1996) : *Crossocheilus periyarensis*, a new cyprinid fish from Thanikkudy(Thekkady), Kerala, India. *J. Bombay nat. Hist. Soc.*, **93**(1) : 62-64.
- Raj, B. S. (1941a) : On a new genus of Schizothoracinae fishes from Travancore, South India. *Rec. Indian Mus.*, **53** : 209-214.
- Raj, B. S. (1941b) : Two new cyprinid fishes from Travancore, South India, with remarks on *Barbus (Puntius) micropogon* Cun. and Val. *Rec. Indian Mus.*, **53** : 375-386.
- Raju Thomas, K., Biju, C. R., Ajitkumar, C. R. & John George, M. (1999) : Ichthyofauna of Eravikulam National Park with notes on Trout culture in Rajamalai, Munnar, Kerala. *J. Bombay nat. Hist. Soc.*, **96**(2) : 199-202.
- Rema Devi, K. (1992d) : Fishes of Kalakad Wildlife Sanctuary, Tirunelveli district, Tamil Nadu, India with a redescription of *Horabiosa joshuai* Silas. *Rec. zool. sur. India*, **92**(1-4) : 193-209.
- Silas, E. G. (1951b) : Fishes from the High Range of Travancore. *J. Bombay nat. Hist. Soc.*, **50**(2) : 323-330.
- Talwar, P. K. & Jhingran, A. G. (1991) : *Inland fishes of India and Adjacent countries*. Vol. 1 & 2. Oxford and IBH Publishing Co. New Delhi. pp. 1158.
- Tilak, R. & Sharma, V. (1982) : *Game fishes of India and Angling*. International Book Distributors, Dehra Dun. pp. 304.
- Zacharias, A. K., Bhardwaj & Jacob, P. C. (1996) : Fish fauna of Periyar Tiger Reserve. *J. Bombay nat. Hist. Soc.*, **93**(1) : 39-43.

AMPHIBIA

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INTRODUCTION

The amphibian fauna of the world comprises of about 5150 species. Of this, 216 species are known to occur in India. Within Indian limits, comparatively higher concentrations of genera and species in amphibian populations can be found in the Western Ghats and the north-eastern region (Chanda, 1988). Western Ghats is the richest in India in terms of amphibian endemism. 93 amphibian taxa are endemic to Western Ghats. A perusal of the distributional data of Indian amphibians provided by Dutta (1997) reveals the occurrence of only *Rana leptodactyla* in the Eravikulam National Park. Including this species, the present study confirms the occurrence of 11 species of amphibians in the Park, the details of which are presented here.

SYSTEMATIC ACCOUNT

Class AMPHIBIA
Order ANURA
Family RANIDAE

1. *Rana leptodactyla* Boulenger

1882. *Rana leptodactyla* Boulenger, *Cat. Batr. Sal. Brit. Mus., London* : 57.

Diagnostic characters : A small sized Ranid with papillate tongue; toes not more than 1/4 webbed; first finger shorter than second; tips of fingers and toes dilated into discs; tympanum 2/3 diameter of the eye; loreal region very oblique; snout blunt; tibio-tarsal articulation reaching the tip of the snout or beyond; heels overlapping when

the limbs are folded at right angles to the body; skin of back with short, longitudinal glandular folds.

Material examined : 3 exs., Rajamalai, 26.ii.95 & 3.iv.94, colls : R. M. Sharma & K. C. Gopi; 7 exs., Meenthotti, 27.ii.95, coll : R. M. Sharma; 5 exs., Naikollimalai, 28.ii.95, coll : R. M. Sharma; 2 exs., Turner's valley, 5.iii.95, coll : R. M. Sharma; 3 exs., (Tadpoles), Eravikulam River, 3.iii.93, coll : M. S. Pradhan.

Measurements : Snout to vent (s-v) length : 9-23 mm.

Taxonomic Notes : In a recent classification suggested by Dutta (1997) the species is treated as *Indirana leptodactylus* (Boul.).

2. *Rana limnochares* Gravenhorst

1829. *Rana limnochares* Gravenhorst, *Deliciae Musei Zoologici* : 41.

Diagnostic characters : A small sized Ranid without papilla on tongue; toes usually half webbed with three phalanges of the fourth toe free; tibio-tarsal articulation reaching the nostril; outer metatarsals united in the basal half or third; first finger longer than second; inner and outer metatarsal tubercles present; skin above often warty with short and interrupted longitudinal glandular folds.

Material examined : 2 exs., Eravikulam river, 3.iii.93, coll. : M. S. Pradhan; 4 exs., Kolukkumalai, 4.iii.93 & 10.iv.94, coll : M. S. Pradhan & K. C. Gopi; 3 exs., Meenthotti, 27.ii.95, coll : R. M. Sharma.

Measurements : s-v Length : 19-21 mm.

Taxonomic note : Dutta (1997) treats the species under the name *Limnonectes limnocharis* (Graven.).

3. *Nyctibatrachus* sp.

Material examined : 5 exs., Kolukkumalai, 4.iii.95, coll : R. M. Sharma; lex., Eravikulammalai, 7.iii.95, coll : R. M. Sharma.

Remarks : Though close to *N. deccanensis* Dubois, the species exhibit variations in a few characters from all the known species of *Nyctibatrachus*. Further detailed study is required to establish its true identity.

Measurements : s-v length : 15-23 mm.

4. *Micrixalus* sp.

Material examined : 1 ex., Turners' valley, 5.iii.95, coll : R. M. Sharma.

Measurement : s-v length : 27 mm.

Remarks : The species appears to be distinct from all the hitherto known species of *Micrixalus*. However, it needs detailed comparative study with other species of the genus in order to establish its specific identity.

Family MICROHYLIDAE

5. *Ramanella montana* (Jerdon)

1853. *Hylaedactylus montanus* Jerdon, *J. Asia. soc.* 22 : 533.

Diagnostic characters : A small sized frog with well marked post-narial ridges which are nearly in contact on mid-line; belly dark brown or blackish with white spots or blotches; toes webbed; skin smooth.

Material examined : 2 exs., Anamudi, 5.iv.94, coll : R. M. Sharma.

Measurements : s-v length : 25-33 mm.

Family BUFONIDAE

6. *Bufo melanostictus* Schneider

1799. *Bufo melanostictus* Schneider, *Hist. Amph.* 1. Jena : 216.

Diagnostic characters : A large toad with prominent cranial ridges and with tubercles bearing black cornifications on the cranial ridges, upperlips, tips of fingers and toes, metatarsal tubercle and palm; parotid glands large and prominent; tympanum distinct, 2/3 diameter of eye; first finger equal to or longer than second; skin heavily tuberculated with black spine-tipped warts; two series of large warts along middle of the back.

Material examined : 2 exs., Near Eravikulam hut, 3.iii.93, coll : M. S. Pradhan; 1 ex. Rajamalai, 4.iv.94, coll : R. M. Sharma; 3 exs., Anamudi, 5.iv.94, coll : K. C. Gopi; 2 exs., Bhimanada, 12.iv.94, coll : K. C. Gopi; 2 exs., Kolukkumalai, 10.iv.94, coll : K. C. Gopi; 1 ex., Turner's valley, 5.iii.95, coll : R. M. Sharma.

Measurements : s-v length : 40-83 mm.

Family RHACOPHORIDAE

7. *Rhacophorus pleurostictus* (Gunther)

1864. *Polypedates pleurostictus* Gunther, *Rept. Brit. India* : 430.

Diagnostic characters : A medium sized frog with vomerine teeth in two small groups; snout rounded; canthus rostralis distinct and loreal region concave; tympanum half the diameter of the eye; fingers with a distinct web at base; subarticular tubercles moderate; inner metatarsal tubercle prominent; skin smooth or finely granular; belly and lower surface of thighs granular; groin and sides of thighs purplish brown with yellow spots or marbling; limbs with dark cross bands.

Material examined : 2 exs., Bhimanada, 12.iv.94, coll : K. c. Gopi; 1 ex., Rajamalai, 26.ii.95; coll : R. M. Sharma; 2 exs., Naikollimalai, 28.ii.95 & 1.iii.95, coll : R. M. Sharma.

Measurements : s-v length : 40-61 mm.

8. *Philautus pulcherrimus* (Ahl)

1927. *Rhacophorus pulcherrimus* Ahl, *Sitz. Ges. Naturf. Freunde Berlin* : 41.

Diagnostic characters : Tongue without a papilla; tympanum indistinct; throat smooth; fingers with a rudiment of web; tibio-tarsal articulation reaching between eye and tip of snout; Upper arm colourless; thigh with a narrow green band.

Material examined : 1 ex., Meenthotti, 27.iii.95. Coll : R. M. Sharma.

9. *Philautus signatus* (Boulenger)

1882. *Ixalus signatus* Boulenger, *Cat. Batr. Sal. Brit. Mus.*, London : 106.

Diagnostic characters : Tongue with a free pointed papilla in anterior part of median line; snout pointed; hinder side of thigh not coloured or merely with brown reticulation.

Material examined : 3 exs., Turner's valley, 5.iii.95, coll. : R. M. Sharma.

Measurements : s-v length : 16-24 mm.

10. *Philautus beddomii* (Gunther)

1876. *Ixalus beddomi* Gunther, *Ann. Mag. Nat. Hist.* 4(17) : 567-577.

Diagnostic characters : Tongue without papilla; tympanum indistinct; throat granular; tibio-tarsal articulation reaching eye; upper arm usually green above.

Material examined : 1 ex., Rajamalai, 26.ii.95, coll. : R. M. Sharma; 1 ex., Naikollimalai, 28.ii.95, coll. : R. M. Sharma; 15 exs., Kolukkumalai, 4.iii.95, coll. : R. M. Sharma; 2 exs., Turner's valley, 5.iii.95, coll. : R. M. Sharma; 12 exs., Eravikulammalai, 7.iii.95, coll. : R. M. Sharma; 5 exs., Meenthotti, 27.iii.95, coll. : R. M. Sharma.

Measurements : s-v length : 9-24 mm.

11. *Philautus nasutus* (Gunther)

1868-1869. *Ixalus nasutus* Gunther, *Proc. zool. soc.*, London : 484.

Diagnostic characters : Tongue without a conical papilla; tympanum perfectly distinct, one third the diameter of eye; fingers free; toes not quite half webbed; a narrow glandular line along middle of head and back.

Material examined : 1 ex., Anamudi, 5.iii.94, coll. : K. C. Gopi.

Measurements : s-v length : 18 mm.

DISCUSSION

The faunal dynamics in a tropical evergreen ecosystem is not often visible due to its high degree of interacting diversity. However, in an ecosystem like that of Eravikulam National Park where the faunal diversity is not very high, the interacting mechanisms often become apparent. In such an ecosystem the dependence of one faunal group on another and with the environment become much pronounced. Thus, the amphibian population of the park clearly exhibits its role forming direct link with the food web of the Ophidian (Reptilia) fauna of the park particularly in the Park's core area.

The two very common snakes in the park are *Ahaetulla dispar* and *Amphiesma stolata*. *Ahaetulla dispar*, commonly known as Gunther's whip snake is endemic to Southern Western Ghats. This snake is arboreal in habit. Mainly frogs, lizards and mice form its food. Tallying with the habits of the snake, the Park supports a good population of five different species of arboreal amphibia belonging to the family Rhacophoridae. *Amphiesma stolata*, commonly called the striped keelback is found all over India and elsewhere. The species is often seen around ponds, lakes, streams and rivers feeding on frogs, toads and small lizards and occasionally rodents. In concurrence with its habits, 5 species of frogs chiefly aquatic in habits (of the family Ranidae and Microhylidae) and 1 species of toad (family : Bufonidae) thrive in good populations in the Park.

Of the 11 species of Amphibia recorded in the study, population-wise, *Bufo melanostictus*, *Philautus beddomii* and *Rana leptodactyla* appear to dominate the rest. All the amphibian species recorded from the Park in the present study, but for *Rana limnocharis* and *Bufo melanostictus*, are mostly confined to the Western Ghats system.

REFERENCES

- Chanda, S. K. 1998. Amphibia in : *Faunal diversity in India.*, Envis Centre, Zoological Survey of India, Calcutta : 427-433.
- Dutta, S. K. 1997. *Amphibians of India and Sri Lanka - checklist and bibliography.*, Odyssey Publishing house, Bhubaneswar, India : 342 pp.

REPTILIA

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INTRODUCTION

The Eravikulam National Park (E. N. P.) could be explored for the studies of reptilian species by very few surveyers in the past. Smith (1935), Davidar (1978) and Rice (1979) made initial attempts to give an account on the reptilian fauna found in the core area of the park at an altitude over 2000m. Rice (1979) reported only three species of lizards and five species of snakes from this region. Therefore, it was felt necessary to make fresh attempts to update the reptilian inventory of the park. The inventory and the systematic account presented here are based on the collections made during the current surveys by Z. S. I. and also on the basis of the bibliographic records of the species reported from the park and adjoining areas.

SYSTEMATIC ACCOUNT

(* denotes the species collected from ENP during current surveys)

- Phylum CHORDATA
Class REPTILIA
Order SQUAMATA
Suborder LACERTILIA
Family GEKKONIDAE
- *1. *Dravidogecko anamallensis* (Gunther)
Family AGAMIDAE
- *2. *Salea anamallayana* (Beddome)
Family SCINCIDAE
- *3. *Scincella travancoricum* (Beddome)
4. *Mabuya carinata* (Schneider)

5. *Ristella travancorica* (Beddome)

Suborder SERPENTES (OPHIDIA)

Family UROPELTIDAE

6. *Uropeltis pulneyensis* (Beddome)

7. *Uropeltis maculatus* (Beddome)

8. *Teretrurus sanguineus* (Beddome)

Family COLUBRIDAE

*9. *Amphiesma stolatu* (Linn.)

*10. *Ahaetulla disper* (Gunther)

11. *Xylophis perroteti* (Dum. & Bib.)

Family VIPERIDAE

12. *Trimeresurus macrolepis* Beddome

13. *Trimeresurus malabaricus* (Jerdon)

*1. *Dravidogecko anamallensis* (Gunther)

Anamalai Dravid Gecko or Southern Forest Gecko

Locality : Rajamalai.

Habitat : Terrestrial, rock dwelling, generally found in high altitude forests of Southern India. nocturnal and insectivorous.

Current Survey Remarks : Two specimens were collected from Rajamalai region by ZSI survey parties during 1993 and 1994.

Distribution : Anamalai, Palni and Tirunelveli Hills of south Western India.

Status : Rare (Tikader and Sharma, 1992).

Reference : Smith (1935, Indian Reprint Ed.

1974) Murthy (1985) and Tikader and Sharma (1992).

***2. *Salea anamallayana* (Beddome)**
Dark Brown Bush Lizard

Locality : Shola forest at Kolukkumalai.

Altitude : 2000 + m.

Habitat : Terrestrial, rock dwelling, generally found in high altitude forests of Southern India; diurnal, insectivorous.

Current Survey Remarks : One specimen was collected.

Distribution : Anamalai, Palni and other hill ranges in South-Western India.

Status : Rare (Tikader and Sharma, 1992).

Reference : Smith (1935, Indian Reprint Ed. 1974), Murthy (1985) and Tikader and Sharma (1992).

***3. *Scincella travancoricum* (Beddome)**
South Indian Ground Skink

Locality : Sambamalai and Kolukkumalai.

Altitude : 2200 + m.

Habitat : Terrestrial, subarboreal, generally found in high altitude forests of Southern India; diurnal, insectivorous.

Current Survey Remarks : Two specimens were collected.

Distribution : Travancore, Anamalai and Palni hills in South India.

Status : Common (Tikader and Sharma, 1992).

Reference : Smith (1935, Indian Reprint Ed. 1974), Murthy (1985) and Tikader and Sharma (1992).

4. *Mabuya carinata* (Schneider)
Common Indian Skink

Locality : Core area of ENP.

Habitat : Terrestrial, living in multiparous habitats including grasslands, diurnal, insectivorous.

Current Survey Remarks : Nil; however, sighting in core area has been reported by Rice (1979).

Distribution : Peninsular India.

Status : Very common (Tikader and Sharma, 1992).

References : Rice (1979), Murthy (1985) and Tikader & Sharma (1992).

5. *Ristella travancorica* (Beddome)
Reddish-brown four fingered Skink

Locality : Anamalai Hills.

Altitude : 700-1700 m.

Habitat : Terrestrial, subarboreal, living in moist forests at higher altitudes, diurnal, insectivorous.

Current Survey Remarks : Nil; however, its occurrence in ENP has been reported by Rice (1979).

Distribution : Palni and Tirunelveli Hills and Malabar coast.

Status : Rare (Tikader and Sharma, 1992).

References : Smith (1935; Indian reprint Edition 1974), Rice (1979), Murthy (1985) and Tikader and Sharma (1992).

6. *Uropeltis pulneyensis* (Beddome)
Rough-tailed Snake

Locality : Seven Malais, Munnar Hills.

Altitude : 1820 m.

Habitat : Terrestrial, burrowing snake living by choice beneath soil, stones, logs, etc. in dense forests.

Current Survey Remarks : Nil.

Distribution : Madurai, Palni, Travancore and Alagar Hills in South India.

Status : Common (Rice, 1979).

Conservation status : Indian Wildlife (Protection) Act Schedule : IV.

Reference : Smith (1935; Indian Reprint Edition 1974), Rice (1979), Murthy (1982).

Remarks : Non-poisonous snake.

7. *Uropeltis maculatus* (Beddome)
Rough-tailed Snake

Locality : Core area of ENP.

Altitude : 2000-2400 m.

Habitat : Terrestrial, burrowing snake living in moist forests at higher altitudes.

Current Survey Remarks : Nil; however, its occurrence in ENP has been reported by Rice (1979).

Distribution : Travancore and other hills in southern Kerala.

Status : Abundance status not known.

Conservation status : Indian Wildlife (Protection) Act Schedule : IV.

Reference : Smith (1935; Indian Reprint Edition 1974), Rice (1979) and Murthy (1982).

Remarks : Non-poisonous snake.

8. *Teretrurus sanguineus* (Beddome)
Rough-tailed Snake

Locality : Nyamakkad, Munnar Hills.

Altitude : 1700-2800 m.

Habitat : Terrestrial, burrowing snake living in moist forests at higher altitudes.

Current Survey Remarks : Nil; however, its occurrence in Munnar hills close to ENP has been reported by Murthy (1982).

Distribution : Wynaad, Travancore Hills in Kerala.

Status : Abundance status not known.

Conservation status : Indian Wildlife (Protection) Act Schedule : IV.

Reference : Smith (1935; Indian Reprint Edition 1974) and Murthy (1982).

Remarks : Non-poisonous snake.

***9. *Amphiesma stolata* (Linn.)**
Buff striped keelback snake

Locality : Turner's valley and Meenthotti.

Habitat : Inhabits banks of rivers, tanks, etc. and marshy areas where frogs and toads are available. Hides in holes in ground. Diurnal in behaviour.

Current Survey Remarks : Two specimens were collected.

Distribution : Throughout India.

Status : Common (Daniel, 1983).

Conservation status : Indian Wildlife (Protection) Act Schedule : IV.

Reference : Smith (1935; Indian Reprint Edition 1974), Rice (1979) and Daniel (1983).

Remarks : Non-poisonous snake.

***10. *Ahaetulla disper* (Gunther)**
Gunther's whip-snake

Locality : Turner's Hill. Bhimanada tank, Rajamalai and Anamudi.

Altitude : 2400-2700 m.

Habitat : Terrestrial, generally found in grasslands at higher altitudes, camouflaging very well in its green colouration with the surroundings; diurnal.

Current Survey Remarks : Eight specimens were collected.

Distribution : Nilgiri, Travancore and other hills in Southern India.

Status : Common.

Conservation status : Indian Wildlife (Protection) Act Schedule : IV.

Reference : Smith (1935; Indian Reprint Edition 1974), Rice (1979) and Daniel (1983) and Pradhan & Sharma (communicated).

Remarks : Non-poisonous snake.

11. *Xylophis perroteti* (Dvm. & Bib.)

Locality : Core area of ENP.

Habitat : Terrestrial, earth snake preferring to live in forest patches at higher altitudes, diurnal.

Current Survey Remarks : Nil; however, Rice (1979) reported its occurrence in ENP, Kerala.

Distribution : Wynaad to Tirunelveli Hills in Western Ghats.

Status : Abundance status is not known.

Conservation status : Indian Wildlife (Protection) Act Schedule : IV.

Reference : Smith (1935; Indian Reprint Edition 1974), Rice (1979) and Murthy (1982).

Remarks : Non-poisonous snake.

12. *Trimeresurus macrolepis* Beddome
Pit Viper

Locality : Fringe areas of the park.

Altitude : 1000-2400 m.

Habitat : Terrestrial, arboreal, prefers to live in bushes near riparian niches at higher altitudes.

Current Survey Remarks : Nil; however, Rice (1979) reported its occurrence in ENP Core area.

Distribution : Nilgiri, Palni, Anamalai, Shevaroy, Travancore and Neliampathy Hills.

Status : Uncommon.

Conservation status : Indian Wildlife (Protection) Act Schedule : IV.

Reference : Smith (1935; Indian Reprint Edition 1974), Rice (1979) and Aengals (1995).

Remarks : Poisonous snake. Injects haemotoxic poison, sufficient to kill an adult human being.

13. *Trimeresurus malabaricus* (Jerdon)
Malabar Pit Viper

Locality : Fringe areas of the park.

Altitude : 1000-2400 m.

Habitat : Terrestrial, arboreal, prefers to live in bushes in forest patches at higher altitudes.

Current Survey Remarks : Nil; however, Murthy (1981) reported its occurrence in adjoining area.

Distribution : South of Mahabaleshwar in Western Ghats and including Anamalai Hills.

Status : Common in hilly forests (Murthy, 1981).

Conservation status : Indian Wildlife (Protection) Act Schedule : IV.

Reference : Smith (1935; Indian Reprint Edition 1974), Murthy (1981) and Aengals (1995).

Remarks : Poisonous snake. Injects haemotoxic poison, sufficient to kill an adult human being.

DISCUSSION

Thirteen reptilian species which include five lizards and eight snakes are reported. Though the reptilian fauna has been poorly represented, ten out of the thirteen species reported are endemic to Western Ghats.

REFERENCES

- Aengals, R. 1995. Reptilian fauna in the plantation of Valparai, Western Ghats, Tamil Nadu, *Cobra* : 19 : 21-23.
- Daniel, J. C. 1983. *The Book of Indian Reptiles*. Publ. : Bombay Natural History Society, Mumbai.
- Davidar, E. R. C. 1978. Distribution and status of the Nilgiri Tahr (*Hemitragus hylocrius*). *J. Bombay nat, Hist. Soc.*, 75(3) : 815-844.
- Murthy T. S. N. 1981. Reptiles of the Silent Valley and New Amarambalam area, Kerala. *The Snake* : 15 : 42-52.
- Murthy T. S. N. 1982. An illustrated field guide to the rough tailed snakes of India. *The Snake* : 14 : 119-135.
- Murthy T. S. N. 1985. A field guide to the lizards of Western Ghats. *Rec. Zool. Surv. India*, Occ. paper No. 72 : 1-51.
- Pradhan, M. S. and Sharma, R. M. (Communicated). A note on occurrence and current status of Gunther's whip snake, *Ahaetula dispar* (Gunther) in *The Snake*.
- Rice C. C. 1979. Further observations on Nilgiri Tahr (*Hemitragus hylocrius*) in Eravikulam National Park, Kerala, India. *Unpublished Report submitted to the New York Zoological Society*.
- Smith, M. 1935 (Reprint Ed. 1974) *The Fauna of British India including Ceylon and Burma. Reptilia and Amphibia*, Vol. 2 *Sauria* and Vol. 3 *Serpentes*. Publ. Taylor and Francis, London.
- Tikader, B. K. and Sharma, R. C. 1992. *Handbook Indian Lizards*, Publ : Director, Zool. Surv. of India, Calcutta.

AVES

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INTRODUCTION

The richness and diversity of the bird fauna of Kerala have been documented by Salim Ali, based on his Travancore-Cochin Ornithological survey conducted in 1933-35. His surveys highlighted the importance of the high ranges of Kerala as important bird habitats. Though Kerala has extensive network of protected areas, mostly on its ghats, very little information is available about the status of the bird fauna in these areas other than those documented by Salim Ali, in his book "Birds of Kerala" (1969). Srivasthava et. al. (1993) has listed the birdfauna of Periyar Tiger Reserve, Sugathan and Varghese (1996) listed the avifauna of Thattekkad bird sanctuary and Zacharias and Gaston (1993) has given an account of the bird fauna of Wynaad including the Wynad wildlife sanctuary. But no such detailed list is available for the avifauna of other protected areas of Kerala. The purpose of this article is to document the birdfauna of Eravikulam National Park.

OBSERVATIONS

The bird fauna of Eravikulam documented here (Table-I) is a compilation of random observations carried out between 1993 and 1998 at different parts of the park. The list though, not comprehensive, gives a picture of the birdfauna of the national park.

Observations were not systematic but uniform methods were adopted to record the occurrence of birds and their habitats. Birds which are seen in fairly good numbers in all the observations were treated as very common; those which were seen in smaller numbers (less than 10) but during every observations were treated as common; those which were observed in less number (less than 10) yet not in all days of observations were treated as uncommon and those which were recorded less than 5 times during the whole observations were treated as rare. Birds which were observed within the National park and outside are listed.

Altogether 94 species of birds were recorded from the Eravikulam National Park and its surrounding areas. This comprises 27 non-passerines and 67 passerines (Table-I). Of these, 8 species the Redwinged crested Cuckoo, the Crow pheasant, Ceylon Hoopoe, the Brown Shrike, the Jungle Myna the Brown Flycatcher, the Black Red Start and the Large Pied Wagtail were recorded from outside the National Park area. When compared with other protected areas of Kerala, 94 is a very low figure for the bird fauna in the Park. Ali (1935-37) has also mentioned this low bird diversity of the area in 1930's. Several common species which occur in fairly good numbers in other forest areas are not observed here. The ecological conditions of this higher elevation area may be unsuitable for many birds.

TABLE - I
Avifauna of Eravikulam National Parks

Sl. No.	Common Name	Scientific Name	Occurrence	Status	Habitat
Order : FALCONIFORMES					
Family : ACCIPITRIDAE					
1.	Blackwinged Kite	<i>Elanus caeruleus</i>	UC	B	G
2.	Japanese Desert Buzzard	<i>Buteo buteo</i>	UC	M	G
3.	Black Eagle	<i>Ictinaetus malayensis</i>	C	B	S
4.	Pale Harrier	<i>Circus macrourus</i>	UC	M	G
5.	Crested Serpent Eagle	<i>Spilornis cheela</i>	UC	B	S
Family : FALCONIDAE					
6.	Indian Kestrel	<i>Falco tinnunculus</i>	UC	B	G
Order : GALLIFORMES					
Family : PHASIANIDAE					
7.	Painted Bush Quail	<i>Perdica erythrorhyncha</i>	UC	B	G
8.	Grey Junglefowl	<i>Gallus sonneratii</i>	UC	B	S
Order : CHARADRIIFORMES					
Family : CHARADRIIDAE					
9.	Wood Snipe	<i>Gallinago nemoricola</i>	R	M	G
Order : COLUMBIFORMES					
Family : COLUMBIDAE					
10.	Jerdons Imperial Pigeon	<i>Ducula badia</i>	R	B	S
11.	Nilgiri Wood Pigeon	<i>Columba elphinstonii</i>	R	B	S
12.	Emerald Dove	<i>Chalcophaps indica</i>	UC	B	S
Order : CUCULIFORMES					
Family : CUCULIDAE					
13.	Redwinged Crested Cuckoo	<i>Clamator coromandus*</i>	R	M	S
14.	Southern Crow Pheasant	<i>Centropus sinensis*</i>	UC	B	S/G
15.	Lesser Coucal	<i>Centropus toulou</i>	UC	B	G
Order : STRIGIFORMES					
Family : STRIGIDAE					
16.	Grass Owl	<i>Tyto capensis</i>	R		G
Order : CAPRIMULGIFORMES					
Family : CAPRIMULGIDAE					
17.	Jerdon's Longtailed Nightjar	<i>Caprimulgus macrurus</i>	R	B	G

Sl. No.	Common Name	Scientific Name	Occurrence	Status	Habitat
Order : APODIFORMES					
Family : APODIDAE					
18.	Edible Nest Swiftlet	<i>Collocalia unicolor</i>	UC	B	G
19.	Brownthroated Spinetail Swift	<i>Chaetura gigantea</i>	UC	B	
20.	Whiterumped Spinetail Swift	<i>C. sylvatica</i>	UC	B	
21.	Indian Alpine Swift	<i>Micropus melba</i>	UC	B	G
22.	Large Whiterumped Swift	<i>Apus pacificus</i>	UC	B	G
Order : CORACIIFORMES					
Family : MEROPIDAE					
23.	Chestnutheaded Bee-eater	<i>Merops leschenaulti</i>	UC	B	G
Family : UPUPIDAE					
24.	Ceylon Hoopoe	<i>Upupa epops*</i>	R	B	G
Order : PICIFORMES					
Family : CAPITONIDAE					
25.	Small Green Barbet	<i>Megalaima viridis</i>	C	B	S
Family : PICIDAE					
26.	Malabar Golden backed Woodpecker	<i>Dinopium benghalense</i>	R	B	S
27.	Malherbe's Golden backed Woodpecker	<i>Chrysocolaptes lucidus</i>	R	B	S
Order : PASSERIFORMES					
Family : PITTIDAE					
28.	Indian Pitta	<i>Pitta brachyura</i>	R	M	S
Family : ALAUDIDAE					
29.	Small Nilgiri Skylark	<i>Alauda gulgula</i>	C	B	G
Family : HIRUNDINIDAE					
30.	Dusky Crag Martin	<i>Hirundo concolor</i>	UC	B	G
31.	Eastern Swallow	<i>H. rustica</i>	UC	M	G
32.	Nilgiri House Swallow	<i>H. tahitica</i>	C	B	G
33.	Redrumped Swallow	<i>H. daurica</i>	C	B	G
Family : LANIIDAE					
34.	Rufousbacked Shrike	<i>Lanius schach*</i>	UC	B	S
35.	Brown Shrike	<i>L. cristatus</i>	C	M	G
Family : DICRURIDAE					
36.	Indian grey Drongo	<i>Dicrurus leucophaeus</i>	UC	M	S

Sl. No.	Common Name	Scientific Name	Occurrence	Status	Habitat
Family : STURNIDAE					
37.	Jungle Myna	<i>Acridotheres fuscus*</i>	C	B	G
Family : CORVIDAE					
38.	Jungle Crow	<i>Corvus macrorhynchos</i>	C	B	
Family : CAMPEPHAGIDAE					
39.	Pied Flycatcher Shrike	<i>Hemipus picatus</i>	UC	B	S
40.	Scarlet Minivet	<i>Pericrocotus flammeus</i>	R	B	S
Family : PYCNONOTIDAE					
41.	Rubythroated Bulbul	<i>Pycnonotus melanicterus</i>	R	B	S
42.	Redwhiskered Bulbul	<i>P. jocosus</i>	VC	B	S/G
43.	Yellowbrowed Bulbul	<i>Hypsipetes indicus</i>	UC	B	S
44.	Black Bulbul	<i>H. madagascariensis</i>	VC	B	S
Family : MUSCICAPIDAE					
45.	Spotted Babbler	<i>Pellorneum ruficeps</i>	UC	B	S
46.	Scimitar Babbler	<i>Pomatorhinus horsfieldii</i>	UC	B	S
47.	Whitethroated Babbler	<i>Dumetia hyperythra</i>	R	B	S
48.	Rufous Babbler	<i>Turdoides subrufus</i>	UC	B	S
49.	Nilgiri Quaker Babbler	<i>Alcippe poioicephala</i>	UC	B	S
50.	Whitebreasted Laughing Thrush	<i>Garrulax jerdoni</i>	C	B	S
51.	Brown Flycatcher	<i>Muscicapa latirostris*</i>	UC	B	S
52.	Rufoustailed Flycatcher	<i>Muscicapa ruficauda</i>	UC	M	S
53.	Black and Orange Flycatcher	<i>M. nigrorufa</i>	UC	B	S
54.	Bluethroated Flycatcher	<i>M. rubeculoides</i>	R	M	S
55.	Verditer Flycatcher	<i>M. thalassina</i>	UC	M	S
56.	Nilgiri Verditer Flycatcher	<i>M. albicaudata</i>	UC	B	S
57.	Greyheaded Flycatcher	<i>Culicicapa ceylonensis</i>	UC	B	S
58.	Black Redstart	<i>Phoenicurus ochreros*</i>	R	M	
59.	Coorg Wren-Warbler	<i>Prinia hodgsonii</i>	UC	B	G
60.	Ashy Wren-Warbler	<i>P. socialis</i>	R	B	G
61.	Jungle Wren-Warbler	<i>P. sylvatica</i>	UC	B	S/G
62.	Broadtailed Grass Warbler	<i>Schoenicola platyura</i>	R	B	G
63.	Thickbilled Warbler	<i>Acrocephalus aedon</i>	R	B	S/G
64.	Blyth's Reed Warbler	<i>Acrocephalus dumetorum</i>	UC	M	S/G
65.	Booted Warbler	<i>Hippolais caligata</i>	R	M	S/G
66.	Tickell's Leaf Warbler	<i>Phylloscopus affinis</i>	UC	M	S
67.	Largebilled Leaf Warbler	<i>P. magnirostris</i>	UC	M	S

Sl. No.	Common Name	Scientific Name	Occurrence	Status	Habitat
68.	Greenish Leaf Warbler	<i>P. trochiloides</i>	UC	M	S
69.	Large Crowned Leaf Warbler	<i>P. occipitalis</i>	UC	M	S
70.	Tytler's Leaf Warbler	<i>P. tyleri</i>	R	M	S
71.	Whitebellied Short wing	<i>Brachypteryx major</i>	R	B	S
72.	Indian Blue Chat	<i>Erithacus brunneus</i>	UC	B	S
73.	Nilgiri Pied Bush Chat	<i>Saxicola caprata</i>	C	B	G
74.	Stone Chat	<i>S. torquata</i>	R	M	G
75.	Blueheaded Rock Thrush	<i>Monticola cinclorhynchus</i>	R	M	S
76.	Blue Rock Thrush	<i>M. solitarius</i>	R	M	G
77.	Malabar Whistling Thrush	<i>Myiophonus horsfieldii</i>	C	B	
78.	Nilgiri Thrush	<i>Zoothera dauma</i>	R	B	S
79.	Blackcapped Blackbird	<i>Turdus merula nigropileus</i>	UC		S
80.	Bourdillon's Blackbird	<i>T. m. bourdilloni</i>	UC	B	S
Family : PARIDAE					
81.	Grey Tit	<i>Parus major</i>	UC	B	S
82.	Yellowchecked Tit	<i>P. xanthogenys</i>	UC	B	S
Family : SITTIDAE					
83.	Velvetfronted Nuthatch	<i>Sitta frontalis</i>	UC	B	S
Family : MOTACILLIDAE					
84.	Tree Pipit	<i>Anthus hodgsoni</i>	R	M	G
85.	Rufous Rock Pipit	<i>A. similis</i>	R	B	G
86.	Nilgiri Pipit	<i>A. nilgiriensis</i>	UC	B	G
87.	Grey Wagtail	<i>Motacilla caspica</i>	UC	M	G
88.	Large Pied Wagtail	<i>M. maderaspatensis*</i>	UC	B	
Family : DICAERIDAE					
89.	Thickbilled Flowerpecker	<i>Dicaeum agile</i>	UC	B	S
90.	Tickell's Flowerpecker	<i>D. erythrorhynchos</i>	R	B	S
91.	Nilgiri Flowerpecker	<i>D. concolor</i>	UC	B	S
Family : NECTARINIIDAE					
92.	Small Sunbird	<i>Nectarinia minima</i>	UC	B	S
93.	Nilgiri White-eye	<i>Zosterops palpebrosa</i>	C	B	S
Family : FRINGILLIDAE					
94.	Common Rosefinch	<i>Carpodacus erythrinus</i>	UC	M	S

Abbreviations : Occurrence: C = common; UC = uncommon; R = rare; VC = very common.
 Status : B = resident; M = migrant.
 Habitat : S = shola; G = grassland; = not determined.
 * = observed outside the National Park.

DISCUSSION

The bird fauna of Eravikulam present many peculiarities. Out of the 94 species recorded in the area 26 are migrants, which include a good number of Leaf warblers. The Nilgiri Wood Pigeon, Nilgiri House Swallow, Rufous Babbler, Whitebreasted Laughing Thrush, Black and Orange Flycatcher, Nilgiri Verditer Flycatcher, Broadtailed Grass Warbler, Whitebellied Shortwing, Bourdillon's Blackbird, Nilgiri Pipit and the Small Sunbird which are endemic to the Western Ghats occur here. Of these the Whitebreasted Laughing thrush and the Black and Orange Flycatcher seem to occur in fairly good numbers here than any other areas in their range in the Southern Western Ghats.

Birds such as the Lesser Coucal, the Grass Owl, the Brownthroated Spinetail Swift, Whiterumped Spinetail Swift and the Nilgiri Thrush which have a discontinuous distribution in the Southern Western Ghats and the Eastern Himalaya also occur here. The Grass Owl

recorded by Ali(1959) but not observed during this study has also been included in the list.

A number of south-Asian Endemics like the Painted Bush Quail, the Grey Junglefowl, Edible-Nest Swiftlet, Rubythroated Bulbul, Yellowbrowed Bulbul and the Malabar Whistling Thrush also occur here. The Malabar Whistling thrush seems to be declining in numbers outside the National Park.

Frugivores are represented by the Jerdon's Imperial Pigeon, Nilgiri Wood Pigeon, Emerald Dove and the Small Green Barbet. Eighty species are insectivores. The preponderance of insectivores is an interesting feature of the birdfauna of the Eravikulam National Park.

In spite of the lesser number of species, as already mentioned, the bird fauna of Eravikulam presents many peculiarities. The good number of endemic species, leaf warblers and the high preponderance of insectivores are worth noting. There is much potential for a detailed study on the avian communities in the area.

REFERENCE

- Ali, S. (1935-37). Ornithology of Travancore and Cochín with notes by Hugh Whistler. *J. Bombay Nat. Hist. Soc.* Vol. 37-39, 8 parts.
- Ali, S. (1969). Birds of Kerala. Oxford University Press, Madras.
- Srivastava, K. K., V. J. Zacharias, A. K. Bhardwaj and P. Mohamad Jafer (1993). Birds of Periyar Tiger Reserve, Kerala, South India. *Indian Forester*, 119(10) : 816-827.
- Sugathan, R. & Varghese, A. P. (1996). A review of the Birds of Thattekkad Bird Sanctuary, Kerala. *J. Bombay Nat. Hist. Soc.* 93 : 487-506.
- Zacharias, V. J. & A. J. Gaston (1993). The Birds of Wynaad, Southern India. *Forktail*, 8 : 11-23.

MAMMALIA

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INTRODUCTION

Very few attempts have been made in past to study the faunal diversity of Eravikulam National Park (E.N.P.). Rice (1979, 1986 and 1990), Davidar (1976), Schaller (1971), etc. have carried out some studies on the faunal components of the region in and around the park. However, most of the work has been concentrated on the ecological and behavioural studies of one of the most endangered species, Nilgiri tahr. No special efforts were made in the past to prepare a faunal inventory of this region. The present account of mammalian species from E. N. P. is based on the collections made during the current Z. S. I. surveys and also on the direct sighting records. Related bibliographic information was also consulted and incorporated, wherever necessary, to update the past records.

OBSERVATIONS

About 48 species have been enumerated through the present study. A systematic account of every species with information on its status, distribution, habitat, etc., has been provided. The mammalian diversity appeared to be poor apparently due to extreme climatic conditions. Out of 372 mammalian species occurring in India only 48 sp. could be recorded, of which 22 species have been sighted directly or indirectly by survey parties, while 7 were collected during survey period.

Table-1 gives the details of number of

mammalian species sighted, collected and/or recorded from ENP region.

Table-1 : No. of Mammalian species sighted, collected and/or recorded from ENP

Total No. of species collected.	: 7
No. of species sighted on the basis of direct and indirect evidences during project period.	: 22
No. of species sighted by Parties other than ZSI in the recent past.	: 13
No. of species recorded earlier	: 6
Total No. of species reported	: 48

Fig.1 shows that eight mammalian orders have been reported, out of which Carnivora and Rodentia are the predominant ones. Surprisingly, it will also be seen that Chiroptera (bats) has been very poorly represented. The vast stretches of grasslands with fairly good population of diverse entomofauna appeared to have resulted in better and diversified representation of Insectivora. A Sri Lankan insectivore form, Kelaart's long-clawed shrew (*Feroculus feroculus*) preferring to live in montane ecosystem at higher altitudes, has been collected and reported for the first time from India (Pradhan, Sharma and Shankar 1997). Artiodactyla, though poorly represented in the Park includes an endangered endemic species of mountain goat, *Hemitragus hylocrius* (Ogilby) (Nilgiri Tahr). Similarly two out of four primate species, Nilgiri Langur and lion-tailed Macaque, were sighted in ENP region and are endemic to South-West India. Systematic

account of 48 mammalian species reported from the Park is given below :

SYSTEMATIC ACCOUNT

(* denotes species collected and/or sighted during current surveys)

Class MAMMALIA
Order INSECTIVORA
Family SORICIDAE
Subfamily CROCIDURINAE

***1. *Suncus murinus* (Linn.)**
House shrew

Locality : Bordering areas of Eravikulam National Park (ENP) like Rajamalai and Vaguvarrai.

Habitat : Synanthropic habitats, in and around houses, forest forms like grassland, scrub and forests.

Current Survey Remarks : Sighting in Tea Estates near Munnar, Rajamalai, Vaguvarrai, etc.

Distribution : Throughout India.

Status : Common.

Source : Lindsay (1929), Ellerman and Morrison-Scott (1951) and Corbet & Hill (1992).

Remarks : Taxonomically most controversial genus which needs comprehensive revision.

2. *Suncus montanus* (Kelaart)
Montane Shrew

Locality : E. N. P. core area at an altitude of 2000m. and more.

Habitat : Terrestrial mainly montane form above 1500m; may also enter houses.

Distribution : Upper Bhavani, Anamalai, Nilgiri and Palni Hills in India and Sri Lanka.

Status : Not uncommon.

Source : Lindsay (1929), Ellerman and

Morrison-Scott (1951) and Corbet & Hill (1992).

Remarks : This species includes *Suncus niger malabaricus* Lindsay (Corbet and Hill, 1992). The species needs comprehensive taxonomic revision.

***3. *Suncus dayi* Dobson**
Day's Shrew

Locality : Eravikulam National Park Hut in core area and Turner's Valley.

Habitat : Terrestrial mainly montane form at higher altitude;

Distribution : Palni Hills and Upper Bhawani area in South India.

Current Survey Remarks : Two males specimens were collected during the faunistic surveys conducted in 1993 and 1994.

Status : Not uncommon. It is an endemic species.

Source : Lindsay (1929), Ellerman and Morrison-Scott (1951) and Corbet & Hill (1992).

Remarks : The species needs comprehensive taxonomic revision.

***4. *Suncus struscus* (Savi)**
Savi's Pygmy Shrew

Locality : E. N. P. core area at higher altitude.

Habitat : Along moist soil of river banks.

Distribution : Throughout India.

Current Survey Remarks : One specimen was collected from Meenthotti, E. N. P. core area during 1994 survey.

Status : Not known.

Source : Lindsay (1929), Ellerman and Morrison-Scott (1951), Aswathanarayana *et al.* (1987) and Corbet & Hill (1992).

Remarks : The species includes *Suncus etruscus perrotteti* (Duvernoy) (Corbet & Hill, 1992).

***5. *Feroculus feroculus* Kelaart**
Kelaart's long-clawed Shrew

Locality : ENP Core area, Kerala.

Habitat : Terrestrial, lives in montane Swamp and marshes at around 2000m.

Distribution : Udhagamandalam (Ootacamond), Upper Bhavani and Sri Lanka.

Current Survey Remarks : Two specimens collected from ENP Core area during 1993 and 1994 surveys.

Status : Uncommon.

Source : Lindsay (1929), Ellerman and Morrison-Scott (1951), Corbet & Hill (1992) and Pradhan *et. al.* (1997).

Remarks : First record of this species from India (Pradhan *et. al.* 1997).

Order	CHIROPTERA
Suborder	MEGACHIROPTERA
Family	PTEROPODIDAE
Subfamily	PTEROPODINAE

***6. *Pteropus giganteus* (Brunnich)**
Indian Flying Fox

Locality : Near Rajamalai in ENP, Kerala.

Habitat : Diurnal biotope, daytime on large trees of different plant species. But at night, flies longer distances in search of fruits.

Distribution : Peninsular India.

Current Survey Remarks : Two roosting sites were located in Munnar and Rajamalai area under ENP.

Status : Locally common.

Conservation Status : Indian Wildlife (Protection) Act (1972 as amended upto 1991) Schedule : V.

Source : Ellerman and Morrison-Scott (1951),

Brosset (1962) and Corbet & Hill (1992).

Remarks : Family and subfamily names are based on Handley (1980) as referred in Corbet and Hill (1992).

***7. *Cynopterus sphinx* (Vahl.)**
Short nosed fruit bat

Locality : Rajamalai area under ENP.

Habitat : Generally seen on and near fruit bearing trees.

Distribution : Peninsular India.

Current Survey Remarks : Sighting in evening time at Information Centre near Rajamalai under ENP.

Status : Locally common.

Conservation Status : Indian Wildlife (Protection) Act (1972 as amended upto 1991) Schedule : V.

Source : Ellerman and Morrison-Scott (1951) and Corbet & Hill (1992).

Remarks : None.

Suborder	MICROCHIROPTERA
Family	RHINOLOPHIDAE
Subfamily	RHINOLOPHINAE

8. *Rhinolophus rouxi* Teminck
Horse-shoe leaf-nose bat

Locality : Rajamalai area under ENP.

Habitat : forest dwelling species, however, during day time prefers anthropic biotope.

Current Survey Remarks : Nil.

Distribution : Nilgiri Hills, Palni Hills, Silent Valley etc.

Status : Not known.

Source : Ellerman and Morrison-Scott (1951), Sinha (1973), Das (1986), Bates, Harrison & Muni (1994).

Remarks : The species includes *Rhinolophus petersil* (Corbet & Hill, 1992).

Family VESPERTILLIONIDAE
Subfamily KERIVOULINAE

9. *Harpiocephalus harpia madrassius* Thomas

Locality : Perumalmalai.

Habitat : Generally found in forests at higher altitudes.

Current Survey Remarks : Nil.

Distribution : Palni Hills.

Status : Mostly rare.

Source : Ellerman & Morrison-Scott (1951), Das (1986), Corbet & Hill, (1992).

Remarks : Subspecific status of the species remains unclear. Though Das (1986) has synonymized *madrassius* with *lasyurus*, Corbet & Hill (1992) still retains the identity of *madrassius* as a separate subspecies.

Order PRIMATES
Suborder ANTHROPOIDEA
Family CERCOPIITHECIDAE
Subfamily CERCOPIITHECINAE

*10. *Macaca radiata diluta* Pocock
Bonnet Macaque

Locality : ENP, Kerala.

Habitat : Arboreal, lives in thick forested areas of rain forest and evergreen forest.

Current Survey Remarks : Sighting of small troupes near Rajmalai and also in Sholas in core area.

Distribution : Anamalai ranges and Palni Hills in South India.

Status : The subspecies is endemic to South

India, especially to the parts of Western Ghats in Kerala and Tamil Nadu.

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule II, Part I, (ii) CITES : Appendix II.

Source : Ellerman & Morrison-Scott (1951), Roonwal & Mohnot (1977), Ramachandra (1988) and Corbet & Hill (1992).

Remarks : *M. radiata diluta* Pocock appears to be marginally sympatric with *Macaca silenus* (Linn.) Goodman & Barnabus (1972) as reported by Corbet & Hill (1992) have reported haemoglobin polymorphism in sample populations from Southern India.

11. *Macaca silenus* (Lin.)
Lion-tailed Macaque

Locality : Shola forests at an altitude around 1350m in ENP, Kerala.

Habitat : Arboreal, confined to dense evergreen and semi-evergreen forests.

Distribution : Hills of South-West India at the altitudes between 300-1300 m.

Status : Endemic species, Endangered (ZSI, Red Data Book, 1994).

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule I, Part I; IUCN : Endangered; CITES : Appendix I.

Source : Roonwal & Mohnot (1977), Prater (1980), Red Data Book (1994) and Corbet & Hill (1992).

Remarks : Nil.

Family CERCOPITHECIDAE
Subfamily COLOBINAE

*12. *Semnopithecus entellus* (Dufresne)
Hanuman Langur

Locality : Shola forests in core area of ENP and Rajmalai area.

Habitat : Terrestrial and arborreal, feeds upon, both leaves and fruits. They live in troops, raid crops and are tolerant of human activities.

Distribution : Throughout India.

Current Survey Remarks : Sighting of medium sized troops in Shola forests in core and adjoining areas in ENP.

Status : Locally common.

Conservation Status : Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule II, Part I ; CITES : Appendix I.

Source : Ellerman & Morrison-Scott (1951), Roonwal & Monhat (1977), Prater (1980), Ramachandran (1988) and Corbet & Hill (1992).

Remarks : *Presbytis entellus* (Duf.) has been redesigned as *Semnopithecus entellus* (Duf.) (Corbet & Hill, 1992).

***13. *Semnopithecus johni* (Fischer)**
John's langur, Nilgiri langur

Locality : Rajamalai in ENP.

Habitat : Terrestrial and Arboreal, lives in Canopy in Sholas or stretches of dense evergreen forests. They may invade gardens and belts of cultivated wood lands.

Current Survey Remarks : Sighting of one troupe in Rajamalai area in April 1994.

Distribution : South of Coorg in Western Ghats.

Status : Endemic to Western Ghats, Vulnerable (ZSI Red Data Book, 1994).

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule II, Part I, (ii) CITES : Appendix II.

Source : Ellerman & Morrison-Scott (1951), Roonwal & Monhot (1977), Prater (1980), Hohmann (1988) (as reported by Corbet & Hill, 1992); Corbet & Hill (1992) and K. Shankar (1997).

Remarks : Several animals suspected of being hybrids between this species and *S. entellus* have been recorded in the troops of *S. johni* (Hohmann, 1988).

Order CARNIVORA
Family CANIDAE

***14. *Canis aureus* Linn.**
Asiatic Jackal

Locality : ENP core area near ENP hut.

Habitat : Terrestrial, lives in variety of habitats from scrub to forests bordering human habitations, nocturnal animal. A very versatile species, prey includes rodent species, but sometimes also feed on carion.

Current Survey Remarks : Sighting of fresh droppings in core area at the altitude of about 2000m.

Distribution : Throughout India.

Status : Vulnerable (Tikader, 1983).

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule II, Part II, (ii) CITES : Appendix III (India).

Source : Ellerman & Morrison-Scott (1951), Prater (1980), Tikader (1983), Rice (1986) and Corbet & Hill (1992).

***15. *Cuon alpinus* (Pallas)**
Indian Wild dog or Dhole

Locality : Most of the core area of ENP, Kerala.

Habitat : Lives in open forests and on fringes and hunts in packs.

Current Survey Remarks : Sighting of a small pack on the slopes of Turner's valley.

Distribution : Peninsular India south of Ganges.

Status : IUCN : Vulnerable (Tikader, 1983).

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule II, Part I, (ii) CITES : Appendix II.

Source : Ellerman & Morrison-Scott (1951), Prater (1980), Tikader (1983) Rice (1986) and Corbet & Hill (1992).

Remarks : Nil.

Family URSIDAE

*16. *Ursus ursinus* (Shaw.)
Sloth Bear

Locality : Core are of ENP.

Habitat : Inhabits forested hills close to water, nocturnal animal feeding on fruits, flowers, honey etc.

Current Survey Remarks : Sighting in the forested patch at the base of National Park near Vagavurrai Tea Estate.

Distribution : Southern Peninsular India.

Status : IUCN : Vulnerable (Tikader, 1983).

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule I, Part I, (ii) CITES : Appendix III (India).

Source : Ellerman & Morrison-Scott (1951), Prater (1980), Tikader (1983) and Corbet & Hill (1992).

Remarks : *Melursus ursinus* has been redesignated as *Ursus ursinus* (Corbet & Hill, 1992).

Family MUSTELIDAE
Subfamily LUTRINAE

*17. *Lutra lutra* (Lin.)
Eurasian or Common otter

Locality : Core area of ENP, Kerala.

Habitat : Terrestrial, prefers to live near water bodies enriched in aquatic life. Makes lair in hollows beneath roots of trees near water bodies.

Current Survey Remarks : Sighting of one specimen in Eravikulam river near ENP hut in March 1995.

Distribution : Nilgiri, Palni Hills and Coorg in South India.

Status : Indeterminate (Karanth, 1987).

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule II, Part II, (ii) CITES : Appendix I.

Source : Ellerman & Morrison-Scott (1951), Prater (1980), Karanth (1987), Corbet & Hill (1992).

Remarks : Sighting by forest officials at a stream 4 kms south of ENP Hut. *Lutra lutra nair* (F. Cuvier) has lost its subspecific status and it has been retained at specific status only (Corbet & Hill, 1992).

18. *Amblonyx cinereus nirnai* (Pocock)
Oriental small clawed-otter

Locality : Core area of ENP, Kerala.

Habitat : High altitude form to be found always above the altitude of 1000 m, terrestrial, feeds on crustaceans and other invertebrates.

Distribution : Southern Coorg and hilly tracks above 1000 m in South India.

Status : Endemic species vulnerable, (ZSI Red Data Book 1994).

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule I, Part I, (ii) CITES : Appendix II.

Source : Ellerman & Morrison-Scott (1951), Prater (1980), Corbet & Hill (1992).

Remarks : Sighting by forest officials in core area near ENP, hut.

Subfamily MUSTELINAE

19. *Martes gwatkinsi* Horsfield
South Indian Yellow-throated Marten

Locality : Core area of ENP, Kerala.

Habitat : Terrestrial and arboreal, found at higher altitudes (3000 m.), diurnal when not disturbed.

Distribution : Nilgiri Hills, Coorg and Travancore.

Status : IUCN : Indeterminate (Corbet and Hill, 1992) and endemic.

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule II, Part II, (ii) CITES : Appendix III (India).

Source : Ellerman & Morrison-Scott (1951), Prater (1980), Ramachandran (1988) and Corbet & Hill (1992).

Remarks : Sighting by Forest officials in core area of E. N. P. at higher altitude.

Family VIVERRIDAE
Subfamily VIVERINNAE20. *Viverricula indica indica* Desmarest
Small Indian Civet

Locality : Sholas near Bhimanada tank, in ENP, Kerala.

Habitat : Terrestrial, nocturnal, sleeping in underground burrows, keeps to heavy forests, prefers to hunt by night, prey on rats, squirrel, small birds and lizards.

Distribution : Southern Peninsular India.

Status : Common (Karanth, 1987).

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule II, Part II.

Source : Ellerman & Morrison-Scott (1951), Prater (1980), Karanth (1987), Corbet & Hill (1992).

Remarks : Sighting of two individuals of small Indian Civet in the core area at higher altitude during the project period by forest officials.

Subfamily PARADOXURINAE

*21. *Paradoxurus hermaphroditus* (Pallas)
Palm Civet or Toddy cat

Locality : Core area (Alt. 1000 m) near Turner's valley in ENP, Kerala.

Habitat : Terrestrial, arboreal, nocturnal, lying curled up by day among the branches or in a hole in the tree trunk. Feeds on birds, small mammals and fruits.

Current Survey Remarks : Sighting of fresh dropping on as far north as the Narmada river.

Status : Common (Karanth, 1987).

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule II, Part II.

Source : Ellerman & Morrison-Scott (1951), Prater (1980), Karanth (1987) and Corbet & Hill (1992).

Remarks : Nil.

Subfamily HERPESTINAE

*22. *Herpestes edwardsi* (Geoffroy)
Indian Grey Mongoose

Locality : Border of ENP near Valparai Tea Estate, Kerala.

Habitat : Creature of open lands, scrub, jungle, cultivations, lives in hedges and thickets among bushes.

Current Survey Remarks : Sighting in the bordering areas near Valparai Tea Estate and Rajamalai area, Kerala.

Distribution : Peninsular India South of Narmada river.

Status : Common.

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule IV, (ii) CITES : Appendix III (India).

Source : Ellerman & Morrison-Scott (1951), Prater (1980) and Corbet & Hill (1992).

Remarks : Nil.

23. *Herpestes smithi* Gray
Ruddy Mongoose

Locality : E. N. P., Kerala.

Habitat : Generally seen in forested areas.

Distribution : Western ghats and Peninsular India.

Status : Not known.

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule IV, (ii) CITES : Appendix III (India).

Source : Ellerman & Morrison-Scott (1951), Prater (1980) and Corbet & Hill (1992).

Remarks : Nil.

*24. *Herpestes fuscus* Waterhouse
Indian Brown Mongoose

Locality : E. N. P. above 1000 m., Kerala.

Habitat : Prefers to live at high altitude (1000-2000 m.) but found in forested areas.

Current Survey Remarks : Sighting in ENP area.

Distribution : Palni Hills, Nilgiri Hills and South India above 1000m, Endemic to South Indian Hill ranges.

Status : Not known.

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) :

Schedule IV, (ii) CITES : Appendix III (India).

Source : Ellerman & Morrison-Scott (1951), Prater (1980) and Corbet & Hill (1992).

Remarks : Nil.

25. *Herpestes vitticollis* Bennet
Striped necked mongoose

Locality : Eravikulam National Park, Kerala.

Habitat : Though a forest living creature, it sometimes comes to cultivations near human habitations.

Distribution : South India.

Status : Locally not uncommon.

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule IV.

Source : Ellerman & Morrison-Scott (1951), Prater (1980) Rice (1986) and Corbet & Hill (1992).

Remarks : Sighting of a live specimen in core area by Rice (1986).

Family FELIDAE

26. *Felis chaus kelaarti* Pocock
Jungle Cat

Locality : Eravikulam National Park, Kerala.

Habitat : Terrestrial and nocturnal small cat, preferring to stay in bushy jungles, scrubs and forests.

Distribution : India.

Status : Vulnerable (Tikader, 1983).

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule II (Part II), (ii) CITES : Appendix II.

Source : Ellerman & Morrison-Scott (1951), Prater (1980) Rice (1986) and Corbet & Hill (1992).

Remarks : Sighting of live specimen by Forest officials near Vagavurai Tea Estate. Breeding in captivity has been reported by Gray (1972) as reported by Corbet & Hill (1992).

27. *Prionailurus bengalensis* Kerr
Leopard cat

Locality : ENP, Kerala.

Habitat : a forest living small cat adapted to different ecological conditions. Nocturnal, prefers to take shelter in the hollows of tree trunks, a good climber and swimmer as well.

Distribution : Throughout India.

Status : Vulnerable (ZSI Red Data Book, 1994).

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule I (Part I), (ii) CITES : Appendix I.

Source : Ellerman & Morrison-Scott (1951), Prater (1980) Rice (1986) and Corbet & Hill (1992).

Remarks : Following Herrington (1986), Corbet & Hill (1992) synonymised *Felis bengalensis* with *Prionailurus bengalensis* Kerr.

28. *Panthera pardus* (Linn.)
Leopard or Panther

Locality : ENP, Kerala.

Habitat : It inhabits a variety of habitats, like hills, plains, thick forests, scrubby jungle etc. away from and near human habitations. A bold animal preying on anything from small birds to large mammals.

Distribution : Throughout India.

Status : Vulnerable (ZSI Red Data Book, 1994).

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule I (Part I), (ii) CITES : Appendix I.

Source : Ellerman & Morrison-Scott (1951),

Prater (1980) Rice (1986) and Corbet & Hill (1992).

Remarks : (i) Recent sighting of live specimen in core area by forest Dept. officials and (ii) sighting of a melanistic form in core area by Rice (1986).

*29. *Panthera tigris* (Linn.)
Tiger

Locality : Core area of ENP, Kerala.

Habitat : Tiger lives in varied habitats from dry open jungles to mangrove swamps, nocturnal animal, hunts between sunset and dawn.

Distribution : Throughout India.

Current Survey Remarks : Sighting of a fresh droppings near Umayamalai.

Status : Vulnerable (ZSI Red Data Book, 1994).

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule I (Part I), (ii) CITES : Appendix I.

Source : Ellerman & Morrison-Scott (1951), Prater (1980) Rice (1986) and Corbet & Hill (1992).

Remarks : Sighting of live specimen near Bhimanada tank in core area by Forest Dept. officials.

Order PROBOSCIDEA
Family ELEPHANTIDAE

*30. *Elephas maximus* Linn.
(Sub-sp. : *Elephas maximus indicus* Cuvier)
Indian Elephant

Locality : Core area of ENP, Kerala.

Habitat : Lives in thick and tall forests, extremely adaptable and can live in steamy humid jungle or in cool elevated forests. Known for seasonal migrations. due to extreme climatic

conditions with heavy rainfall in the region and low mercury columns at night, the elephant populations most probably use the core area at higher altitudes as a migratory tract during day time between the adjoining forested areas at lower elevations.

Distribution : Karnataka, U.P., Bihar, Assam in India.

Current Survey Remarks : Sighting of elephant populations near Bhimnada tank, Rajamalai and also in a valley close to ENP, hut. On three occasions. The uprooting of tea plants and bamboo was noticed in the ENP area.

Status : Vulnerable (ZSI Red Data Book, 1994).

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule I (Part I), (ii) CITES : Appendix I.

Source : Ellerman & Morrison-Scott (1951), Prater (1980) Rice (1986) and Corbet & Hill (1992).

Remarks : Nil.

Order ARTIODACTYLIA
Family SUIDAE

***31. *Sus scrofa* (Linn.)**
Wild Boar

Locality : ENP Core area, Kerala.

Habitat : Versatile with respect to habitat, terrestrial, fossorial, omnivorous.

Distribution : Throughout India.

Current Survey Remarks : Sighting of wild boar small populations at 3-4 places in core area.

Status : Common.

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule III.

Source : Ellerman & Morrison-Scott (1951), Prater (1980) Rice (1986) and Corbet & Hill (1992).

Remarks : Considered as a serious pest of cultivations elsewhere.

Family CERVIDAE

***32. *Cervus unicolor* Kerr**
Sambar

Locality : ENP Core area, Kerala.

Habitat : Lives in small groups, usually in Sholas or woodlands and feed mainly by browsing.

Distribution : Peninsular India.

Current Survey Remarks : Sighting at 4-5 localities in core area.

Status : Common.

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule III.

Source : Ellerman & Morrison-Scott (1951), Prater (1980) Rice (1986) and Corbet & Hill (1992).

Remarks : Nil.

33. *Muntiacus muntjak* (Zimmerman)
Barking Deer

Locality : Core area at higher altitude of ENP, Kerala.

Habitat : Lives singly or in pairs in thick jungles and comes out in open to graze, diurnal in habit.

Distribution : India.

Status : Not common.

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule III.

Source : Ellerman & Morrison-Scott (1951), Prater (1980) Rice (1986) and Corbet & Hill (1992).

Remarks : Sighting of live specimen in shola behind ENP Hut by Forest Dept. officials. *Muntiacus muntjack malabaricus* Lydekker has been merged at specific level in *Muntiacus muntjack* (Zimmerman).

Family BOVIDAE
Subfamily BOVINAE

*34. *Bos gaurus* Smith
Indian Gaur

Locality : Core area at higher altitude of ENP, Kerala.

Habitat : Gaurs are essentially hill animals living in dense forests, lives in herds of 6-12 or even more individuals.

Distribution : India.

Current Survey Remarks : Sighting at Bhimanada tank, Turner's valley and Near ENP, Hut.

Status : Vulnerable (ZSI Red Data Book, 1994).

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule I (Part I), (ii) CITES : Appendix I.

Source : Ellerman & Morrison-Scott (1951), Prater (1980) Rice (1986) and Corbet & Hill (1992).

Remarks : Nil.

Subfamily CAPRINAE

*35. *Hemitragus hylocrius* (Ogilby)
Nilgiri Tahr.

Locality : Core area of ENP, Kerala.

Habitat : Lives mainly on cliff edges and on the fringes of the open grassy plateau mainly above 2000 m.

Distribution : Anamalai, ranges, Palni and Nilgiri Hills.

Current Survey Remarks : Sighting of small herds at 4-5 localities including Rajamalai, Bhimanada tank, Turner's Hills, Kolukkumalai Anamudi, etc. in core area above 2200 m.

Status : Endemic and Endangered (ZSI Red Data Book, 1994).

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule I (Part I).

Source : Ellerman & Morrison-Scott (1951), Prater (1980) Rice (1986) and Corbet & Hill (1992).

Remarks : Nil.

Order LAGOMORPHA
Family LEPORIDAE

*36. *Lepus nigricollis* F. Cuvier.
Black-naped hare

Locality : Bordering areas of ENP, Kerala.

Habitat : Prefers to stay in large tracts of bush and jungles alternating with cultivated plains and even in semiarid conditions.

Distribution : Peninsular India.

Current Survey Remarks : Sighting of a live specimen in bordering area close to Vagvurai Tea Estates.

Status : Common.

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule IV.

Source : Ellerman & Morrison-Scott (1951), Prater (1980) and Corbet & Hill (1992).

Remarks : Nil.

Order RODENTIA
Family SCIURIDAE
Subfamily FUNAMBULINAE

37. *Funambulus layardi dravidianus* (Robinson)
Layard's stripe squirrel

Locality : Forested bordering areas of ENP, Kerala.

Habitat : Not known.

Distribution : West of Travancore and Western ghats.

Status : Not known, but it is an endemic species.

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule I (Part I), (ii) CITES : Appendix I.

Source : Ellerman & Morrison-Scott (1951), Ellerman (1961) and Corbet & Hill (1992).

Remarks : Description based on single immature specimen. Further surveys recommend for confirmation of the occurrence of the subspecies in ENP, Kerala and other related studies.

38. *Funambulus sublineatus* (Waterhouse)
Dusky striped squirrel

Locality : Possible occurrence in forested areas around ENP border, Kerala.

Habitat : Terrestrial, arboreal, inhabiting forests/sholas, shy animal keeping to damp gullies in dense forest patches.

Distribution : Coorg, Nilgiri Hills, Travancore, Madras (in part) Kodai Kanal and High Range habitats.

Status : Not known but it is an endemic species.

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule I (Part I), (ii) CITES : Appendix I.

Source : Ellerman (1961), Agrawal &

Chakraborty (1979), Prater (1980) and Corbet & Hill (1992).

Remarks : Further surveys recommended for confirmation of occurrence and other related studies.

*39. *Funambulus tristriatus* (Waterhouse)
Jungle striped squirrel

Locality : Rajamalai and some shola patches in the core area of ENP, Kerala.

Habitat : Terrestrial, arboreal, prefers to live in thick forests even at high altitudes.

Distribution : Srimangala, Coorg, Travancore, Khandala and other places in Western Ghats.

Current Survey Remarks : Sighting of live specimens at Rajamalai and in some shola patches near ENP Hut.

Status : Not very uncommon, but endemic to Western Ghats.

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule I (Part I), (ii) CITES : Appendix I.

Source : Ellerman (1961), Agrawal & Chakraborty (1979) and Corbet & Hill (1992).

Remarks : Nil.

Subfamily RATUFINAE

40. *Ratufa indica maxima* (Schreber)
Indian Giant Squirrel or Malabar Squirrel

Locality : Contiguous forested areas of ENP with Chinnar WL Sanctuary.

Habitat : Terrestrial and arboreal in thick evergreen and moist-deciduous forests of South India.

Distribution : Nilgiri Hills, Cochin, Travancore, Malabar in South India.

Status : Not known, but it is an endemic species.

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule II (Part II), (ii) CITES : Appendix II.

Source : Ellerman (1961), Agrawal & Chakraborty (1979) and Corbet & Hill (1992).

Remarks : Sighting of a live specimen in a shola behind ENP Hut in 1993 by local Forest Dept. officials. However, further surveys recommended for confirmation of occurrence of the species in ENP, Kerala.

41. *Ratufa macroura* (Penant)
Grizzled Indian Giant Squirrel

Locality : Chinnar Wildlife Sanctuary which is contiguous with ENP, Kerala.

Habitat : Terrestrial, arboreal animal living in the riparian forest patches of higher altitude diurnal in habit and rarely comes on ground.

Distribution : Nilgiri and Palni Hills and Eastern Ghats.

Status : Endangered (ZSI Red Data Book, 1994) and endemic species.

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991), (ii) CITES : Appendix II.

Source : Ellerman (1961), Agrawal & Chakraborty (1979), Ramchandran (1989) and Corbet & Hill (1992).

Remarks : Sighting of small population in adjoining Chinnar Sanctuary by Ramchandran (1989).

Family HYSTRICIDAE

*42. *Hystrix indica* Kerr
Indian Crested Porcupine

Locality : Core area of ENP at high altitude, Kerala.

Habitat : A versatile species occurring in many

habitats ranging from arid rocky hill sides to monsoon forests (including shola-grassland ecosystem).

Distribution : Whole of India.

Current Survey Remarks : Sighting of quills and dropping on a road between ENP Hut and Bhimanada tank.

Status : Not known.

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule IV.

Source : Ellerman (1961), Prater (1980) and Corbet & Hill (1992).

Remarks : The species is considered as an agricultural pest also.

Family MURIDAE
Subfamily PLATACANTHOMYINAE

43. *Platacanthomys lasiurus* Blyth
Malbar Spiny Dormouse

Locality : Shola near Bhimanada tank, ENP, Kerala.

Habitat : Not known, but appears to be a forest dwelling species at higher altitudes.

Distribution : Coorg, Malabar, upper Bhavani and Indira Gandhi WL Sanctuary, Tamil Nadu.

Status : Not known.

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule IV.

Source : Ellerman (1961), Rajagopalan (1968) as reported by Corbet & Hill (1992), Prabhakar (1997).

Remarks : Kartik Shankar from C.E.S., Bangalore, collected two specimens from Shola forests at higher altitude in Upper Bhavani area.

Subfamily MURINAE

44. *Vandeleuria oleracea nilgirica* (Jerdon)
Indian long-tailed Tree mouse

Locality : Possible occurrence in Shola patches in ENP, Kerala.

Habitat : Lives in trees and shrubs or in any hide out couple of feet above the ground.

Distribution : Nilgiri Hills, Upper Bhavani, Eastern Ghats, Sri Lanka (in part).

Status : Not known.

Conservation Status : (i) Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule V.

Source : Ellerman (1961), Agrawal & Chakraborty (1980) and Corbet & Hill (1992).

Remarks : Corbet & Hill (1992) have allotted specific rank to *V. nilgirica*. However, they have opined further studies on additional material before confirmation. Kartik Shankar from C.E.S., Bangalore, collected two specimens from Shola forests at higher altitude in Upper Bhavani area.

*45. *Rattus rattus wroughtoni* Hinton
White bellied rat

Locality : ENP Hut and its surrounding area at high altitude 2350 m, ENP, Kerala.

Habitat : Terrestrial, sometimes depending on habitat arboreal. Though a form found in forest and plantations, both, it prefers to live close to human habitations.

Distribution : Endemic to Western ghats in India.

Current Survey Remarks : 2 ♂ specimens near ENP Hut.

Status : Not uncommon.

Conservation Status : Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule V.

Source : Ellerman (1961), and Corbet & Hill (1992).

Remarks : The sub-species is considered to be agricultural pest elsewhere.

*46. *Mus booduga* (Gray)
Little Indian Field Mouse

Locality : Near Shola close to ENP Hut, ENP, Kerala.

Habitat : Burrowing mouse living in the fields and forested areas, both.

Distribution : Whole of India.

Current Survey Remarks : One damaged specimen from a Shola on a way to Turner's valley at an altitude of 2350 + m.

Status : Common.

Conservation Status : Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule V.

Source : Ellerman (1961), Marshall (1977) and Corbet & Hill (1992).

Remarks : It is a widely spread species but can be confused with *Mus. dummi* considered as agricultural pest.

*47. *Mus cervicolor palnica* (Thomas)

Locality : ENP core area, ENP, Kerala.

Habitat : Terrestrial and high altitude form, generally found in grassy areas of Shola grassland ecosystem.

Distribution : Nilgiri and Palni Hills, Mysore, coorg and Upper Bhavani in South India.

Current Survey Remarks : Collected 1 ♂ from core area of ENP.

Status : Uncommon but it is an endemic subspecies.

Conservation Status : Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule V.

Source : Ellerman (1961), Marshal (1977) and Corbet & Hill (1992).

Remarks : Nil.

48. **Mus famulus famulus** (Bonhote)

Locality : Close to ENP Hut (Alt. 2400 m), ENP, Kerala.

Habitat : Terrestrial and a high altitude form, lives in evergreen shola-grassland ecosystems.

Distribution : South India (Above 1650 m).

Current Survey Remarks : Collected 2 ♂ ♂ form core area of ENP.

Status : Not uncommon but it is an endemic subspecies.

Conservation Status : Indian Wildlife (Protection) Act (1972 as amended upto 1991) : Schedule V

Source : Ellerman (1961), Marshal (1977) and Corbet & Hill (1992).

Remarks : Nil.

DISCUSSION

On the basis of this inventory, 17 species endemic to Western Ghats occur in ENP as presented in Table 2.

Table 2 : List of Endemic Mammalian Fauna reported from ENP

1. Shrew	:	<i>Suncus dayi</i> Dobson
2. South Indian Bonnet Macaque	:	<i>Macaca radiata diluta</i> Pocock
3. Lion-tailed Macaque	:	<i>Macaca silenus</i> (Lin.)
4. Nilgiri Langur	:	<i>Semnopithecus johnii</i> (Fischer)
5. Oriental small-clawed otter	:	<i>Amblonyx cinereus nirnai</i> (Pocock)
6. South Indian Yellow throated marten	:	<i>Martes flavigula gwatkinsi</i> Horsefield
7. Indian Brown Mongoose	:	<i>Herpestes fuscus</i> Waterhouse
8. Nilgiri Tahr	:	<i>Hemitragus hylocrius</i> (Ogilby)
9. Layard's striped squirrel	:	<i>Funambulus layardi dravidianus</i> (Robinson)
10. Dusky striped squirrel	:	<i>Funambulus sub-lineatus</i> (Waterhouse)
11. Jungle striped squirrel	:	<i>Funambulus tristriatus</i> (Waterhouse)
12. Indian Giant squirrel	:	<i>Ratufa indica maxima</i> (Schreber)
13. Grizzled Indian Giant squirrel	:	<i>Ratufa macroura</i> (Pennant)
14. Malbar spiny Dormouse	:	<i>Platacanthomys lasiurus</i> (Blyth)
15. White bellied rat	:	<i>Rattus rattus wroughtoni</i> (Hinton)
16. Field mouse	:	<i>Mus cervicolor painica</i> (Thomas)
17. Fawn coloured mouse	:	<i>Mus famulus famulus</i> (Bonhote)

It will be noticed from Table 2 that about eight species are arboreal forms dominated by macques and squirrels. All the arboreal forms concentrate in isolated Shola forest patches. The least representation of one of the major mammalian orders, Chiroptera (bats) is perhaps due to extreme climatic conditions. Attempts were made to note the level of endemism (Western Ghats endemics) amongst the mammalian species from ENP fig. 2 shows the level of endemism at around 36% which is distinctly higher than that reported from Nilgiri Biosphere Reserve (20%) (Pradhan and Kurup, communicated). Thus, it gives the indication of uniqueness in poorly represented mammalian diversity. Some of the

species like Nilgiri Tahr, Lion-tailed macaque, Kelaart's longclawed shrew, Yellow throated Marten, Grizzled giant squirrel etc. are restricted to such an extent that their area of global distribution is not even 1000 sq. kms. These species with restricted area of distribution needs special attention from conservation point of view.

On the basis of the information available on the species dealt with a comparative histogram depicting the status of mammals in ENP is preserved in Fig. 3. It indicates that the status of about 40% of mammalian species is not known or indeterminate. Most of these species fall under carnivora and rodent categories. Number of vulnerable, rare and endangered species is also fairly high (16 species).

Fig. 1. Order-wise representation of mammalian species from Eravikulam National Park

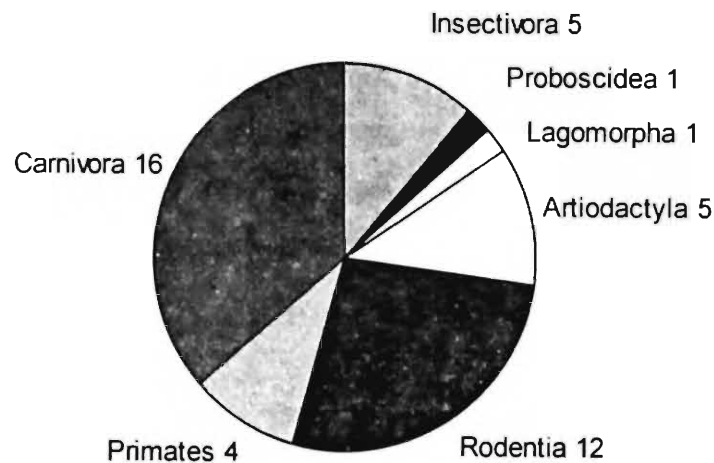


Fig. 2. Endemism in mammalian species from Eravikulam National Park

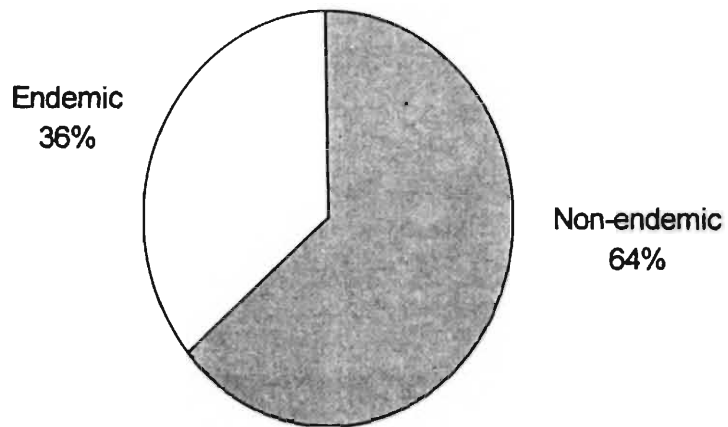
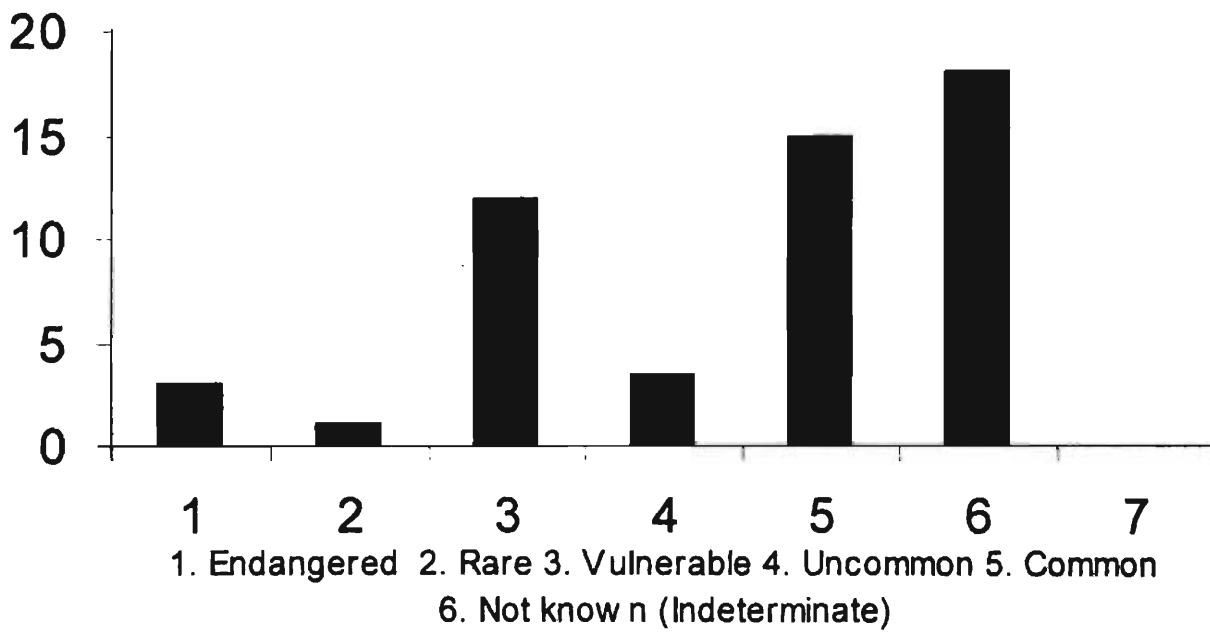


Fig. 3. Histogram showing current status of mammalian species from Eravikulam National Park



REFERENCES

- Agrawal, V. C. and Chakraborty, S. 1979. Catalogue of Mammals in the Zoological Survey of India Rodentia, Part-I. Sciuridae. *Rec. Zool. Sur India*. **74**(4) : 333-481.
- Ashraf, N. V. K., Kumar, A. and Johnsingh, A. J. T. 1993. Two endemic viverrids of the Western Ghats, India. *Oryx* **27**(2) : 109-114.
- Aswathanarayana, N. V., Satya Prakash and Krishna Rao, S. 1987. Karyology of the pygmy shrew, *Suncus etruscus perrotteti* (duvernoy). *Current Science*, **56** : 911-913.
- Bates, P. J. J., Harrison, D. L. and Muni, M. 1994. The bats of Western India revisited. **91**(1) : 1-15 and (2) : 360-380.
- Brosset, A. 1962. The bats of Central and Western India. *Jour. Bom. Nat. Hist. Soc.* **59**(1) : 1-57 and (2) : 583-624.
- Chandrasekar, A. 1989. *Ecology of small Mammals in Tropical forests of South India*. M.Sc. Thesis. Univ. of florida, U.S.A.
- Corbet, G. B. and Hill, J. E. 1992. *The Mammals of the Indomalayan Region*. Publ : Oxford University Press, N. Y.
- Das, P. K. 1986. Studies on the taxonomy and geographical distribution of the species of bats obtained by the Silent Valley (Kerala, India) Expedition, 1980.
- Davidar, E. R. C. 1976. Census of the Nilgiri Tahr in the Nilgiris, Tamil Nadu. *J. Bombay nat. Hist. Soc.* **73** : 142-148.
- Davidar, E. R. C. 1978. Distribution and status of the Nilgiri Tahr (*Hemitragus hylocrius*). *J. Bombay nat. Hist. Soc.*, **75**(3) : 815-844.
- Ellerman, J. R. and Morrison-Scott, T. C. S. 1951. *Checklist of Palaearctic and Indian Mammals 1758 to 1946*. Publ : Brit. Mus. (Nat. Hist.), London.
- Ellerman, J. R. 1961. *The Fauna of India including Pakistan, Burma and Ceylon* (Ed. M. L. Roonwal) : Mammalia : Vol. 3 : Rodentia (1 & 2). Publ. : Zool. Surv. of India, Calcutta.
- Honackl, J. H., Kinman, K. E. and Koepl, J. W. 1982. *Mammals species of the world*. Publ. allen Press Inc. and the Association of Systematic collections Lawrence, Kansas, U. S. A.
- Karanth, Ullas K. 1987. Status of wildlife and habitat conservation in Karnataka. *J. Bombay nat. Hist. Soc.* (Centenary Issue) **83** : 166-179.
- Lindsay, H. M. 1929. Scientific results from the mammal survey XLVIII. *Jour. Bombay nat. Hist. Soc.* **33** : 326-340.
- Marshall, Joe T. Jr. 1977. A synopsis of Asian species of Mus (Rodentia : Muridae). *Bull. amer. Mus. Nat. Hist.*, **158** : (33 : 173-220).
- Marshall, Joe T. Jr. 1992. *Indian Wildlife (Protection) Act, 1972 (as amended upto 1991)*. Publ. Natraj Publ.; Dehra Dun.

- Prabhakar, A. 1997. New records of the Malabar spiny dormouse (*Platacanthomys lasiurus* Blyth) in the Indira Gandhi Wildlife Sanctuary, Tamil Nadu. *Jour. Bombay nat. Hist. Soc.* **94**(1) : 151-152.
- Pradhan, M. S., Sharma, R. M. and Kartik Shankar 1997. first record of Kelaart's long-clawed shrew, *Feroculus feroculus* (Kelaart) (Insectivora, Soricidae, Crocodurinae) from Peninsular India. *Mammalia* (Paris) **61**(3) : 443-450.
- Pradhan, M. S. and Kurup, G. U. (Communicated). Studies on mammalian fauna from Nilgiri Biosphere Reserve. To be included in the Document on fauna from N. B. R. to be published by Zoological survey of India.
- Prater, S. H. 1980. *The book of Indian Animals* (3rd Edition). Publ. : Jour. Bombay nat. Hist. Soc., Mumbai.
- Ramchandran, K. K. 1988. Ecology and behaviour of Malabar Giant squirrel, *Ratufa indica maxima* (Schreber). Kerala Forest Research Institute Report No. 55 (Summary) : 1-10.
- Ramchandran, K. K. 1989. Chinar Wildlife sanctuary - Home of the endangered Grizzled Giant Squirrel. Report published by division of wildlife Biology, Kerala Forest Research Institute : 9-11.
- Rice, C. C. 1979. Further observations on Nilgiri tahr (*Hemitragus hylocrius*) in Eravikulam National Park, Kerala, India. Unpublished report to the New York Zoological Society.
- Rice, C. C. 1986. Observations on predators and prey at Eravikulam National Park, Kerala. *Jour. Bombay nat. Hist. Soc.* : **83**(2) : 283-305.
- Rice, C. C. 1990. Nilgiri tahr, Eravikulam National Park and Conservation. *Conservation in developing countries, problems and prospects*. Proc. of the centenary seminar of the Bombay Natural history Society. Ed. J. C. Daniel and J. S. Serrao. Publ. Oxford University Press, London.
- Roonwal, M. L. and Mohnot, S. M. 1977. *Primates of South Asia*. Publ. : Harvard Univ. Press, London.
- Schaller, G. B. 1971. Observations of Nilgiri tahr (*Hemitragus hylocrius* Ogilby 1838). *J. Bombay nat. Hist. Soc.* : **57** : 365-389.
- Shankar, K. 1997. Decline of montane ecosystem. *Resonance* Feb. Issue : 75-81.
- Sinha, Y. P. 1973. Taxonomic studies on the Indian horseshoe bats of the genus, *Rhinolophus*. *Mammalia* : **37** : 603-630.
- Tikader, B. K. 1983. *Threatened animals of India*. Publ. : Zoological Survey of India, Calcutta.
- Tikader, B. K. 1994. *The Red Data Book on Indian Animals*. Part I : *Vertebrata*. Publ. : Zoological Survey of India, Calcutta.

PLATE : 1



Anamudi - Highest peak in Western Ghats



Eravikulam River

PLATE : 2



Orthetrum sabina sabina (Drury)



Mecopoda elongata (Linnaeus)



Cyrtacanthacris tatarica (Linnaeus)

PLATE : 3



Oxya hyla hyla Serville



Crocothemis servilia servilia (Drury)

PLATE : 4



Pachliopta aristolochiae (Fabricius)



Graphium sarpedon Linnaeus



Papilio helenus Linnaeus



Papilio demoleus Linnaeus



Catopsilia Pomona Fabricius



Pieris canidia Sparrman

PLATE : 5



Euploea core Cramer



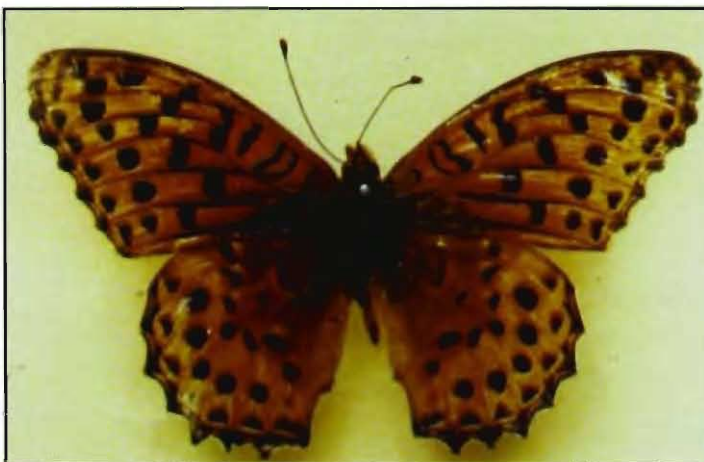
Tirumala limniace Cramer



Parantica nilgiriensis Moore



Junonia hierta Fabricius

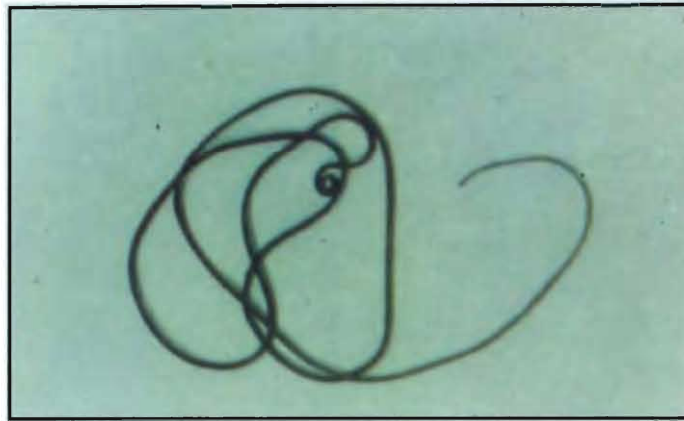


Argyreus hyperbius Linnaeus



Mycalesis oculus Marshall

PLATE : 6



Nematomorpha : *Gordius robustus*



***Lymnaea truncatula* (Mueller)**



***Lymnaea truncatula* (Mueller)**

PLATE : 7



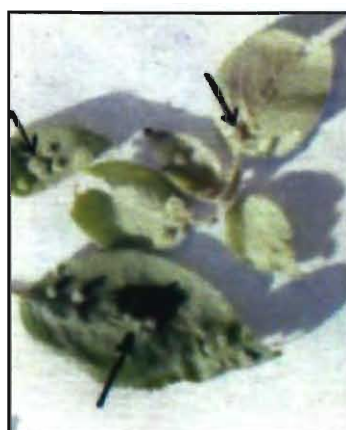
1



2



3



4



5



6



7



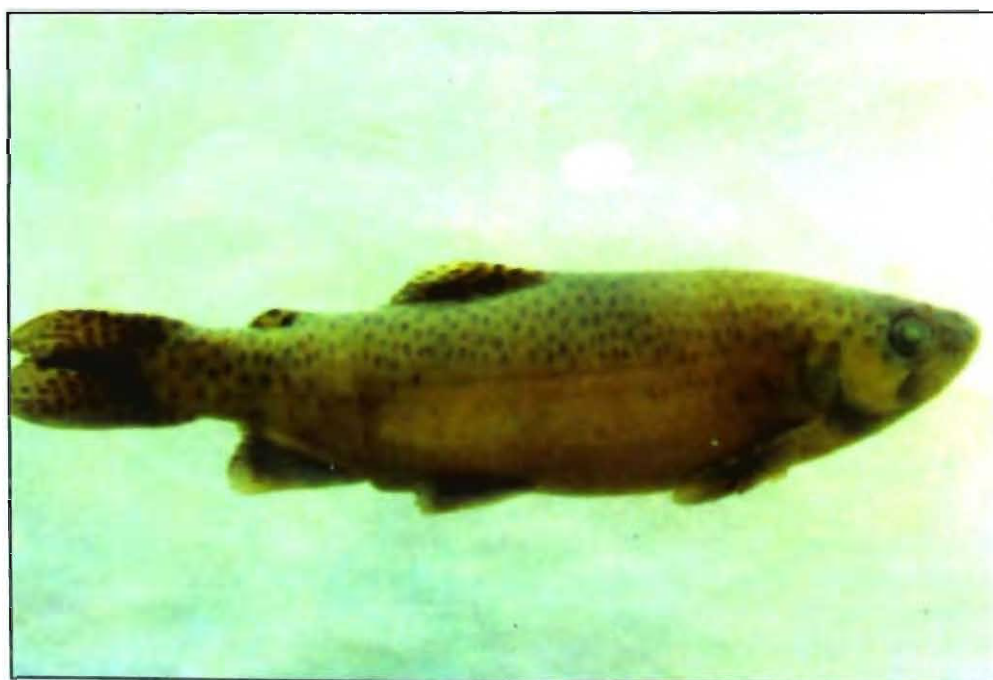
Plantgalls (Zooecidia)

1. Leaf gall on *Cinnamomum zeylanicum* Breyn Caused by *Pauropsylla depressa* Craw.
2. Stem/Shoot axis gall on *Ageratina adenophora* (Spreng.) King & Robinson caused by *Procecidochares utilis* Stone.
3. Leaf gall on *Psychotria johnsonii* H. Hook caused by an unknown insect.
4. Leaf / Petiole/Stem gall on *Strobilanthes sesilis* Nees caused by an unknown Cecidomyiid.
5. Stem gall on *Piper betle* Linn. caused by an unknown insect.
6. Leaf gall on undetermined plant caused by an Eriophid mite.
7. Leaf/petiole gall on undetermined plant caused by an unknown insect.

PLATE : 8



Garra hughi Silas



Salmo gairdnerii gairdnerii Richardson



Bufo melanostictus Schneider



Rhacophorus pleurostictus (Gunther)

PLATE : 10



Salea anamallayana (Beddome)



Ahaetulla dispar (Gunther)

PLATE : 11



Anthus similis



Elephas maximus Linnaeus

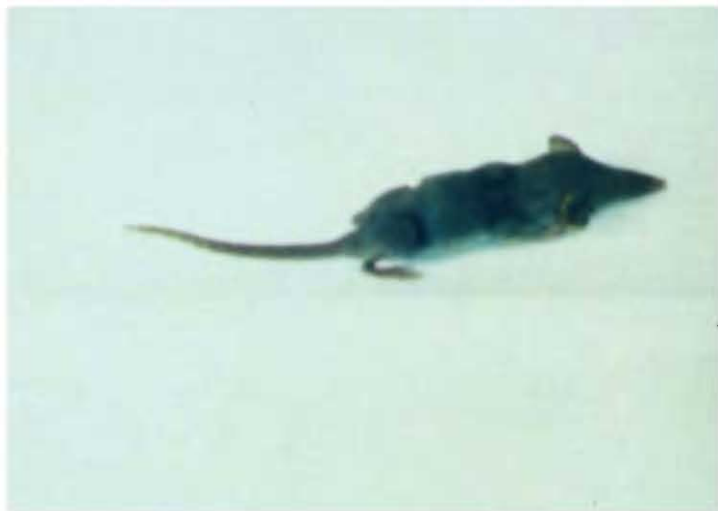
PLATE : 12



Ratufa indica



Bos gaurus



Suncus struscus