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**Records of the
Zoological Survey of India**

**Faunal diversity of a laterite hill system at
Madayipara Kannur District, Kerala, India**

**Muhamed Jafer Palot
C. Radhakrishnan**

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MADAYIPARA, KANNUR DISTRICT, KERALA, INDIA**

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CONTENTS

INTRODUCTION	1
FLORA	4
FAUNA	8
INVERTIBRATA	8
ZOOPLANKTONS	8
INSECTA	9
SYSTEMATIC ACCOUNT	10
LEPIDOPTERA	17
HETEROCERA (MOTHS)	37
MOLLUSCA	41
ARACHNIDA	41
VERTEBRATA	43
PIECES	43
AMPHIBIA	44
REPTILIA	45
AVES	48
ANNOTATED CHECKLIST OF THE BIRDS OF MADAYIPARA	54
MAMMALIA	87
DISCUSSION	92
ACKNOWLEDGEMENTS	96
REFERENCES	96

PREFACE

The Madayipara hills in Kannur District of Kerala, is perhaps one of the most remarkable laterite hillocks of north Malabar. The laterite system is spread over 365 ha, comprising of a flat-topped table like hill, surrounded by the rivers of Kuppam, Ramapuram and Peruvamba, as well as the Kawayi backwaters adjacent to the Lakshadweep Sea. The view from the southeastern part of the hill is picturesque, attracting tourists to the area.

Since 1985, we initiated recording, month wise, the bird census data in and around Madayipara. We also made notes on flora, fauna and the human interferences in the area. We found that this comparatively barren laterite system provide a variety of habitats for many animals and plants during the wet season (June to November) and the temporary pools formed during the wet season serve as invaluable bird refuges, which apparently also functions as staging points for the migratory birds arriving from the Himalaya and Palaeartic countries. Many migratory birds have been found to be over-wintering here.

The Madayipara acts as a good watershed area providing good drinking water to the surrounding populations, in an area otherwise prone to saline water intrusion.

Through this work, we have explored the ecology and the biotic potential (both flora and fauna) that the laterite hills of north Malabar in Kerala possess, especially at Madayipara.

**Muhamed Jafer Palot
C. Radhakrishnan**

INTRODUCTION

Hard crusts of laterite formations have been reported from a number of locations in the laterite occurring regions of the world. In India, such formations are found both in the west coast, more from Dapoli in Ratnagiri in Maharashtra to Malappuram district in Kerala, extending about 8000 ha, and in the Deccan Plateau, which is under semi-arid conditions. As early as 1807 Buchanan coined the term laterite for hardened clay called "Ittica kallu" (in vernacular Malayalam, meaning Brick-stone) occurring in Angadipuram (Malappuram district, Kerala) that is used as a building material in the northern districts (Malabar) of Kerala. The term has been widely used in geological and pedagogical literature in the country and elsewhere. There are many theories on the formation of laterite hills. According to Prescott and Pendleton (1952), it is formed by the oxidation and precipitation of iron. Berger and Beadle (1953) suggest the formations as a result of the accumulation of iron oxide by way of deposition from highland waters. However, in India, many scientists still consider laterite formations as a horizon of a laterite soil profile and that these plateaus are exposures of a laterite horizon, resultant of the topsoil loss due to erosion (Thomas, 1979).

Geomorphologically the state of Kerala is divided into three regions, the coastal plains, the midland hills and the highland hills. The midland hills are characterised by laterite capped plateaus. The area from Malappuram district to Kasaragod district in Kerala is typically formed of these kinds of laterite hills, which also serve as a major ecosystem for many plants and animals besides serving as good water shed areas.

A laterite hill plateau can be considered as an amphibious ecosystem. The alternation of very wet and dry conditions creates an unusual ecological situation that supports a unique biota. To survive in such an ecosystem a species must be able either to tolerate a wide range of conditions, or to grow and reproduce in a short time, the wet phase providing the favourable environment for many species. It is not surprising then that many of the plants and animals found on the temporary pools on such hills are so specialized that they cannot persist for long, or even at all, outside the temporary pools. A few of these forms are 'endemic' to such restricted geographical areas.

Except for geological, geochemical and mineral exploration studies, there is very little information available on the ecology and biodiversity of laterite hills. Joseph and Sivarajan (1990), Pradeep *et al.* (1990, 1991) and Madusoodhanan and Singh (1992) explored the flora of laterite hills of Madayipara and its adjacent areas. Sreekumar and Nair (1991) made an extensive survey on the grasslands of north Malabar. Dominic (1994) studied the flora and Jafer (1998), the butterfly fauna of laterite hills in Malappuram District, Kerala. Unnikrishnan (1995) described the ecology of sacred groves of north Malabar with a note on laterite hills. However, there have been no comprehensive ecological and faunal studies on this ecosystem. In the present study we have made an attempt to explore the biodiversity and the ecological settings of this unique ecosystem.

STUDY AREA

Madayipara (Map.1; Plate-1) is a flat topped hillock overlooking Payangadi town on the northern bank of Kuppam river, located in Madayi village, at latitude 12°2' N and longitude 75°16'E, about 21 Km. north of Kannur town, the district headquarters of Kannur district in Kerala (Sreedharamenon, 1957 & Anonymous, 1996). The river Kuppam, "bending slightly and passing under the guns of an old ruined fort of the Kolathiris" (Logan, 1887) on the south eastern edge of Madayipara, suddenly turns due south at Payangadi and takes a course parallel to the sea to meet the larger Valapattanam river at Matakara, finally discharging in to the Lakshadweep Sea at Azhikkal. Geo-morphological and historical data available suggest that this river till 1450 A.D. drained into the sea, flowing west from Payangadi instead of turning south. On the northwest of Madayipara lies the wetlands of Chembullikundu and Kunhiniangalam formed by the Ramapuram River, Peruvamba River and Kawayi backwaters. On the west, at the seacoast, is situated the promontory of Ezhimala. The seashore from here is less than 2 Km away, as the crow flies.

As the name suggests, the top of this hillock is a laterite plain more than 365ha in area. On the western side of the plateau, there is an ancient temple named Vadukunda Shiva temple; a few yards away from the temple is a fresh water lake, which is about 1.5 acres in extent. The lake is perennial, for it never dries up even in summer months. On the northeastern slope of the hill, is situated the Thiruvarkad Bhagavathi temple (Madayikavu) and its sacred grove, drawing thousands of devotees every year.

GEOLOGY

Geologically, the land had emerged from the sea and the plateau is rich in deposits of China clay, lignite and probably other minerals. The occurrence of laterite and alluvium are the major features of this part of the state. Laterite formations form flat-topped ridges and hills, with deposits of gneisses, charcoal and lignite in some places. Rich deposits of Kaolin are seen in the Madayipara hills. The Diagrammatic cross section of the soil profile of Madayipara is given in Fig. 1. The Kerala Clays and Ceramic Products Ltd. (KCCPL) is situated on the southwestern side of the plateau and their mining activity now having been spread to the vicinity of the Shiva temple and Lake, is a major threat to the entire ecosystem. The damage to the hill during the last 25 years of mining operations was so heavy that scars generated by the Mining Company heavily mar the adjoining areas of Madayi and Vengara.

HYDROLOGY

It is an established fact that the Laterite hills of the west coast form good ground water aquifers. The plenty of unfailing and well-distributed seasonal rainfall percolates deep into the plateau through the laterite, and recharges the never depleting water table of the plateau. In fact, the plateau acts as a very important watershed for the entire village, which is surrounded by the saline waters of tidal rivers and sea. Hence, the plateau is the lifeline of the entire region.

ALTITUDINAL RANGE

The altitude of the Madayipara ranges from a minimum of 40 m to a maximum of 47m above sea level. The southeastern edge of the hill is slightly elevated compared to the remaining areas.

CLIMATE

The area enjoys a tropical wet climate. The southwest monsoon is experienced from June to September and the North-east monsoon prevails during October-November. The annual rainfall in the region is more than 3000 mm, which is more than the recorded state's average rainfall, the details of which are provided in Table-I.

TEMPERATURE

A maximum temperature of 33.9° C is experienced in the month of May and a minimum of 18.9° C. in December. The monthly variations in maximum and minimum temperature are also provided in Table- I.

HUMIDITY

The area experiences a maximum humidity of 98.5% during the month of July and a minimum humidity of 44.9% during the month of December (Table-I).

RAINFALL

The peak period of rainfall is during June and July whereas September and November months show the lowest rates (Table-I). The average number of rainy days in a month is maximum in July and minimum during December to March.

Table-I : Climatic data of the study area

Month/Year	Maximum Temp (°C)	Minimum Temp (°C)	Rainfall (mm)	Humidity (%) in Morning	Humidity (%) in Evening
January, 2003	30.5	19.9	0.0	64.5	55.0
January, 2004	30.9	20.0	0.0	88.1	54.9
February, 2003	31.0	21.2	30.0	90.5	65.2
February, 2004	31.2	22.3	0.0	93.2	60.8
March, 2003	32.1	23.1	0.0	91.5	64.3
March, 2004	32.4	23.3	36.0	94.3	63.3
April, 2003	32.0	24.0	67.0	90.2	67.2

Month/Year	Maximum Temp (°C)	Minimum Temp (°C)	Rainfall (mm)	Humidity (%) in Morning	Humidity (%) in Evening
April, 2004	32.2	23.8	41.90	86.3	64.3
May, 2003	33.1	25.4	36.0	86.8	67.5
May, 2004	33.9	25.8	630.20	88.4	62.4
June, 2003	28.8	23.1	817.0	97.5	76.5
June, 2004	29.2	24.5	1140.0	95.0	90.0
July, 2003	26.4	23.0	850.0	96.3	89.4
July, 2004	27.2	22.8	545.10	98.5	87.2
August, 2003	28.1	23.2	454.80	96.8	83.2
August, 2004	27.9	22.9	790.0	97.8	78.4
September, 2003	29.2	23.3	126.30	93.3	72.1
September, 2004	28.6	23.8	167.60	94.3	72.3
October, 2003	30.1	23.3	164.20	95.6	74.1
October, 2004	30.0	23.2	213.60	97.5	70.5
November, 2003	30.1	22.2	20.50	96.2	77.3
November, 2004	31.2	22.1	208.30	92.3	78.9
December, 2003	30.2	19.4	0.0	93.0	44.9
December, 2004	30.1	18.9	0.0	92.1	45.6

WIND

Wind velocity is usually light to moderate with some strengthening in force during the southwest monsoon season. The velocity of wind is higher during the period from January to May.

POPULATION OF MADAYI PANCHAYATH

The total population of Madayi panchayat as per the 2001 census is 39,600. Having an area of about 16.7 Sq. km only, the village is thus densely populated. The average population density is more than 2000 per sq. km; which is much higher than the state average of 749.

FLORA

An account on the flora of Madayipara is given here to provide a picture of the kind of vegetation found on the laterite hill system (Plate-2) with which the fauna frequenting the area are associated with, and also to stress upon the importance of the uniqueness of the flora supported by such laterite hill systems, often ignored by many.

The midland hillocks of northern Kerala have its own characteristic floral composition supporting scrub jungles and cashew plantations on the hill slopes and grasslands and

associated aquatic and semi-aquatic plants on the hilltops. Even though these hills are exposed directly to the sunlight and wind, they harbour rich species diversity. Recent plant explorations revealed more additions to the known plant species of the area some of which turned out to be new to science, and endemic to the locality.

The vegetation of the hillock may be classified mainly into grasslands and scrub jungles. The grasslands can again be categorised into wet phase and dry phase grasslands based on the seasons. Altogether 250 plant species have been recorded from Madayipara. An account of the floral composition of Madayipara hill is given below.

Grasslands : Grasslands of Kerala have been classified into two types i.e. Low elevation grasslands and high elevation grasslands. The grasslands on the laterite hills of north Malabar are classified under low elevation dry grasslands, characterised by remarkable diversity. This kind of a natural grassland is the characteristic feature of the laterite hills of Kozhikode, Kannur, Kasaragod districts and the lower parts of Wynad district. These grasslands are highly seasonal and interspersed with other herbaceous plants and scrub jungles.

A total 36 species of grasses are recorded from Madayipara hills, many more remaining to be fully identified. The Common grass species are the *Eragrostis uniloides*, *Ischaemum indicum*, *Heteropogon contortus*, *Pennisetum polystachyon*, *Cynodon dactylon* and species belonging to the genera *Arundinella*, *Dimeria*, *Panicum*, *Themeda* etc. Species of *Arundinella* form the commonest grass species during the months of October and November. The pinkish inflorescence of these grasses makes the area appear as if burnt mixed here and there with green shades. According to Agarwal (1961), *Arundinella* form a higher stage in succession. So it can be safely stated that *Arundinella* grasses represent a higher stage in grassland development in the areas where they occur.

Recent plant explorations, revealed some more new species of grasses from the laterite hills of north Malabar (Sreekumar and Nair, 1991), 11 out of 37 endemic grasses of Kerala are reported from this kind of localities. Thus, these hillocks are isolated ecological niches of conservation importance. However, a detailed account of the species association is lacking.

Grasses control erosion, and several species are well known for their rich fodder value. When the monsoon recedes, the local people start cutting grasses for use as fodder for their cattle. A small plot, containing a thick growth of *Themeda* and other species of grasses fetches about rupees three thousand per season for a landowner.

The Wet Phase : The first fall of southwest monsoon during late May or early June stimulates the germination of seeds and the growth of annual plants. The first groups of plants seen are the *Neanotis foetida*, *Eriocaulon* spp. and grasses, followed by insectivorous plants like *Utricularia* spp. and *Drosera indica* that dominate the land. The deep blue flowers of *Utricularia* and white flower heads of *Eriocaulon* and *Rhamphicarpa* literally paint the whole plateau in shades of blue, violet and white, amidst herbaceous plants such as *Sopubia trifida*, *Lindernia*, *Polygala elongata*, *Justicia simplex*, *Leucas* sp. and several others. The

shallow depressions filled with water accommodate plants like *Vallisneria*, *Nymphoides krishnakesara*, *Marsilia sp.*, *Cryptocoryne spp.*, *Rotala malambuzhensis*, *Rotala malabarica* and *Isoetes coromandelina*. The rare and recently reported new species of *Euphorbia katragensis* can be observed during this phase on the laterite rocks.

Following the retreat of south west monsoon, during September, most of the early appearing plants give way to others like *Celosia argentea*, *Sessamum orientale* and grass species such as *Arundinella spp.*, *Dimeria sp.*, *Ischaemum indicum*, *Panicum spp.*, etc. that dominate subsequently. An abundance of grass species can be noticed during this period. The wet phase lasts up to the end of November.

The Dry Phase : Stronger winds during the month of January and the direct incidence of sunlight enhance the drying up process of the flora of Madayipara. The entire annual herbaceous plants dry up and only some grass species and the thorny *Lepidagathis keralaensis* spread all over the rocky regions of the hills. The miniature fig tree, *Polycarpa corymbosa* can also be seen on the black surfaces of the rocks.

Scrub Jungles : The scrub jungles form the protective cover of the slopes of the hills. The thick grove adjacent to the clay mining company is one of the major vegetations of this hillock. The evergreen forest species like *Hydnocarpus alpina*, *Holigra arnottiana*, *Cinnamomum sp.* are restricted to this area. *Ficus arnottiana* one of the characteristic fig tree of this kind of ecosystem is seen in the southwestern part of the Plateau. The tree is locally called 'Kallaroyal' (Malayalam meaning-Rock Peepal Tree). Besides, other fig species like *Ficus benghalensis*, *Ficus religiosa*, *Ficus racemosa*, *Ficus gibbosa*, *Ficus asperima* and *Ficus hispida*, recorded from the area, attract large number of frugivorous birds and bats during the fruiting season.

The small groves of *Ixora coccinea*, *Ziziphus oenoplia*, *Ziziphus rugosa* and thick clumps of *Calicopteris flouribunda* give refuge to a large number of animals and birds and provide nectar to butterflies and insects during their flowering season. The forest dwelling species of *Stereospermum* is one of the major wonders of this woody area, with its large white flowers blooming during November and December. A large tree of *Careya arborea* that can be seen in the compound of the tourist bungalow indeed is the oldest tree of the hill.

Rare and endangered Plants : The Unique setting of Madayipara and the adjacent laterite hill systems provide good opportunity for the plant taxonomists, because these hillocks are less explored. The University of Calicut during the early 1990s made an attempt to study the floral composition of this fragile ecosystem and found four species endemic to the area Viz:- *Nymphoides krishnakesara* (Joseph and Sivarajan, 1990), a small water lily abundant in the small pools and ponds on the plateau; *Justicia ekakusuma* (Pradeep *et al.* 1990) aptly named because of its nature of flower, rare and seen in the rocky edges of the plateau; *Rotala malabarica* (Pradeep *et al.* 1991), a semi-aquatic plant seen largely in the temporary pools and *Lepidagathes keralaensis* (Madhusoodanan and Singh, 1992) described for the first time from this locality. It is found that the number of *Justicia ekakusuma* has been declining drastically over the years, while other newly described species remain uniformly distributed.

Another interesting plant of this locality is *Isoetes coromandelina*. It is a derivative of the ancient (Devonian) group of arborescent lycopods (Club-mosses). This rare and endangered plant is found near the temporary pools of Madayipará during the wet phase of the plateau. Morphologically *Isoetes* resembles a small stiff-leaved grass, hence its common name, quillwort. Like mosses and other ferns, it requires at least surface moisture to effect fertilization. This primitive species is scarcely distributed in the hills.

Euphorbia katragensis-variety *kasargodensis* is endemic to this kind of locality. The small and beautiful flowers of this species are seen during the wet phase season. This plant is poorly distributed and individuals of the species can be seen on the elevated portions of rocks. Only very few members of this species are found in Madayipara. *Curcuma kannanorensis* is another plant, which is described recently from the district (Ansari *et al.* 1982); it is found immediately after the first shower of the monsoon. Besides, the abundance of insectivorous plants like *Drosera indica* and *Utricularia spp.* are worth mentioning.

Medicinal Plants : The Sacred grove of Madayi Kavvu, the woody thickets at the foothills and the seasonal herbaceous vegetation of the plateau are well known for medicinal plants. Local people have faith in medicinal plants and people have been collecting plants from the area from time immemorial. Unfortunately, the medicinal plants are gradually disappearing from this ecosystem due to exploitation by man.

FAUNA

INVERTEBRATA

ZOOPLANKTONS

Zooplanktons are minute organisms that are suspended in the water column hence their movements are mainly dependent on water currents. The study of small animals in water bodies of Madayipara, especially of the Vadukunda Lake and the Judha Pond were carried out during 1997 covering all three seasons of the year. The study revealed the occurrence of 9 species of the Phylum Rotifera belonging to six genera (Table-II). Rotifers are a diverse group of small (mostly less than 0.5mm long) animals. They are overwhelmingly a freshwater group and flourish even in the tiniest bodies of water, such as small depressions in the laterite rocks. Cladocerans are a group of crustaceans, and in comparison to other groups of planktons, diversity of cladocerans is less in these water bodies. Presence of *Moina brachiata* in Vadukunda Lake indicates the polluted nature of the water, which is an alarming signal for the freshwater lake of Vadukunda.

TABLE-II : Rotifer fauna of two ponds on the Madayipara hill.

Sl. No.	Class/ Order/Family/Species	Vadukunda temple Pond	Judha pond
	Class MONOGONONTA		
	Order PLOIMIDA		
	Family BRACHIONIDAE		
1.	<i>Brachionus caudatus</i>	+	
2.	<i>B. calyciflorus var. dorcas</i>	+	-
3.	<i>B. falcatus</i>	-	+
4.	<i>B. forficula</i>	+	-
5.	<i>Keratella quadrata</i>	+	-
	Family EUCHLANIDAE		
6.	<i>Euchlanis dilatata</i>	+	
	Family LECANIDAE		
7.	<i>Lecane (Monostyla) hamata</i>		+
	Family NOTOMMATIDAE		
8.	<i>Scaridium longicaudum</i>	-	+
	Family FILINIIDAE		
9.	<i>Filinia terminalis</i>	+	-

INSECTA

Insects are important organisms of both terrestrial and aquatic habitats. There has been no comprehensive survey of insects of the laterite hills, but their impact on the functioning of this ecosystem is considerable in view of their roles as herbivores, predators, parasites and pollinators. Many insects are associated with particular plant species, and it is possible that some of the endemic species of plants may support a unique insect fauna. The Bumblebees (Xylocopids) that visit flowers of *Calotropis* and the numerous wasps, bees and ants seen on the flowers of nectary plants form majority of insects found in the locality. *Disophylla quadrifolia* a nectary plant, which blooms in masses from August to January, provides good nectar for many wasp species and butterflies. The blue inflorescence of this plant attracts insects such as wasps, ants, butterflies, moths and dipterans. This plant also provides good foraging sites for predators like spiders, praying mantis, odonates, lizards and geckos since they attract several insects.

A close observation on the mucous secretion of the insectivorous plant *Drosera* showed the presence of large number of minute beetles, small lepidopterans, dipterans, orthopterans, ants and small dragonflies trapped by this plant. Many observations on butterfly predation by *Drosera* have been reported from this area (Jafer and Khaleel, 2000). Insects are the least studied in this unique ecosystem.

Aquatic Insects : Although the information on aquatic insects specific to the perennial water bodies and associated temporary pools on laterite hills is scanty, there is little doubt that they are of major importance in the aquatic systems of laterite hills too since they function as grazers and especially as predators. Birds, fishes and amphibians in turn prey upon them.

The Vadukunda Lake, Judha pond, Kulangara pallikulam and Parackulam are the major water bodies and the temporary pools formed during the monsoon season provide good habitats for the early stages of many species of Odonata, Coleoptera and Hemiptera. Aquatic bug species of the genera *Ranatra* and *Limnometra* (Hemiptera:Insecta) are frequently found in the waterbodies. Aquatic insects are very sensitive and even a slight change in the aquatic environment, cause a decline in their population and are very good indicators of the health of any aquatic system.

Odonata (Plate-3) : Dragonfly nymphs (Order: Odonata) are the most dominant insects to be found in the ponds and temporary wetlands. Mature dragonflies are aerial predators feeding on flying insects, while the nymphal stages are aquatic and prey on aquatic insects, small crustaceans, and other small animals. Dragonfly nymphs are known for their voraciousness, and no doubt they exert a significant influence in the ponds where they occur. 42 species of dragonflies have been observed in the area; a systematic account of the dragonflies found in the area is given below.

SYSTEMATIC ACCOUNT

Order	ODONATA
Suborder	ZYGOPTERA
Superfamily	COENAGRIONOIDEA
Family	COENAGRIONIDAE
Subfamily	PSEUDAGRIONINAE

1. *Ceriagrion cerinorubellum* (Brauer)

Remarks : Common on the hill. Found in widely distributed colonies, around ponds, temporary pools and streams. Breeds in temporary pools and canals infested with aquatic vegetation. Probably the first to emerge after the first shower; teneral are observed in plenty during June and July. An unusual mock mating behaviour between *Copera marginipes* and *Ceriagrion cerinorubellum* was reported from the Kulangara palli pond in the eastern slopes of Madayipara by Jafer & Radhakrishnan (2004).

Distribution : Throughout India.

2. *Ceriagrion coromandelianum* (Fabricius)

Remarks : Observed around water bodies on the hill; females are commonly found in scrub jungles close to the water bodies. Breeds in weedy water immediately after the first shower in June; larval period lasts for 30-35 days.

Distribution : Throughout India.

3. *Pseudagrion microcephalum* (Rambur)

Remarks : Uncommon. Found along with *Ceriagrion cerinorubellum* around the weedy ponds and pools. Oviposition is endophytic, inserting eggs in the submerged aquatic vegetation like *Nymphae nauchali* and *Nymphoides krishnakesara* found in the stagnant marshy waters.

Distribution : Throughout the plains of India, Myanmar, Sri Lanka and Australia.

4. *Pseudagrion rubriceps rubriceps* (Selys)

Remarks : Uncommon on the hill. A few sightings from the locality; frequents mainly the flowing streams near the area being mined for rose clay on the hill.

Distribution : Widely distributed in the plains and submontane areas in India.

Subfamily ISCHNURINAE

5. *Aciagrion occidentale* Laidlaw

Remarks : Uncommon. Irregular visitor. Found associated with *Agriocnemis pygmaea* and *Ischnura aurora* during October to November.

Distribution : Throughout India.

6. *Ischnura aurora aurora* (Brauer)

Remarks : Common. Multivoltine species, observed from June to January, a spurt in population could be seen during October and November.

Distribution : Throughout India.

Subfamily AGRIOCNEMIDINAE

7. *Agriocnemis pygmaea* (Rambur)

Remarks Common. A very common damselfly found on the plateau. Many members of the species were observed during October and November. Breeds in temporary pools along with *Ischnura aurora*.

Distribution : Throughout the Oriental Region, Australia and Pacific Islands.

8. *Agriocnemis splendidissima* Laidlaw

Remarks : Rare. One female specimen was collected in October 2000 from the grasslands adjoining a pond.

Distribution : Throughout India.

Family PLATYCNEMIDIDAE

Subfamily PLATYCNEMIDINAE

9. *Copera marginipes* (Rambur)

Remarks : The species is fond of running water. Found mainly near the springs originating from the eastern slopes. During October, about 12 mating pairs could be seen at the Kulangarapalli pond.

Distribution : Throughout India.

Superfamily LESTOIDEA

Family LESTIDAE

Subfamily LESTINAE

10. *Lestes elatus* Hagen

Remarks : Uncommon. Specimens could be collected only during monsoon months of June and July.

Distribution Throughout India.

11. *Lestes malabarica* Fraser

Remarks : Rare. A single specimen was collected during September.

Distribution : Throughout India.

Superfamily CALOPTERYGOIDEA
 Family CALOPTERYGIDAE
 Subfamily CALOPTERYGINAE

12. *Vestalis gracilis gracilis* (Rambur)

Remarks : Uncommon. Usually found in forests; however, the species was found during the wet season around the wooded patches of the plateau.

Distribution : Throughout India.

Suborder ANISOPTERA
 Superfamily AESHNOIDEA
 Family GOMPHIDAE
 Subfamily LINDENIINAE

13. *Ictinogomphus rapax* (Rambur)

Remarks : Uncommon. Found patrolling over the littoral zone of large ponds and breeding in the ponds during July and August.

Distribution : Throughout India.

Subfamily AESHNINAE

14. *Anax immaculifrons* Rambur

Remarks : Rare. An elusive species. Breeds in temporary pools during June every year, and can be seen only at that time on the plateau and never later.

Distribution : Throughout India.

15. *Gynacantha dravida* Lieftinck

Remarks : Common. Mainly collected at light during night. This species has a crepuscular habit; they feed on mosquitoes and smaller insects. Breeds in stagnant water bodies.

Distribution : Throughout India.

Superfamily LIBELLULOIDEA
 Family LIBELLULIDAE
 Subfamily TETRATHEMISTINAE

16. *Tetrathemis platyptera* Selys

Remarks : Uncommon. Species often found around the wells of the plateau. Breeds in stagnant waters of wells or pools in marshy places; females deposit eggs on plants overhanging water.

Distribution : Throughout India.

Subfamily BRACHYDIPLACTINAE

17. *Brachydiplax sobrina* (Rambur)

Remarks : Uncommon. Found near the weedy temporary pools during rainy season. No breeding records from the locality.

Distribution : Kerala, Assam, Bihar, Uttar Pradesh, Himachal Pradesh, Punjab, Maharashtra, Meghalaya, Orissa, Rajasthan, West Bengal and Western Ghats.

Subfamily LIBELLULINAE

18. *Orthetrum chrysis* (Selys)

Remarks : Uncommon. Breeds in flowing waters of Kackithodu near the mine.

Distribution : Western Ghats, Himachal Pradesh, Orissa, south Andaman Islands.

19. *Orthetrum sabina sabina* (Drury)

Remarks : Common. One of the common dragonflies found in the area. Well known for its predaceous habit, frequenting the scrub jungles and edges of the sacred groves in search of prey. Breeds in stagnant waters including monsoon pools.

Distribution : Throughout India.

20. *Potamarcha congener* (Rambur)

Remarks : Uncommon. Found in large numbers at the foothills. Breeds in weedy ponds and marshy areas.

Distribution : Throughout India.

Subfamily SYMPETRINAE

21. *Acisoma panorpoides panorpoides* Rambur

Remarks : Rare. Not a regular insect of the plateau. Two females were caught during a rainy season.

Distribution: Widely distributed throughout India.

22. *Brachythemis contaminata* (Fabricius)

Remarks : Common. Mostly seen at the beginning of the dry phase. Frequents the drying ponds and ditches for breeding.

Distribution : Throughout India.

23. *Bradinopyga geminata* (Rambur)

Remarks : Common. Often found resting on the rocky crevices near the mines. Breeds in wells, cemented tanks and rocky monsoon pools.

Distribution : Peninsular India.

24. *Crocothemis servilia servilia* (Drury)

Remarks : Common. Females and tenerals are frequently found near bushes but males are scarcely seen. Active only during the wet phase of the plateau.

Distribution : Peninsular India.

25. *Diplacodes trivialis* (Rambur)

Remarks : A common dragonfly found in Madayipara. Observed more in numbers during August and September. Breeds in temporary pools and weed infested ponds.

Distribution : Throughout India.

26. *Diplacodes nebulosa* (Fabricius)

Remarks : Uncommon. Observed only during September and October. No breeding records from the plateau.

Distribution : Throughout India.

27. *Neurothemis fulvia* (Drury)

Remarks : Common. Seen in small numbers throughout the season. Breeds in weedy ponds and marshes.

Distribution : Throughout India.

28. *Neurothemis intermedia intermedia* (Rambur)

Remarks : Uncommon. All the observations are around a spring originating from the southern slope of the plateau. Found during August and September.

Distribution : Throughout Peninsular India.

29. *Neurothemis intermedia atlanta* Ris

Remarks : Rare. A weak flier. A single specimen could be collected from the foothills of Thubarathadam.

Distribution : Throughout Peninsular India.

30. *Neurothemis tullia tullia* (Drury)

Remarks : Common. Many small colonies were observed during the wet phase. Breeds in flowing waters and canals infested with vegetation.

Distribution : Throughout India.

31. *Rhodothemis rufa* (Rambur)

Remarks : Uncommon. A few observations from the plateau during rainy seasons. Breeds in weedy tanks and ponds.

Distribution : Throughout India.

Subfamily TRITHEMISTINAE

32. *Trithemis aurora* (Burmeister)

Remarks : A common dragonfly of the flowing water bodies of the plateau. Adult males can be seen resting on vegetation near water bodies and making short beats up and down, but always returning to the initial resting place; females and teneral males always found taking rest away from water. Breeds in streams and ponds during the wet phase.

Distribution : Throughout India.

33. *Trithemis kirbyi kirbyi* Selys

Remarks : Rare. A single observation at Kackichal near the clay mine.

Distribution : Throughout India.

34. *Trithemis pallidinervis* (Kirby)

Remarks : Rare. A regular visitor of the plateau during the rainy season.

Distribution : Throughout India.

Subfamily PALPOPLEURINAE

35. *Palpopleura sexmaculata sexmaculata* (Fabricius)

Remarks : Rare. A few observations only from the plateau during rainy seasons.

Distribution : Throughout India.

Subfamily TRAMEINAE

36. *Rhyothemis variegata variegata* (Linnaeus)

Remarks : Common. Two peak populations could be met with during the survey. More abundant during September. About 60 individuals were counted from the plateau during first

week of September. The species is locally called *Onathumbi*, heralding the festival of Onam. Breeds in large numbers during September and April.

Distribution : Throughout India.

37. *Pantala flavescens* (Fabricius)

Remarks : Common. Large Migratory swarms were observed during October and November months flying across the plateau towards Arabian Sea. Breeds in weedy marshes and temporary pools.

Distribution : Widely distributed throughout India.

38. *Tramea limbata similata* (Rambur)

Remarks : Swarms of this species could be observed during most of the months. A population spurt can be observed during October. Breeds in temporary pools and ponds.

Distribution : South India and Sri Lanka.

39. *Tholymis tillarga* (Fabricius)

Remarks : Common. A crepuscular species found active during dusk and dawn, often attracted to light. Breeds in marshy ponds and weeded water.

Distribution : Throughout India.

40. *Zygomma petiolatum* Rambur

Remarks : Common. Crepuscular in habit, appearing shortly before dusk and flying till dark, often coming to houses attracted by light. Breeds in small stagnant ponds, pools and wells.

Distribution : Throughout India.

Subfamily UROTHEMISTINAE

41. *Aethriamanta brevipennis* (Rambur)

Remarks : Rare. A single male specimen was caught during a rainy season.

Distribution : Bihar, West Bengal, Western Ghats and Kerala.

42. *Urothemis signata signata* (Rambur)

Remarks : Uncommon. Found along with the swarms of *Pantala* and *Tramea limbata* near the mining area. Breeds in weedy tanks and slow running streams.

Distribution : Throughout Peninsular India.

LEPIDOPTERA

(Plate-4)

Rhopalocera (Butterflies) : The most noticeable insects of Madayipara are the butterflies. The southwestern slope adjacent to the present China Clay mining company is literally covered by a thick growth of woody grove, which forms the microhabitat for many butterfly species. A total of 111 species of butterflies were observed during the study. A family-wise treatment of the butterfly species is given below.

Papilionidae : Of the 111 species of butterflies recorded, 13 species were papilionids. The Southern Birdwing, the largest butterfly in India could be observed fairly in good numbers along the foothills. The rare and beautiful forest dwelling species like Paris Peacock and Buddha Peacock were also noted. The Crimson Rose protected in the Schedule I of the Indian Wildlife (Protection) Act of 1972 was also seen on many occasions.

Pieridae : 12 species of this group of Whites and Yellows occur in the area. The most important species are the Common gull and Common Wanderer, which are highly seasonal and observed commonly between the months of September and November. The Giant Orange Tip was observed keeping the same path across the area, regularly.

Nymphalidae : With 39 species under the various subfamilies mentioned below, Nymphalidae forms the most diverse butterfly family frequenting Madayipara.

Satyrinae : Browns are not uncommon to the area. 7 species were recorded from the area. Large aggregations of Bushbrowns and Evening Browns could be observed on the decaying fruits of Jackfruit and mango.

Danainae : Danoids are most common and found frequently attending the flowers of *Disophylla quadrifolia*, a blue flowered herb, locally known as 'nayithumba', which is seasonal and seen mostly immediately after the south west monsoon. Once in mid October, a large congregation of eleven Common Crows, fourteen Blue Tigers and four common Tigers could be observed taking nectar from this plant. The larval food plants of the Plain Tiger and Blue Tiger were found commonly growing in the area. The Common Crow was seen laying eggs on the tender leaves of *Ficus arnottiana*, a larval food plant of the species (Jafer & Radhakrishnan, 2001).

Nymphalinae : The Tamil Yeoman, a rare butterfly, was observed commonly around the hills. A number of larvae of this species were seen on the *Hydnocarpus alpina* tree during rainy season. The Yellow Pansy, Black Rajah and Gaudy Baron were seen very rarely. All other Pansies including Lemon, Peacock, Grey and Chocolate were seen in abundance, dominated by the Grey Pansy. The Danaid Eggfly one of the species protected under Schedule-I of Indian Wildlife (Protection) Act of 1972 was recorded along with the Large Eggfly. The Painted Lady, a migratory species was seen all over the hills in large numbers

during October and November months, active mostly during the evening hours. The sighting of Clipper, a large butterfly is also worth mentioning.

Heliconiinae : Only one butterfly species represented this subfamily at Madayipara. The Tawny Coster can be seen all over the plateau immediately after the monsoon. The food plants of this species, *Passiflora foetida*, a medicinal climber found on the slopes of the hills and close to the rail track adjacent to the mining company, support a good population of Tawny Costers.

Lycaenidae : 23 species were observed. The Common Pierrot and the Common Cerulean were common amongst the lycaenids. The beautiful Yamfly and Red Pierrot were occasionally seen. The Longbanded Silverline, one of the endemic species of butterflies in south India was seen during the wet season. The Plum Judy is basically a forest dwelling species. It was once observed in the sacred grove of Madayi Kavu on the northern side of the plateau.

Hesperiidae : 24 species of skippers were recorded from the hills. The richness of their larval foodplants (grasses) is probably the reason for their diversity. The Suffused Snow Flat and Water Snow Flat were seen for a short period during a wet season.

Butterflies being a major pollinator, it would be interesting to know the association of butterflies with the plants that are rare and restricted to the laterite hill. This microhabitat having an area of roughly about 1.5 ha in continuation with the present mining company all along the slopes, harbour a thick growth of plants of medicinal importance, most of which are also the larval food plants of these insects. The intensive mining activities and proposed expansion of mines are the major threat to this unique butterfly habitat. The rich diversity of butterfly species attracts many students and entomologists to the area. This locality is now aptly known among butterfly enthusiasts as 'Butterfly Park'. One can easily identify many of these species within a 100-meter stretch of the 'Park' during the wet season of the year. The nectary plants such as *Crotalaria retusa*, *Clerodendron paniculatum*, *Leucas sp.*, *Acacia intsia*, *Premna latifolia*, *Disophylla quadrifolia*, *Lantana camara*, *Mussaenda frondosa* and *Ziziphus oenoplia* attract large number of butterflies.

Systematic account of Butterflies (Rhopalocera : Lepidoptera) of Madayipara with names of their larval food plants.

PAPILIONIDAE

PAPILIONINAE TROIDINI

1. *Troides minos* Cramer Southern Birdwing

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

Remarks : Uncommon. Mainly seen during wet phase of the plateau. Frequently visits the flower heads of *Clerodendron paniculatum*.

2. *Pachliopta aristolochiae* (Fabricius)

Common Rose

Larval Food Plants : *Aristolochia indica*, *A. tagala*.*Remarks* : Uncommon. Can be observed in small numbers during September to January and February.3. *P. hector* (Linnaeus)

Crimson Rose

Larval Food Plant : *Aristolochia indica*.*Remarks* : Common. A frequent visitor to the flowers of *Leucas*. This early morning visitor spends very little time on each flower. Protected under Schedule-I of Indian Wildlife (protection) Act, 1972.

PAPILIONINAE LEPTOCRICINI

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

Common Blue Bottle

Larval Food Plants : *Cinnamomum* sp., *C. verum*, *Polyalthia longifolia*.*Remarks* : Uncommon. Only seen during rainy seasons. Larvae were observed on *Cinnamomum* tree.5. *Graphium agamemnon menides* (Felder &Felder)

Tailed Jay

Larval Food Plants : *Annona reticulata*, *A. squamosa*, *Cinnamomum* spp., *Michelia champaca*, *Polyalthia longifolia*.*Remarks* : Uncommon. A busy butterfly found attracted to *Acacia intsia*, *Disophylla quadrifolia* flowers.

PAPILIONINAE PAPILIONINI

6. *Papilio clytia clytia* (Linnaeus)

Common Mime

Larval Food Plants : *Cinnamomum* spp.*Remarks* : Uncommon. Both *clytia* and *dissimilis* forms were observed in the area.7. *Papilio demoleus demoleus* Linnaeus

Lime Butterfly

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

Remarks : Uncommon. An elusive butterfly species, observed very less in number during the survey. A spurt in population can be observed during April.

8. *P. liomedon* Moore
Malabar Banded Swallowtail

Larval Food Plant : *Evodia roxburghiana*.

Remarks : Rare. Seen only during July to September months. This species was observed to lay eggs on *Evodia roxburghiana*, locally called *Kanala* or *Kattu rubber*, near Kulangarapalli pond on the eastern slopes of the plateau.

9. *P. helenus* (Hampson)
Red Helen

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

Remarks : Rare. A fast flier. Very few observations only could be made during the wet phases of the plateau.

10. *P. polytes polytes* (Linnaeus)
Common Mormon

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

Remarks : Common. The *styris* and *polytes* forms were recorded. Most often found breeding on *Murraya koenigii*.

11. *P. p. polymnestor* Cramer
Blue Mormon

Larval Food Plants : *Glycosmis arborea*, *Atlantia racemosa*, *Citrus* spp.

Remarks : Uncommon. A large butterfly. Found more frequently during September and October months.

12. *P. paris tamilana* Moore
Paris Peacock

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

Remarks : Rare. Only two sightings during the survey. Both the records were during October. A forest species, seldom seen in the plains.

13. *P. Buddha* Westwood
Buddha Peacock

Larval Food Plant : *Zanthoxylum rhetsa*.

Remarks : Rare. One of the beautiful butterfly species of southern India. All the observations were during July to December.

PIERIDAE

COLIADINAE COLIADINI

14. *Catopsilia pomona* (Fabricius)
Common Emigrant

Larval Food Plants : *Cassia fistula*, *C. tora*, *C. alata*.

Remarks : Common. Often seen attending the flowers of *Acacia intsia*, *Disophylla quadrifolia* and *Clerodendron* spp..

15. *C. pyranthe* (Linnaeus)
Mottled Emigrant

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

Remarks : Uncommon. Seen in more numbers during April and May.

16. *Eurema brigitta rubella* (Wallace)
Small Yellow

Larval Food Plant : *Cassia* sp.

Remarks : Rare. Very few records from the locality.

17. *E. hecabe simulata* (Moore)
Common Grass Yellow

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

Remarks : Common. Seen during all the seasons. More numbers were recorded during October.

18. *E. blanda silhetana* (Wallace)
Three-spot Grass Yellow

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

Remarks : Uncommon. Recorded only during the wet phase.

PIERINAE PIERINI

19. *Delias eucharis* (Drury)
Common Jezebel

Larval Food Plant : *Dendrophthoe falcate*.

Remarks : Uncommon and found sporadically on the plateau.

20. *Leptosia nina nina* (Fabricius)
Psyche

Larval Food Plants : *Capparis* sp., *Cleome viscosa*.

Remarks : Common. A wet season species. Large numbers of larvae were observed on *Cleome viscosa* plant growing on the slopes of the hill.

21. *Cepora nerissa phryne* (Fabricius)
Common Gull

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

Remarks : Uncommon. Seen during September to November.

22. *Anapheis aurota* (Fabricius)
Caper White/Pioneer

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

Remarks : Rare. Generally a dry zone species; very few records from the locality.

23. *Appias lyncida latifasciata* Moore
Chocolate Albatross

Larval Food Plant : *Capparis* sp.

Remarks : Rare. A single sighting from the plateau.

PIERINAE EUCHLOEINI

24. *Parenonia valeria hippia* (Fabricius)
Common Wanderer

Larval Food Plant : *Capparis* sp.

Remarks : Common. Large number of larvae and pupae can be observed on *Capparis* plant immediately after the monsoon.

25. *Hebomoia glaucippe australis* Butler
Giant Orange Tip

Larval Food Plant : *Capparis* sp.

Remarks : Common. A magnificent flier, seldom seen resting during the day. A single visit in the 'butterfly park' during the wet phase assures sighting of 4 to 5 individuals of this species.

NYMPHALIDAE

SATYRINAE MELATINI

26. *Melanitis leda leda* (Drury)
Common Evening Brown

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

Remarks : Common. A population spurt can be observed during the month of October. Many individuals can be found attracted to light during this period.

SATYRINAE ELYMNIINI

27. *Elymnias hypermnestra caudata* Butler
Common Palmfly

Larval Food Plants : *Areca catechu*, *Cocos nucifera* and Ornamental Palms.

Remarks : Uncommon. During the wet phase, many individuals can be found breeding on the ornamental palms in homesteads around the plateau.

28. *Lethe europa ragalva* Fruhstorfer
Bamboo Treebrown

Larval Food Plants : Bamboos.

Remarks : Rare. A single record, collected under light.

29. *Mycalesis perseus typhlus* Fruhstorfer
Common Bushbrown

Larval Food Plants : *Oryza* spp., *Oplismenus compositus*.

Remarks : Common. More of a homestead species found attracted to decaying vegetable matter.

30. *M. mineus polydecta* (Cramer)
Dark-brand Bushbrown

Larval Food Plants : Grasses.

Remarks : Rare. Found along with the Common Bushbrown.

31. *Orsotrioena medus mandata* (Moore)
Nigger

Larval Food Plant : *Oryza sativa*.

Remarks : Common. Found along with other bushbrowns.

SATYRINAE SATYRINI

32. *Ypthima huebneri huebneri* Kirby
Common Fourring

Larval Food Plants : Grasses.

Remarks : Uncommon. It is a shade loving species frequenting wooded areas of the plateau.

CHARAXINAE CHARAXINI

33. *Charaxes solon solon* (Fabricius)
Black Rajah

Larval Food Plants : *Tamarindus indicus*, *Moullava spicata*.

Remarks : Rare. More than 20 individuals were seen attracted to the fruit sap of *Careya arborea* tree located near the Rest House Compound during April.

HELICONIINAE ACRAEINI

34. *Acraea violae* (Fabricius)
Tawny Coster

Larval Food Plants : *Adenia hondala*, *Passiflora foetida*.

Remarks : Uncommon. Two population spurts were noticed, the first from April to May and the second from August to November.

HELICONIINAE ARGYNNINI

35. *Cupha erymanthis maja* Fruhstorfer
Southern Rustic

Larval Food Plant : *Flacourtia* sp.

Remarks : Uncommon. Though a forest species, sighted many times during the wet season.

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

Larval Food Plants : *Flacourtia* sp. *Smilax* sp.

Remarks : Uncommon. Congregation of more than 50 individuals can be observed during the month of May. An avid nectar feeder found attracted to flowers of *Acacia intsia* plant.

37. *Cirrochora thais thais* Fabricius
Tamil Yeoman

Larval Food Plant : *Hydnocarpus alpina*.

Remarks : Common. A well-known forest species. A small population of this species thrives on the plateau due to the presence of their larval food plant, *Hydnocarpus alpina*.

LIMENITINAE NEPTINI

38. *Neptis jumbah jumbah* Moore
Chestnut streaked Sailer

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

Remarks : Common. Seen more in numbers during the wet phase.

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

Larval Food Plants : *Bombax ceiba*, *Canavalia gladiata*, *Mucuna purpurea*, *Xylia xylocarpa*.

Remarks : Common. One of the most common species of the hill, frequenting all kinds of habitats.

40. *Pantoporia hordonia hordonia* (Stoll)
Common Lascar

Larval Food Plant : *Acacia intsia*.

Remarks : Common. A regular member of the 'Butterfly Park'

41. *Athyma ranga karwara* Fruhstorfer
Black Vein Sergeant

Larval Food Plant : *Olea dioica*.

Remarks : Rare. Observed five times during the survey.

42. *Limenitis procris undifragus* Fruhstorfer
The Commander

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

Remarks : Common. Active during the wet phase. Many larvae were seen on the ornamental *Mussaenda* plant grown in the home gardens around the plateau.

LIMENITINAE PARTHENINI

43. *Parthenos sylvia virens* Moore
Clipper

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

Remarks : Uncommon. Though a jungle species, many observations could be from the locality during the wet phase.

LIMENITINAE EUTHALINI

44. *Tanaecia lepidea miyana* Fruhstorfer
Grey Count

Larval Food Plants : *Careya arborea*, *Melastoma malabathricum*.

Remarks : Uncommon. Highly seasonal, found from June to November. Frequently visits the decaying mangoes and jackfruits along with other bush brown species.

45. *Euthalia aconthea meridionalis* Fruhstorfer
Common Baron

Larval Food Plants : *Mangifera indica*, *Anacardium occidentale*.

Remarks : Common. Females are more common and found attracted to decaying fruits. Their flight period mainly starts with the summer rains in April and extends up to November or December.

46. *E. lubentina arasada* Fruhstorfer
Gaudy Baron

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

Remarks Rare. Mostly recorded during April and May months.

47. *Dophla evelina laudabilis* Swinhoei
Red Spot Duke

Larval Food Plant : *Anacardium occidentale*.

Remarks : Rare. An elusive butterfly species. Sighted on very few occasions from the plateau.

LIMENITINAE BIBLINI

48. *Ariadne ariadne indica* (Moore)
Angled Castor

Larval Food Plants : *Ricinus communis*, *Tragia involucrata*.

Remarks : Uncommon. Seen during rainy seasons.

49. *A. merione merione* Cramer
Common Castor

Larval Food Plants : *Ricinus communis*, *Tragia involucrata*.

Remarks : Uncommon. Their numbers appear to have declined over the years due to habitat degradation.

NYMPHALINAE NYMPHALINI

50. *Junonia hierta hierta* Fabricius
Yellow Pansy

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

Remarks : Rare. A single observation.

51. *Junonia orithya swinhoei* (Butler)
Blue Pansy

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

Remarks : Rare. A large number of members of this species could be observed from the plateau only in August – September 1998. Thereafter there has been no record of this species from the locality. Their unusual presence on the plateau may be connected with the migratory habits of the species.

52. *J. lemonias* (Linnaeus)
Lemon Pansy

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

Remarks : Common. Found attracted to *Disophylla* flower heads in good numbers from August to December.

53. *J. almana almana* (Linnaeus)
Peacock Pansy

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

Remarks : Common. Like the Lemon Pansy, this species is also found attracted to *Disophylla*.

54. *J. atlites atlites* (Linnaeus)

Grey Pansy

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

Remarks : Common. Frequents the flowers of *Disophylla*. Can be found more in numbers during November and December.

55. *J. iphita pluvialis* Fruhstorfer

Chocolate Pansy

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

Remarks : Common. Like other pansies this species is also attracted to *Disophylla* for nectar.

56. *Cynthia cardui cardui* (Linnaeus)

Painted Lady

Larval Food Plants : *Artemisia* sp., *Blumea* sp.

Remarks : Rare. Can be sighted during October and November, probably connected with the migratory habit of the species.

57. *Hypolimnas bolina jacintha* Drury

Great Eggfly

Larval Food Plants : *Portulaca oleracea*, *Sida rhombifolia*.

Remarks : Uncommon. Mainly seen from September to December.

58. *H. misippus* (Linnaeus)

Danaid Eggfly

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

Remarks : Uncommon. But can be observed immediately after the monsoon. Listed in the Schedule-I of Indian Wildlife (Protection) Act of 1972.

DANAINAE DANAINI

59. *Parantica aglea aglea* (Stoll)

Glassy Blue Tiger

Larval Food Plants : *Calotropis gigantea*, *Ceropegia bulbosa*, *Cryptolepis buchanani*, *Tylophora indica*.

Remarks : Uncommon. Not a regular butterfly; often seen in small numbers.

60. *Tirumala limniace exoticus* Gmelin
Blue Tiger

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

Remarks : Common. One of the commonest butterflies found throughout all seasons on the plateau. Many larvae were observed on the *Wattakaka volubilis*, a climber, at the Kottakunnu region of the hill.

61. *Danaus chrysippus chrysippus* (Linnaeus)
Plain or Common Tiger

Larval Food Plants : *Calotropis gigantea*, *Cryptolepis buchanani*.

Remarks : One of the commonest species of the hill, evidently due to the occurrence of large number of its larval food plant, *Calotropis gigantea* in the locality.

62. *D. genutia genutia* (Cramer)
Striped Tiger

Larval Food Plants : *Asclepias curassavica*, *Tylophora* sp.

Remarks : Uncommon. Mainly found during wet seasons.

DANAINAE EUPLOEINI

63. *Euploea core core* (Cramer)
Common Crow

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

Remarks Common. A polyphagous butterfly found most of the year in the locality. A new larval food plant of the butterfly species, *Ficus arnottiana*, was first reported from this area (Jafer & Radhakrishnan, 2002).

64. *E. klugii kollari* Felder & Felder
Brown King Crow

Larval Food Plants : *Ficus hispida*, *Streblus asper*, *Ficus glomerata*.

Remarks : Rare. A single record from the area.

LYCAENIDAE
RIODININAE RIODINIINAE

65. *Abisara echerius prunosa* (Moore)
Plum Judy

Larval Food Plants : unknown.

Remarks : Rare. A few observations from the sacred groves of Madayikavu during the wet seasons.

MILETINAE MILETINI

66. *Spalgis epius epius* (Westwood)
Apefly

Larval Food : Scale Insects.

Remarks : Rare. All the observations were during April or May.

POLYOMMATINAE POLYOMATINI

67. *Castalius rosimon rosimon* (Fabricius)
Common Pierrot

Larval Food Plants : *Ziziphus mauritiana*, *Z. rugosa*.

Remarks : A locally abundant species found throughout the year. Many larvae were found on the *Ziziphus* plant during April and May and again from November to January.

68. *Caleta caleta decida* (Lewiston)
Angled Pierrot

Larval Food Plant : *Ziziphus rugosa*

Remarks : Common but less compared to the Common Pierrot. Observed during November and December, more in numbers.

69. *Pseudozizeeria maha ossa* (Swinhoe)
Pale Grass Blue

Larval Food Plants : *Oxalis corniculata*, *Tephrosia pauciflora*.

Remarks : Common. Can be found in large numbers during September and October. An incident of this species trapped by the insectivorous plant *Drosera indica* was reported from the locality (Jafer & Khaleel, 2000).

70. *Euchrysops cnejus cnejus* (Fabricius)

Gram Blue

Larval Food Plants : *Acacia* spp., various grams and beans.*Remarks* : Uncommon. Mostly seen in the vegetable farmlands of Thuvarathadam during the wet season.71. *Lampides boeticus* (Linnaeus)

Pea Blue

Larval Food Plants : *Crotalaria* spp., *Pisum sativum*, *Species of gram*.*Remarks* : Uncommon. Seen only during October and February in small numbers.72. *Jamides bochus bochus* (Cramer)

Dark Cerulean

Larval Food Plants : *Crotalaria* sp., *Pongamia pinnata*, *Xylia xylocarpa*.*Remarks* : Rare. Occasionally sighted from October to January.73. *Jamides celeno aelianus* (Fabricius)

Common Cerulean

Larval Food Plants : *Abrus precatorius*, *Pongamia pinnata*, *Saraca asoca*, *Xylia xylocarpa*.*Remarks* : Common. Once an abundant species now found in lesser numbers. Frequents *Disophylla* plant for nectar.74. *Prosotas nora nora* (Felder)

Common Line Blue

Larval Food Plants : *Acacia catechu*, *Pithecellobium dulce*, and a few unspecified plants from families *Combretaceae*, *Myrtaceae* and *Sapindaceae*.*Remarks* : Rare. Mainly seen during October and November months.75. *Talicauda nyseus nyseus* Gurin- Meneville

Red Pierrot

Larval Food Plant : *Kalanchoe* sp.*Remarks* : Common. A spurt in population can be observed during May. Large number of larvae can be found on the garden variety of *Kalanchoe* during May and June.

THECLINAE ARHOPALINI

76. *Thaduka multicaudata kanara* (Evans)

Many-tailed Oakblue

Larval Food Plant : *Trewia nudiflora*.*Remarks* : Rare. A single observation during October 2003.

**77. *Surendra quercetorum bipalgiata* (Butler)
Common Acacia Blue**

Larval Food Plant : *Acacia* sp.

Remarks : Uncommon. Can be observed immediately after the monsoon in small numbers.

THELCINAE AMBLYPODIINI

**78. *Iraota timoleon arsaces* Fruhstorfer
Silver Streak Blue**

Larval Food Plants : *Ficus benghalensis*, *F. racemosa* and *F. religiosa*.

Remarks : Rare. A single observation on *Careya arborea* fruit in April 2002.

THELCINAE AMPHAEINI

**79. *Spindasis vulcanus vulcanus* (Fabricius)
Common Silverline**

Larval Food Plants : *Cadaba fruticosa*, *Canthium* sp., *Ziziphus mauritiana*, *Z. rugosa*.

Remarks : Uncommon. The flight period is restricted to the wet phase.

**80. *S. lohita lazularia* Moore
Long-banded Silverline**

Larval Food Plants : *Dioscorea pentaphylla*, *Terminalia paniculata*, *Xylia xylocarpa*.

Remarks : Rare. A few records from the area during the wet season.

THELCINAE LOXURINI

**81. *Loxura atymnus atymnus* (Cramer)
Yamfly**

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

Remarks : Common. A regular butterfly of the plateau.

**82. *Cheritra freja freja* (Fabricius)
Common Imperial**

Larval Food Plants : *Xylia xylocarpa*, *Saraca asoca*, *Cinnamomum* sp. *Ixora* sp.

Remarks : Rare. A single observation from the plateau during January 2003.

THELCINAE HORAGINI

83. *Rathinda amor* (Fabricius)
Monkey Puzzle

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

Remarks : Uncommon. Flight period observed from October to January.

THELCINAE ZESIINI

84. *Zesius chrysomallus* Hubner
Red Spot

Larval Food Plants : *Terminalia paniculata*, *Anacardium occidentale*, *Psidium guava*.

Remarks : Uncommon. More butterflies were observed during October and November.

THELCINAE LOLAINI

85. *Tajuria cippus cippus* (Fabricius)
Peacock Royal

Larval Food Plant : *Dendrophthoe falcata*.

Remarks : Uncommon. All the observations were during September to December. Found attracted to *Disophylla quadrifolia* plant.

THELCINAE DEUDORIGINI

86. *Rapala manea schistacea* (Moore)
Slate Flash

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

Remarks : Uncommon. Found from September to January, coinciding with the flowering of *Disophylla*.

CURETINAE CURETINI

87. *Curetis thetis thetis* (Drury)
Indian Sunbeam

Larval Food Plants : *Abrus precatorius*, *Pongamia pinnata*, *Derris scandens*.

Remarks : Uncommon. Seen immediately after the southwest monsoon till November.

HESPERIIDAE

COELIADINAE

88. *Bibasis sena sena* (Moore)
Orange-Tail Awl

Larval Food Plant : *Hiptage madablota*.

Remarks : Rare. A forest loving species found once in the locality during October 2002.

89. *Hasora chromus chromus* (Cramer)
Common Banded Awl

Larval Food Plants : *Pongamia pinnata*, *Ricinus communis*.

Remarks : Uncommon. Only very few sightings from the locality.

90. *H. badra badra* (Moore)
Common Awl

Larval Food Plants : *Derris* spp.

Remarks : Uncommon. A wet season species.

91. *Badamia exclamationis* (Fabricius)
Brown Awl

Larval Food Plant : *Terminalia bellirica*

Remarks : Rare. A single observation during August 2003.

PYRGINAE

92. *Celaenorrhinus leucocera* (Kollar)
Common Spotted Flat

Larval Food Plant : *Carvia callosa*.

Remarks : Common. Flight period was observed to be from August to December. Found attracted to the flowers of *Disophylla*.

93. *C. ambareesa* (Moore)
Malabar Spotted Flat

Larval Food Plants : *Carvia callosa*, *Eranthemum roseum*.

Remarks : Rare. A few observations during October and December.

94. *Tagiades gana silvia* Evans
Suffused Snow Flat

Larval Food Plant : *Dioscorea* sp.

Remarks : Uncommon. Mainly seen during the rainy season. Often attracted to *Disophylla* flower for nectar.

95. *T. litigiosa litigiosa* Moschler
Water Snow Flat

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

Remarks : Uncommon. Sighted during rainy seasons.

96. *Psedocoladenia dan dan* (Fabricius)
Fulvous Pied Flat

Larval Food Plant : *Achyranthes aspera*.

Remarks : Uncommon. Mainly a wet season species; frequents the *Disophylla* flowers.

97. *Pseudocladenia indrana*
Tricolour Pied Flat

Larval Food Plant : *Xylia xylocarpa*.

Remarks : Uncommon. Sighted on the *Disophylla* plant feeding nectar.

98. *Sarangesa dasahara* Swinhoe
Common Small Flat

Larval Food Plant : *Asystasia* spp.

Remarks : Uncommon. Found in the wooded area of the plateau from November to January.

99. *S. purendra pandra* Evans
Spotted Small Flat

Larval Food Plants : *Asystasia* spp.

Remarks : Common. Abundant immediately after the southwest monsoon. An unusual egg laying by this butterfly on *Lepidagathis keralaensis*, an acanthaceae plant was observed during November 2002.

100. *Sipalia galba galba* (Fabricius)
Indian Grizzled Skipper

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

Remarks : Rare. A few sightings during December, 2003.

HESPERIINAE

101. *Ampittia discorides* (Fabricius)
Bush Hopper

Larval Food Plant : *Oryza sativa*.

Remarks : Rare. Found on the hill slopes during the wet season.

102. *Iambrix salsala lutipennis* (Plotz)
Chestnut Bob

Larval Food Plants : *Bamboosa arundinacea* and grasses.

Remarks : Uncommon. An active butterfly of the wet season.

103. *Psolos fuligo subfasciatus* Moore
Coon

Larval Food Plant *Zingiber* sp.

Remarks : Uncommon. Flight period found restricted from October to January.

104. *Notocrypta curvifascia curvifascia* (Felder & Felder)
Restricted Demon

Larval Food Plants : *Costus speciosus*, *Curcuma* sp., *Zingiber* sp.

Remarks : Uncommon. Mainly seen from October to December.

105. *Udaspus folus* (Cramer)
Grass Demon

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

Remarks : Uncommon. A wet season butterfly.

106. *Suastus gremius gremius* (Fabricius)
Indian Palm Bob

Larval Food Plants : *Caryota urens*, *Cocos nucifera*

Remarks : Uncommon.

107. *Gangara thyrsis thyrsis* (Fabricius)
Giant Redeye

Larval Food Plants : *Caryota urens*, *Cocos nucifera*, Ornamental palms

Remarks : Uncommon. A wet season species. Found breeding on ornamental palms grown in adjacent gardens.

108. *Taractrocera maeuius* sagara Moore
Common Grass Dart

Larval Food Plants : Grasses

Remarks : Common. Found throughout the year. A peak in population can be observed from October to December. Found attracted to *Disophylla* flowers.

109. *T. ancilla bambusae* (Moore)
Dark Palm Dart

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

Remarks : Uncommon. Mainly found from October to January.

110. *Barbo cinnara* (Wallace)
Rice Swift

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

Remarks : Uncommon. A species of the foothills.

111. *Pelopidas mathias mathias* (Fabricius)
Small Branded Swift

Larval Food Plants : Unknown.

Remarks : Uncommon. Found throughout the year in small numbers.

Heterocera (Moths)

Moths are least studied from Kerala. Some samples attracted to light during the study period could be collected. A total of 19 species belonging to 10 families were recorded from Madayipara. The Atlas Moth, *Attacus atlas*, could be observed in good numbers regularly during October and November. An outbreak of *Hyblaea peura* (Teak defoliator), a notorious pest of Teak (*Tectona grandis*) was observed in October 1996 and again in November 2004. Similarly, an outbreak of Teak skeltoniser, *Eutectona machoearalis* was also noticed among the Teak plantations along the foothills of Madayipara during the month of November 2004. A cocoon of Tussar Silk Moth, *Anthereae paphia* was collected from Cashew tree (*Anacardium occidentale*) and reared during February 2004. A list of moths (Table – III) recorded from the Madayipara hill is presented below.

Table-III : Systematic list of Moths (Heterocera : Lepidoptera)

	Order	LEPIDOPTERA
	Suborder	HETEROCERA
	Family	GEOMETRIDAE
1.	<i>Euschema percota</i> Swinhoe	
2.	<i>Hyposidra successaria</i> Walker	
3.	<i>Hyposidra talaka</i> Walker	
4.	<i>Pseudoterpna ruginaria</i> Guen.	
5.	<i>Macaria fasciata</i> Fabricius	
	Family	NOCTUIDAE
6.	<i>Ischyja manila</i> Cramer	
7.	<i>Ophideres fullonica</i> Linnaeus	
8.	<i>Nyctipao hieroglyphica</i> Drury	
	Family	SPHINGIDAE
9.	<i>Macroglossum particolor</i> Roths & Jord.	
10.	<i>Acharontia styx styx</i> Westn.	
	Family	PYRALIDAE
11.	<i>Eutectona machoeaeralis</i> Walker	
12.	<i>Pygopsila tyres</i> Cramer	
	Family	SATURNIDAE
13.	<i>Attacus atlas</i> Linaneus	
14.	<i>Anthereae paphia</i> Linnaeus	
	Family	HYBLAEIDAE
15.	<i>Hyblaea peura</i> Cramer	
	Family	ARCTIIDAE
16.	<i>Deiopia pulchella</i> Linnaeus	
	Family	LYMANTRIDAE
17.	<i>Dasychira mendosa</i> Hubn.	

- Family SYNTOMIDAE
18. *Syntomoides godartii* Boisduval

- Family EIPLEMIDAE
19. *Orudiza protheclaria* Walker

Orthoptera : Grasshoppers can commonly be seen in the grasslands of the Madayipara immediately after the first shower during the last week of May. The Kottakunnu grasslands of the hill are abundant with large acridid grasshoppers and small tettigonids during October and November. The large assemblage of grasshoppers attracts a number of birds and frogs to the area. A list of Grasshoppers collected from the Madayipara is provided (Table-IV) below.

Table-IV : Systematic list of Orthoptera from Madayipara

	Order	ORTHOPTERA
	Family	ACRIDIDAE
1.	<i>Cotantops indicus</i> (Botis)	
2.	<i>Acrida turrita</i> (Linnaeus)	
3.	<i>Dittiopteris venusta</i> (Walker)	
4.	<i>Oedaleus abruptus</i> (Thunberg)	
5.	<i>Catantops pinguis</i> (Walker)	
6.	<i>Stauroderus bicolor</i> (Charpentier)	
7.	<i>Atractomorpha crenulata</i> (Fabricius)	
8.	<i>Acrydium bipunctatum</i> (Linn.)	
9.	<i>Ditopternis ceylonica</i> (Saussure)	
10.	<i>Morphacris citrina</i> (Kirby)	
11.	<i>Paratettix variabilis</i> (Bol.)	
12.	<i>Ptemosairta bimaculata</i> (Thunb)	
13.	<i>Oedaleus abruptus</i> (Thunb.)	
14.	<i>Trilophidia turpis</i> (Walker)	
15.	<i>Mecosta fasciatus</i> (Brun)	
16.	<i>Gesonula punctifrons</i> (Stal.)	
17.	<i>Euparatettix personatus</i> (Bol.)	
18.	<i>Mecostethus fasciatus</i> (Brunn.)	
19.	<i>Acrida exaltata</i> (Walker)	
20.	<i>Acrida lugurbis</i> (Brunn.)	
21.	<i>Tylotropidius varicornis</i> (Walker)	

6. *Eumantis assamica* Giglio-Tos
Subfamily MANTINAE
7. *Hierodula (Hierodula) ventralis*. Giglio-Tos.
Family EMPUSIDAE
Subfamily EMPUSINAE
8. *Gongylus gongylodes* (Linnaeus)
Subfamily SCHIZOCEPHALLINAE
9. *Schizocephala bicornis* (Linnaeus)

In addition to the faunal groups discussed above, there are many other invertebrates (Plate-5) associated with laterite hills such as annelids and nematodes, even though very little information is available on them. No doubt, these play a significant role in the laterite hill landscapes of Madayipara.

MOLLUSCA

The Apple Snail, *Pila globosa* is widespread in many aquatic habitats. The early stages of this large mollusc were seen in abundance in the waters of Thuvarathadam area and other abandoned paddy fields on the plateau, which attract over-wintering bird migrants like Red Shanks and Green Shanks to the fields. In smaller ponds, abundance of *Indoplanorbis exustus* was noticed among the aquatic vegetation. The *Psidium (Afropsidium)* sp. is widespread in many temporary pools and appears to possess a high degree of adaptation to this kind of environment. Besides, these aquatic species, certain land mollusks like *Trachia ruginosa* were found in the vicinity along with a species of land slug, which frequent the bathrooms, and toilets of the houses around the locality.

ARACHNIDA

Spiders : Spiders (Order Araneae) are another least studied and neglected group of invertebrates in Kerala. From the available literature, we could identify 16 species though many more species occur here. A systematic list of the spider species (Table – VI) is given below.

Table-VI A systematic list of Spiders recorded from Madayipara.

Sl. No.	Order/Family/ Species	Common Name
	Order ARANEAE	
	Family ARANEIDAE	
1.	<i>Argiope anasuja</i>	Speckled Fourleg
2.	<i>Argiope pulchella</i>	Banded Forleg

Sl. No.	Order/Family/ Species	Common Name
3.	<i>Eriovixia laglaisei</i>	
4.	<i>Gasteracantha geminata</i> Family ERESIDAE	Tribanded Spiky Orb
5.	<i>Stegodyphus sarasinorum</i> Family HERSILIDAE	Ashy Social Spider
6.	<i>Hersilia savignyi</i> Family OXYOPIDAE	Common Two-tail
7.	<i>Oxyopes birmanicus</i>	Brown Lynx
8.	<i>Oxyopes</i> sp.	Brown Lynx
9.	<i>Peucetia viridana</i> Family PHOLCIDAE	Green Lynx
10.	<i>Crossopriza lyoni</i>	Box Longlegs
11.	<i>Smerinogopus pallidus</i> Family SALTICIDAE	
12.	<i>Hasarias adansoni</i>	
13.	<i>Plexippus paykullii</i> Family SICARIIDAE	Zebra Jumper
14.	<i>Loxosceles</i> sp. Family SPARASSIDAE	
15.	<i>Heteropoda venatoria</i>	Giant Crab Spider
16.	<i>Olios milleti</i> Family THOMISIDAE	
17.	<i>Thomisus</i> sp.	Crab Spider

Scorpionida : During our surveys, we could collect from the locality 2 species of scorpions belonging to 2 families. The most common species found around Madayipara is *Heterometrus (Heterometrus) malapuramensis*, a species described from Kerala during 1983. This species is mainly found under boulders near the Madayikavu Sacred grove. All the collections were made during the wet season. A small species of scorpion, *Lychas (Endotrichus) tricarinatus* was also collected from the locality. This species is locally called *manithel* due to its small size.

VERTEBRATS

There are no vertebrate species strictly restricted to the laterite hills of north Malabar. The laterite hillocks with its waterbodies, bushy vegetation and and sacred groves provide ample refuge for many vertebrate animals.

PISCES

The tableland is well known for its water bodies. A total of 7 ponds and several small monsoon pools are located on the plateau. Out of these, two are perennial and the remaining flooded only during the wet phase from June to December or January. There are about 13 species of fishes recorded from these water bodies. *Oreochromis mossambica*, an exotic fish, was well represented in the parackulam pond. Brackishwater species like *cupanus*, *Puntius vittatus* and *Aplocheilus blocki* were also collected from most of the water bodies of the plateau. A systematic list of the fish species (Table – VII) recorded from the area is given below :

Table-VII : A systematic list of the fishes from Madayipara.

Sl. No.	Scientific Name	Common Name
	Class PISCES	
	Order CYPRINIFORMES	
	Family CYPRINIDAE	
1.	<i>Danio malabaricus</i> Jerdon	Giant Danio
2.	<i>Rasbora daniconius</i> (Ham.)	Common Rasbora
3.	<i>Puntius amphibius</i> (Val.)	Scarlet-banded Barb
4.	<i>Puntius vittatus</i> Day	Kooli Barb
5.	<i>Puntius ticto ticto</i> (Hamilton)	Two Spot Barb
	Order PERCIFORMES	
	Family BELONTIIDAE	
6.	<i>Pseudosphromenus (val.) cupanus</i>	Paradise Fish
	Family CICHLIDAE	
7.	<i>Etroplus suratensis</i> (Bloch.)	Pearl Spot
8.	<i>Oreochromis mossambica</i> Peters	Tilapia
	Order ATHERINIFORMES	
	Family APLOCHEILIDAE	
9.	<i>Aplocheilus lineatus</i> (Val.)	Top Minnow

Sl. No.	Scientific Name	Common Name
10.	<i>Aplocheilus blocki</i> (Arnold) Order SILURIFORMES Family CLARIIDAE	Dwarf or Green Punchax
11.	<i>Clarias batrachus</i> (Linnaeus) Family HETEROPNEUSTINAE	Walking Catfish
12.	<i>Heteropneustes fossilis</i> (Bloch.) Order CHANNIFORMES Family CHANNIDAE	Indian Catfish
13.	<i>Channa orientalis</i> Bloch & Schneider	Smooth-breasted Snake Fish

AMPHIBIA

(Plate – 6, figs. 1-4)

Frogs and toads are by far the most obvious and typical vertebrates of this kind of an ecosystem. There are 14 species (Table – VIII) of amphibians recorded from the area (Jafer and Radhakrishnan, 2002). The Rufescent Frog, *Tomopterna rufescens* is an important burrowing frog that has developed the behaviour necessary to cope up with a long dry season. The ability of *T. rufescens* to dig burrows is an important aspect of its adaptation to a dry climate. The population survives dry periods by excavating burrows deep in the soil. It is difficult to imagine how the frog could make burrows in great depths in the rocky laterite soil of the hill. Apparently they seek out special microhabitats where this is possible. The young ones of *Tomopterna rufescens* are common during the onset of monsoon all over the hilltop throughout the wet-phase. A ten-minute's walk along the central portion of the rocky area of the hill can result in the sighting of more than 10 members of this frog during July. Once near Kottakunnu at around 6.40 in the evening, as many as fifty fungoid frogs (*Rana malabarica*) were seen crossing the hills from west to east direction. At night while monitoring the amphibians using torchlight, the rare, Red Narrow-mouthed Frog (*Microhyla rubra*) could be located in the locality. Again in the peak rainy days, the Indian Toad (*Bufo melanostictus*) was seen preying on insects under the lights. The Malabar flying Frog, *Rhacophorus malabaricus* as well as *Limnonectes brevipalmata*, *Tomopterna breviceps* and *Philautus* spp. were observed very rarely on the hills. The fungoid frog, *Rana malabarica* can be seen frequenting houses at the foothills of Madayipara. It has a remarkable homing ability. We have marked and translocated a few, but by the very next day the same frogs returned to their former sites.

Table-VIII : Amphibian fauna of Madayipara

Sl. No.	Scientific Name	Common Name	Status
	Class AMPHIBIA		
	Order ANURA		
	Family MICROHYLIDAE		
1.	<i>Microhyla rubra</i> (Jerdon)	Red Narrow-mouthed Frog	Rare
	Family RANIDAE		
2.	<i>Rana malabarica</i> Tschuudi	Fungoid Frog	Common
3.	<i>Hoplobatrachus tigerinus</i> Daudin	Indian Bull Frog	Common
4.	<i>Limnonectes limnocharis</i> Gevenhorst	Indian Cricket Frog	Uncommon
5.	<i>Limnonectes brevipalmata</i> Petters	Short-webbed Frog	Uncommon, Endemic
6.	<i>Euphlyctis cyanophlyctis</i> Schneider	Skipper Frog	Common
7.	<i>Euphlyctis hexadactylus</i> Lesson	Indian Pond Frog	Uncommon
8.	<i>Tomopterna rufescens</i> (Jerdon)	Rufescent Frog	Common, Endemic
9.	<i>Tomopterna breviceps</i> Schneider	Indian burrowing Frog	Rare
	Family RHACOPHORIDAE		
10.	<i>Polypedates maculatus</i> (Gray)	Common Tree Frog	Uncommon
11.	<i>Rhacophorus malabaricus</i> Jerdon	Malabar Gliding Frog	Rare
12.	<i>Philautus leucorhinus</i> (Lichtenstein & Martens)	White-nosed Bush Frog	Uncommon
	Family BUFONIDAE		
13.	<i>Bufo melanostictus</i> Schneider	Common Indian Toad	Common
	Order APODA		
	Family URAEOTYPHLIDAE		
14.	<i>Uraeotyphlus</i> sp.		Rare

REPTILIA**(Plate – 6, figs. 5-12 & Table – IX)**

Even though laterite hills are known to be good habitats for lizards and snakes, very few species only could be recorded during the study.

Turtles and Terrapins : The Indian Pond Terrapin, *Melanochelys trijuga* was observed frequently in the waters of Judhakulam. Once during a rainy season, a specimen of the Southern Flap-shelled Turtle, *Lissemys punctata* was caught on the southern foothills of Madayipara. They are caught and eaten by the local people.

Lizards : There are 5 species of lizards thriving on the hill. The most important and threatened one is the Monitor Lizard, *Varanus bengalensis*. The alleged medicinal property of this animal attracts poachers to the locality. This species is protected under Schedule II of the Indian Wildlife (Protection) Act of 1972. Poaching as well as the rapid developmental activities on the foothills and other areas has greatly affected the population of the species, and now they are restricted to the sacred groves of Madayikavu. Once in June 1995, we observed a breeding monitor lizard, near the rocky crevices of Madayikavu with 4 eggs.

Snakes : 19 species of snakes were observed during the survey. (Jafer Palot & Radhakrishnan, 2002) The Indian Rock Python was once observed at the foothills of Payangadi during rainy seasons, which was apparently brought by the storm waters of Kuppam River. It is interesting to mention that all the three species of Sand Boas including the recently described Whitaker's Sand Boa, *Eryx whitakeri* (Das, Indraniel, 1991) was observed in the area. The most common one is the Common Sand Boa, *Eryx conicus*. Rat snake is most frequently seen in the open grasslands of the plateau. Many times the bite of Common Kukri Snake, *Oligodon arnensis* was reported from the locality. Poisonous snakes represented in the area and occasionally seen are the Indian Cobra, Russel's Viper and the Krait. Even though the rock pit vipers are reported from other laterite hills adjacent to Madayi, It is poorly distributed in the locality.

Table-IX : Reptilian fauna of Madayipara

Sl. No.	Scientific Name	Common Name	Remarks
1.	Class REPTILIA Order TESTUDINES Family EMYDIDAE <i>Melanochelys trijuga</i> (Schweigger) Family TESTUDINIDAE	Indian Pond Terrapin	Common
2.	<i>Lissemys punctata</i> (Lacepede) Order SQUAMATA Suborder SAURIA Family GEKKONIDAE	Indian Flap-shelled Turtle	Rare
3.	<i>Hemidactylus brooki</i> Gray	Spotted House Gecko	Common
4.	<i>Hemidactylus frenatus</i> Schlegel	Tic-Ticky House Gecko	Common

Sl. No.	Scientific Name	Common Name	Remarks
5.	Family AGAMIDAE <i>Calotes versicolor</i> (Daudin)	Indian Garden Lizard	Common
6.	Family SCINCIDAE <i>Mabuya carinata</i> (Schneider)	Common Indian Skink	Common
7.	Family VARANIDAE <i>Varanus bengalensis</i> (Daudin)	Indian Monitor Lizard	Uncommon
8.	Suborder SERPENTES Family TYPHLOPIDAE <i>Ramphotyphlops braminus</i> (Daudin)	Common Blind Snake	Uncommon
9.	<i>Typhlops acutus</i> (Dumeril & Bibron)	Beaked Blind Snake	Uncommon
10.	Family BOIDAE <i>Python molurus</i> (Linnaeus)	Indian Rock Python	Rare
11.	<i>Eryx conicus</i> (Schneider)	Common Sand Boa	Uncommon
12.	<i>Eryx johani</i> (Russel)	Red Sand Boa	Uncommon
13.	<i>Eryx whitakeri</i> Inraneil Das	Whitaker's Sand Boa	Rare
14.	Family COLUBRIDAE <i>Coluber mucosus</i> (Linnaeus)	Indian Rat Sanke	Common
15.	<i>Oligodon arnensis</i> (Shaw)	Common Kukri Snake	Rare
16.	<i>Dendrelaphis tristis</i> (Daudin)	Common Indian Bronze-back	Uncommon
17.	<i>Lycodon aulicus</i> (Linnaeus)	Common Wolf snake	Uncommon
18.	<i>Xenochrophis piscator</i> (Schneider)	Checkered Keelback	Common
19.	<i>Amphisema stolata</i> (Linnaeus)	Striped Keelback	Common
20.	<i>Boiga trigonata</i> (Schneider)	Common Cat Snake	Rare
21.	<i>Ahaetulla nasuta</i> (Lacepede)	Green Vine Snake	Uncommon
22.	<i>Sibynophis sp</i>	Blackheaded Snake	Rare
23.	Family ELAPIDAE <i>Bungarus caeruleus</i> (Schneider)	Common Krait	Uncommon
24.	<i>Naja naja</i> (Linnaeus)	Indian Cobra	Uncommon
25.	Family VIPERIDAE <i>Vipera russellii</i> (Shaw)	Russel's Viper	Uncommon
26.	<i>Hypnale hypnale</i> (Merrem)	Hump-nosed Pit Viper	Rare

AVES

(Plate-7 : 1-3)

The unique topographic setting of the Madayipara hill, an elevated table like plateau surrounded by the wetland system formed by the rivers of Kuppam, Ramapuram, Peruvamba and Kaayi backwaters and the legendary hills of Ezhimala on the western side, on the shores of the Lakshadweep Sea, has been an important land mark for the sailors in the past and a very distinct land mark for the migratory birds from far beyond Himalaya and from Palaearctic countries. A total of 168 species of birds were recorded during the study (see the annotated check-list below). Of these, 9 species observed during the study were not previously recorded by Salim Ali, in his work "Birds of Kerala" (1969), but recorded in the recent work of Neelakantan *et al.* ((1993). They are, Oriental Pratincole, Little ringed Plover (*Race-jerdoni*), Terek Sandpiper, Sanderling, Temminck's Stint, Dunlin, Grey Plover, Wire-tailed Swallow and the Desert Wheatear. Depending on their seasonal occurrence on the hill, the avian inhabitants are categorized in to four groups, viz. Residents, Migrants, Overwintering Migrants and the Local Migrants.

Residents : There are 96 species of birds using the different habitats of the hill. Among some resident species that use the plateau as a breeding ground are the Ashy-crowned finch Lark, Bush Lark, Eastern Skylark, Malabar Crested Lark, Paddy field Pipit, Pied Bush Chat, Red-wattled Lapwing, Yellow-wattled Lapwing and the Stone Curlew (Table – XI). These ground-nesting birds are affected even by slight disturbances in the locality. A number of skylarks and pipits were found mostly feeding on the seeds of grass species. The recent decline in the number of Yellow-wattled Lapwing and Stone Curlew in the hills indicate the present disturbed condition of the habitat, mainly due to the mining activities. The breeding success of other ground nesting birds is also highly affected by the uncontrolled movement of vehicles and overgrazing in the nesting localities. The relicts of the populations of Grey junglefowl and Red Spurfowl were recorded on the slopes of Madayipara. Two young ones of Grey Junglefowl seen in January 1996, at Eripuram shows that breeding populations still survive on the plateau. Once in October, 1995 in a plot of 1.5 acres, a large unusual congregation of 52 Red-wattled Lapwing and 21 Yellow-wattled Lapwing could be observed.

Migrants (Table – X) : A total of 46 species of migrants were observed on the Madayipara Hill. Migratory birds start arriving mostly in late August and leave the hill in late October. Majority of the species come from Palearctic Region, beyond the Himalaya, of Central and Northern Asia and Eastern and Northern Europe. The most abundant and regular winter visitors are from the family Charadriidae represented by 25 species. A number of birds can be seen during the last week of August which shows that the influx of the migrants readily concentrate on the plateau during that period. The observations over the years clearly indicate that the site is a staging point of the early migrants visiting far from Palaearctic countries. Since the wetland areas surrounding the plateau get flooded during the peak monsoon month of August, the incoming migrants naturally get attracted towards the flat-topped elevated tableland of Madayipara, which forms a good feeding ground by that time. The proximity

of Ezhimala Hills on the seacoast is a well-known landmark for these flying visitors. The sighting of the Desert Wheatear in August 1988 is, a new record for the avifauna of Kerala. Common Sandpipers start arriving by the third week of July, every year, and their numbers show a steady increase to about 100 birds by the end of August. Number of Lesser Sand Plovers, Large Sand Plovers, Red Shanks, Curlew Sandpipers and Green Shanks also increase by the second week of August. Golden Plovers, Turnstones, etc with the vestiges of breeding plumage arrive by the last week of August. By the second week of September, all shorebirds that visit this place can be seen in good numbers. The most common wader visiting the area is the Lesser Sand Plovers to be followed by Large Sand Plovers and Red Shanks. During September 1994, a large flock of about 500 Lesser Sand Plovers and a record number of about 160 Red Shanks could be observed. An association of Lesser Sand Plover, Large Sand Plover, Curlew Sandpiper and Little Stint were noticed here. During the mid eighties, large roosts of migratory White Wagtails were observed near Parackulam area. Since then their populations were not at all recorded on the hills. Large flocks of Wagtails have been using this plateau as a stopover during the migratory flights for a short period of two or three days. The species involved were Yellow Wagtails and Grey Wagtails.

During every October, large flocks of Greater Short-toed Larks visit the area. The flocks normally comprise of about 40-60 individuals, feeding actively the seeds of grasses that are in plenty during that season. These birds are regularly preyed upon by another winter visitor, the Common Kestrel, which has been a regular visitor of the area since 1985. During October and November 1985, a lonely female Peregrine Falcon was seen roosting on the plateau.

Table-X : Migratory birds of Madayipara.

Sl. No.	Common Name	Scientific Name
1	Garganey	<i>Anas querquedula</i>
2.	Western Marsh Harrier	<i>Circus aeruginosus</i>
3.	Pallid Harrier	<i>Circus macrourus</i>
4.	Booted Eagle	<i>Hieraaetus pennatus</i>
5.	Common Kestrel	<i>Falco tinnunculus tinnunculus</i>
6.	Peregrine Falcon	<i>Falco peregrinus japonensis</i>
7.	Pacific Golden Plover	<i>Pluvialis fulva</i>
8.	Grey Plover	<i>Pluvialis squatarola</i>
9.	Kentish Plover	<i>Charadrius alexandrinus alexandrinus</i>
10.	Lesser Sand Plover	<i>Charadrius mongolus atrifrons</i>
11.	Greater Sand Plover	<i>Charadrius leschenaultii leschenaultii</i>
12.	Common Snipe	<i>Gallinago gallinago gallinago</i>

Sl. No.	Common Name	Scientific Name
13.	Jack Snipe	<i>Lymnocyptes minimus</i>
14.	Whimbrel	<i>Numenius phaeopus phaeopus</i>
15.	Eurasian Curlew	<i>Numenius arquata orientalis</i>
16.	Common Redshank	<i>Tringa totanus</i>
17.	Marsh Sandpiper	<i>Tringa stagnatilis</i>
18.	Common Greenshank	<i>Tringa nebularia</i>
19.	Green Sandpiper	<i>Tringa ochropus</i>
20.	Wood Sandpiper	<i>Tringa glareola</i>
21.	Terek Sandpiper	<i>Xenus cinereus</i>
22.	Common Sandpiper	<i>Actitis hypoleucos hypoleucos</i>
23.	Ruddy Turnstone	<i>Arenaria interpres interpres</i>
24.	Sanderling	<i>Calidris alba</i>
25.	Little Stint	<i>Calidris minuta</i>
26.	Temminck's Stint	<i>Calidris temminckii</i>
27.	Dunlin	<i>Calidris alpina alpina</i>
28.	Curlew Sandpiper	<i>Calidris ferruginea</i>
29.	Sandwich tern	<i>Sterna sandvicensis</i>
30.	Whiskered Tern	<i>Chlidonias hybrida</i>
31.	Pied Crested Cuckoo	<i>Clamator jacobinus jacobinus</i>
32.	Indian Pitta	<i>Pitta brachyura</i>
33.	Greater Short-toed Lark	<i>Calandrella brachydactyla</i>
34.	Common Swallow	<i>Hirundo rustica gutturalis</i>
35.	Red-rumped Swallow	<i>Hirundo daurica erythropygia</i>
36.	White Wagtail	<i>Motacilla alba dukhunensis</i>
37.	Yellow Wagtail	<i>Motacilla flava thunbergi</i>
38.	Grey Wagtail	<i>Motacilla cinerea cinerea</i>
39.	Richard's Pipit	<i>Anthus richardi</i>
40.	Brown Shrike	<i>Lanius cristatus cristatus</i>
41.	Blyth's Reed Warbler	<i>Acrocephalus dumetorum</i>
42.	Greenish Leaf Warbler	<i>Phylloscopus trochiloides viridanus</i>
43.	Asian Paradise Flycatcher	<i>Trepsiphone paradisi leucogaster</i>
44.	Rosy Starling	<i>Sturnus roseus</i>
45.	Golden Oriole	<i>Oriolus oriolus kundoo</i>
46.	Ashy Drongo	<i>Dicrurus leucophaeus longicaudatus</i>

Table-XI : Breeding birds of Madayipara

Sl. No.	Common Name	Scientific Name
1.	Grey Junglefowl	<i>Gallus sonneratii</i>
2.	Red Spurfowl	<i>Galloperdix spadicea spadicea</i>
3.	White-breasted Waterhen	<i>Amaurornis phoenicurus phenicurus</i>
4.	Red-wattled Lapwing	<i>Vanellus indicus indicus</i>
5.	Yellow-wattled Lapwing	<i>Vanellus malabaricus</i>
6.	Stone-Curlew	<i>Burhinus oedicnemus indicus</i>
7.	Rose-ringed Parakeet	<i>Psittacula krameri manilenis</i>
8.	White-breasted Kingfisher	<i>Halcyon smyrnensis</i>
9.	Lesser Pied Kingfisher	<i>Ceryle rudis trravancoreensis</i>
10.	Malabar Crested Lark	<i>Galerida malabarica</i>
11.	Eastern Sky Lark	<i>Alauda gulgula australis</i>
12.	Ashy-crowned Sparrow Lark	<i>Eremopterix grisea</i>
13.	Jerdon's Bush Lark	<i>Mirafra affinis</i>
14.	Black Drongo	<i>Dicrurus macrocercus</i>
15.	Indian Robin	<i>Saxicoloides fulicata fulicata</i>
16.	Pied Bushchat	<i>Saxicola caprata nilgiriensis</i>
17.	Large Pied Wagtail	<i>Motacilla maderaspatensis</i>
18.	Paddy field Pipit	<i>Anthus rufulus</i>
19.	Purple Sunbird	<i>Nectarinia asiatica asiatica</i>
20.	Purple-rumped Sunbird	<i>Nectarinia zeylonica flaviventris</i>

Over-wintering migrants (Table – XII) : The phenomenon of over-wintering has been observed since 1983 on Madayipara. This is a phenomenon of winter migrants coming from Palearctic countries, staying back at the wintering grounds and spending their summer in the wintering areas. In India this phenomenon is not well documented. Deepakumar (1991) recorded some populations of waders over-wintering in Kadalundy and Purathur estuaries of Kerala.

The wet phase of Madayipara accommodates a good population of over-wintering waders from the surrounding wetlands. A good shower of southwest monsoon attracts the birds to the Madayipara, which provide good habitats for foraging and roosting as well.

Table-XII : Over-wintering migrants of Madayipara.

Sl. No.	Common Name	Scientific Name
1.	Pacific Golden Plover	<i>Pluvialis fulva</i>
2.	Little ringed Plover	<i>Charadrius dubius cronicus</i>
3.	Kentish Plover	<i>Charadrius alexandrinus alexandrinus</i>
4.	Lesser Sand Plover	<i>Charadrius mongolus atrifrons</i>
5.	Greater Sand Plover	<i>Charadrius leschenaultii leschenaultii</i>
6.	Common Snipe	<i>Gallinago gallinago gallinago</i>
7.	Jack Snipe	<i>Lymnocyrtus minimus</i>
8.	Whimbrel	<i>Numenius phaeopus phaeopus</i>
9.	Common Redshank	<i>Tringa totanus</i>
10.	Marsh Sandpiper	<i>Tringa stagnatilis</i>
11.	Common Greenshank	<i>Tringa nebularia</i>
12.	Green Sandpiper	<i>Tringa ochropus</i>
13.	Wood Sandpiper	<i>Tringa glareola</i>
14.	Terek Sandpiper	<i>Xenus cinereus</i>
15.	Common Sandpiper	<i>Actitis hypoleucos hypoleucos</i>
16.	Ruddy Turnstone	<i>Arenaria interpres interpres</i>
17.	Sanderling	<i>Calidris alba</i>
18.	Little Stint	<i>Calidris minuta</i>
19.	Dunlin	<i>Calidris alpina alpina</i>
20.	Curlew Sandpiper	<i>Calidris ferruginea</i>
21.	Sandwich Tern	<i>Sterna sandvicensis sandvicensis</i>

Observations were conducted at random from 1983 -1998, while systematic regular monitoring was done during 1987 and 1988, 1994 to 1996 and again from 2003 -2005. Altogether 21 species of migratory shorebirds were recorded as over- wintering at Madayipara (Table-XII). Of these, five species viz; Lesser Sand Plover (100-300), Greater Sand Plover (20-40), Redshank (50-70), Greenshank (8-15), Curlew Sandpiper (4-14) were seen in fairly good numbers regularly. Other species were seen less regularly and in small numbers. Large waders like Green Shanks, Red Shanks, Whimbrels, etc. seemed to prefer plots which were slushy where as the smaller ones were seen feeding on the harder surface. All the birds were observed feeding actively especially in the evenings, and during night they roosted on the higher and drier parts of the rocky area.

The observations proved that the rain is the most important factor that attracts migrants to Madayipara. The number of birds was at its peak during the days of heavy rains. Even

during the drier months of April-May, one good shower brought with it a number of birds to the plateau. Similarly one or two days of good sunshine dramatically reduced the number of birds from Madayipara. This could be possibly linked with the food availability for these waders. The wet phase of Madayipara apparently provides plenty of food and shelter to the over-wintering migrants. Besides these waders, the Sandwich Tern was seen over-wintering in this locality. It is noticed that the area in between the play ground near Vadukunda temple and the Sacred grove of Madayikavu was used by maximum number of over-wintering migrants as their foraging and roosting grounds.

Local migrants (Table – XIII) : There are certain birds which are residents but not seen during all the months. They occasionally use the hill as a feeding place or a roosting place. The Common Peafowl, which is a very rare vagrant species, was observed twice in the area. The Reef Heron, obviously a bird of estuaries or sea-shores was seen once near Parackulam in February 1985. Small Green-billed Malkoha, a rare bird, was occasionally observed in the woody thickets of the slopes, adjacent to the present mining company. Whitebrowed Bulbul, an elusive bird, was rarely observed feeding in the bushes next to the mining company. There are Egrets which spend the day time in the paddy fields of Kunhimangalam and Chembullikundu seen crossing over Madayi Plateau every evening on their roosting flights to Muttukandy and Thavam area on the banks of Kuppam river. During June and July, large flocks of Blackheaded Munias, Whitebacked Munias and Bayas were found feeding on the grasslands of Kottakunnu and Judhakulam areas of the hill.

Table-XIII : Locally migratory species of birds at Madayipara.

Sl. No.	Common name	Scientific name
1.	Little Grebe	<i>Podiceps ruficollis capensis</i>
2.	Large Egret	<i>Casmerodius albus</i>
3.	Median Egret	<i>Mesophoyx intermedia intermedia</i>
4.	Little Egret	<i>Egretta garzetta garzetta</i>
5.	Reef Heron	<i>Egretta gularis schistacea</i>
6.	Grey Heron	<i>Ardea cinerea rectirostris</i>
7.	Night Heron	<i>Nycticorax nycticorax</i>
8.	White-necked Stork	<i>Ciconia episcopus episcopus</i>
9.	Black Kite	<i>Milvus migrans govinda</i>
10.	Crested Serpent Eagle	<i>Spilornis cheela melanotis</i>
11.	Common Peafowl	<i>Pavo cristatus</i>
12.	Little ringed Plover	<i>Charadrius dubius jerdoni</i>
13.	Plum-headed Parakeet	<i>Psittacula cyanocephala cyanocephala</i>

Sl. No.	Common name	Scientific name
14.	Indian Hanging Parrot	<i>Loriculus vernalis vernalis</i>
15.	Pompadour Green Pigeon	<i>Treron pompadora affinis</i>
16.	Yellow-legged Green Pigeon	<i>Treron phoenicoptera chlorigaster</i>
17.	Small Green-billed Malkoha	<i>Phaenicophaeus viridirostris</i>
18.	Common Indian Nightjar	<i>Caprimulgus indicus indicus</i>
19.	Blue-tailed Bee-eater	<i>Merops philippinus philippinus</i>
20.	White-browed Bulbul	<i>Pycnonotus luteolus luteolus</i>
21.	White-rumped Munia	<i>Lonchura striata striata</i>
22.	Black-headed Munia	<i>Lonchura malacca malacca</i>
23.	Spotted Munia	<i>Lonchurra punctulata punctulata</i>
24.	Baya Weaver	<i>Ploceus philippinus travancoreensis</i>
25.	Grey-headed Myna	<i>Sturnus malabricus malabaricus</i>
26.	Jungle Myna	<i>Acridotheres fuscus mahrattensis</i>

ANNOTATED CHECKLIST OF THE BIRDS OF MADAYIPARA

Order PODICIPEDIFORMES

Family PODICIPEDIDAE Grebes

1. *Podiceps ruficollis capensis* Salvadori
Little Grebe

Habitat, Distribution and Status: Invariably present in almost all open water bodies in occasional congregations up to 50 individuals. Breeds during the SW monsoon.

Remarks : Rare. Usually seen singly in Vadukunda Lake during the rainy season.

Order PELECANIFORMES

Family PHALACROCORACIDAE Cormorants/Shags

2. *Phalacrocorax niger* (Vieillot).
Little Cormorant

Habitat, Distribution and Status: Found at all wetlands and water bodies throughout Kerala. There is circumstantial evidence on the increase in their population in the last two decades. Resident.

Remarks : Uncommon. A small flock of 2-3 birds were regularly seen in Vadukunda Lake and Parackulam.

Family ARDEIDAE Herons, Egrets & Bitterns

3. *Egretta garzetta garzetta* (Linnaeus)

Little Egret

Habitat, Distribution and Status: Brackish and freshwater wetlands, paddy fields and edges of tanks. Widespread breeding resident, but in lesser numbers than other egrets. No breeding records from north Kerala except Wynad (Uthaman 1990). There could be a migrant population also, spending winter here.

Remarks : Uncommon. Rarely visit the ponds during dry months. Large flocks regularly fly across Madayipara for roosting from Chembalikundu wetlands to Ezhome.

4. *Egretta gularis schistacea* (Hemprich & Ehrenberg)

Western Reef-Egret

Habitat, Distribution and Status: Patchy in distribution along the seacoast and estuarine mudflats. No breeding records. Apparently, a migrant.

Remarks : Vagrant. A brackish water species. Only one sighting during February 1985.

5. *Ardea cinerea rectirostris* Gould

Grey Heron

Habitat, Distribution and Status: Widespread, in small numbers; brackish wetlands, reed beds and paddy fields. Winter visitor with a small breeding population.

Remarks : Uncommon. Roost flight over the Madayipara.

6. *Casmerodius albus* (Linnaeus)

Large Egret

Habitat, Distribution and Status: Throughout the area in small numbers. Coastal wetlands, mangrove swamps and paddy fields.

Remarks : Uncommon. Roost flight over Madayipara.

7. *Mesophoyx intermedia intermedia* (Wagler)

Median Egret

Habitat, Distribution and Status: Probably the second-most numerous of our egrets. Paddy fields, reed beds and mangrove swamps.

Remarks : Uncommon. Occasional visitor of the water bodies.

8. *Bubulcus ibis coromandus* (Boddaert)

Cattle Egret

Habitat, Distribution and Status: Widespread and the most abundant of our egrets. Fallow

land, grassland, cultivation lands and house compounds wherever there are cattle. No breeding records.

Remarks : Common winter visitor, often seen with the grazing cattle.

9. *Ardeola grayii grayii* (Sykes)
Indian Pond Heron

Habitat, Distribution and Status: Resident with extensive range. Seen around paddy fields, wetlands and tanks. Breeds throughout the state.

Remarks : Common at the wetlands. Large numbers congregate during the drying phase of the wetlands.

10. *Nycticorax nycticorax*
Night Heron/ Black-crowned Night Heron

Habitat, Distribution and Status: Wide-ranging; breeding colonies reported at various parts of the state. Seen around larger wetlands.

Remarks : At twilight harsh calls of the foraging birds can be heard over the plateau.

Family CICONIIDAE Storks

11. *Ciconia episcopus episcopus* (Boddaert)
White-necked Stork

Habitat, Distribution and Status: Widespread, in small numbers. Breeding record from three localities only: Periyar Tiger reserve (Robertson & Jackson, 1992) in Idukki district and Kootanad and Kotakara in Thrissur district during November 2004. Winter visitor with a small breeding population. Locally common.

Remarks : Rare. A single observation at Parackulam during March 2003.

Order ANSERIFORMES

Family ANATIDAE Swans, Geese & Ducks

12. *Anas querquedula* Linnaeus
Garganey

Habitat, Distribution and Status : Found in large numbers along with the Pintail, in the wetlands and backwaters throughout. Winter visitor.

Remarks : A single female bird was observed during November 1995 at Vadukunda Lake.

Order FALCONIFORMES

Family ACCIPITRIDAE

Hawks, Eagles, Buzzards, Old World Vultures, Kites & Harriers

13. *Elanus caeruleus vociferus* (Latham)

Black-shouldered Kite

Habitat, Distribution and Status: Present in open areas from the coastal wetlands and fallow fields to the grasslands in the hills. Resident. Locally common.

Remarks : Locally migratory. Mainly seen from December to February in the open grasslands of the plateau.

14. *Milvus migrans govinda* Sykes

Black Kite

Habitat, Distribution and Status : The most abundant raptor; inseparable from human habitations. Uncommon in Wynad; now rare in Kottayam town due to persecution (Sreekumar pers. comm.). Absent from most parts during the SW Monsoon season. Resident.

Remarks : Absent from most parts during the SW Monsoon season. A roost of more than 40 birds was observed in Kottakunnu region of the plateau.

15. *Haliastur indus indus* (Boddaert)

Brahminy Kite

Habitat, Distribution and Status: Resident in the coastal areas and inland areas near water.

Remarks : A resident kite species, observed in small numbers with the roost of Black kite.

16. *Haliaeetus leucogaster* (Gmelin)

White-bellied Sea Eagle

Distribution and Status: Present along the seaboard from the north to Mahe (Jafer Palot, 2000); occasional sightings from the south.

Remarks : Occasional soaring flight with other kites around the area.

17. *Spilornis cheela melanotis* (Jerdon)

Crested Serpent-Eagle

Habitat, Distribution and Status : The most widespread of our eagles. Evergreen and moist deciduous forests as well as well wooded villages. Several breeding records from the Sacred Groves of north Kerala. Resident.

Remarks : Locally migratory. Noisy display flights can be observed immediately after the monsoon.

18. *Circus aeruginosus aeruginosus* (Linnaeus)

Western Marsh-Harrier

Habitat, Distribution and Status: Widespread; marshes, paddy fields and riverbeds. Winter visitor.

Remarks : Rare. Occasional roost along with Brahminy kite during November.

19. *Circus macrourus* (S.G.Gmelin)
Pallid Harrier

Habitat, Distribution and Status: Fallow land, paddy fields and open grasslands on the hills.

Remarks : Winter visitor. Uncommon. Mainly seen during January to March. Listed under Near Threatened category of IUCN.

20. *Accipiter badius badius* (Gmelin)
Shikra

Habitat, Distribution and Status: Widespread resident; open forest, well-wooded villages and towns.

Remarks : A common raptor. Breeding records during March-April on Coconut palm.

21. *Hieraaetus pennatus* (Gmelin)
Booted Eagle

Habitat, Distribution and Status : Winter visitor, seen at the wetlands of the plains, laterite hillocks of north Kerala as well as the grasslands of the highland areas of the state.

Remarks : A regular winter visitor to the wetlands of Ezhome and Chemballickundu and rarely seen flying over the grasslands of the plateau.

Family FALCONIDAE Falcons

22. *Falco tinnunculus tinnunculus* Linnaeus
Common Kestrel

Habitat, Distribution and Status : The race *tinnunculus* is a winter visitor affecting cultivation in the coastal areas, grass and scrub lateritic plains and the midlands, ascending to grassy hills also. The race *objurgatus* is resident, mainly in the grasslands of the hills. Fairly common, locally.

Remarks : A regular winter visitor, seen mainly from November to March or April.

23. *Falco peregrinus japonensis* Tunstall
Peregrine Falcon

Habitat, Distribution and Status: The race, *japonensis* is a winter visitor to the wetlands of the coastal area and midlands.

Remarks A winter migrant, occasionally roosting on the electric tower on the plateau during the period from December to February.

Order GALLIFORMES

Family PHASIANIDAE Pheasants, Partridges, Quails

24. *Perdica argoondah salimalii* Whistler
Rock Bush-Quail

Habitat, Distribution and Status: No recent sightings from Kerala. Dry stony land with some scrub.

Remarks : Rare, only one sighting from the Thuvarathadam vegetable garden during March 2005.

25. *Galloperdix spadicea spadicea* (Gmelin)
Red Spurfowl

Habitat, Distribution and Status: Edge of forests and secondary jungles. In north Kerala, the species frequents cashew plantations and homesteads of the lateritic midlands. Nominate race occurs in Wynad and the rest of north Kerala, while *stewarti* is found in the south. Resident.

Remarks : Uncommon. Mainly seen in the cashew plantations at the foothills and the sacred groves.

26. *Gallus sonneratii* Temminck
Grey Junglefowl

Habitat, Distribution and Status: Edges and clearings of evergreen forest, moist deciduous forest, adjacent plantations and cashew groves in the lateritic midlands of north Kerala. Extremely rare in some of its former range, e.g. forests of Wynad and outside the Wynad Wildlife sanctuary, evidently due to persecution. Resident.

Remarks : Rare. A small population still thrives in the foothills and cashew plantations. Chicks were seen during January to May.

27. *Pavo cristatus* Linnaeus
Common Peafowl

Habitat, Distribution and Status: Moist and dry deciduous forests as well as cultivations. Apart from the protected areas (e.g. Wynad and Chinnar Wildlife sanctuaries) the bird occurs in some localities of Kasaragod, Malappuram, Palakkad and Thrissur Districts in Kerala. Resident.

Remarks : Vagrant. One sighting during April 1995 near Thuvarathadam.

Order GRUIFORMES

Family RALLIDAE

Rails, Crakes, Moorhens, Coots

28. *Amaurornis phoenicurus phoenicurus* (Pennant)
White-breasted Waterhen

Habitat, Distribution and Status: Widespread resident of the wetlands, paddy fields, mangrove swamps, edges of tanks and riverbanks.

Remarks : Uncommon in the edges of paddy fields adjacent to the Madayikavu.

Order CHARADRIIFORMES
Family CHARADRIIDAE
Plovers, Dotterels, Lapwings

29. *Pluvialis fulva* (Gmelin)
Pacific Golden Plover

Habitat, Distribution and Status: Widespread resident of the wetlands, paddy fields, mangrove swamps, edge of tanks and riverbanks.

Remarks : Migrant. A flock of about 100 individuals regularly over-winter at Madayipara from June to August.

30. *Pluvialis squatarola* (Linnaeus)
Grey Plover

Habitat, Distribution and Status: Mudflats at estuaries, tidal creeks and seashore. A regular winter visitor in small numbers (Neelakantan et al 1993).

Remarks : Uncommon. Found among the flocks of Golden Plover in small numbers. Rarely over-winter.

31. *Charadrius dubius curonicus* Gmelin
Little Ringed Plover

Habitat, Distribution and Status: The race, *curonicus* is a winter visitor in small numbers at the coastal wetlands and occasionally inland also. Uncommon. The race *jerdoni* is a breeding resident, in low numbers (Neelakantan et al 1993). Coastal plains and riverbanks at midlands.

Remarks : Common. A small flock of 15-20 individuals usually frequent the temporary pools from August to November. Roosting population can also be seen at times till April.

32. *Charadrius alexandrinus alexandrinus* Linnaeus
Kentish Plover

Habitat, Distribution and Status : Seen in small numbers at estuaries, mudflats and the seacoast. Winter visitor.

Remarks : Once seen over- wintering with Lesser Sand Plovers and Curlew Sandpiper.

33. *Charadrius mongolus atrifrons* Wagler

Lesser Sand Plover

Habitat, Distribution and Status : Found in large numbers at the seacoast, mudflats and fallow fields of the coastal area. Winter visitor.

Remarks : Most common shorebird of the Plateau. Around 200 individuals were observed to over-winter at Madayipara along with other charadriids.

34. *Charadrius leschenaultii leschenaultii* Lesson

Greater Sand Plover

Habitat, Distribution and Status: Seacoast and mudflats, in small numbers. Winter visitor.

Remarks : Present at the plateau in small numbers. Over-winter with other plovers, in small numbers.

35. *Vanellus malabaricus* (Boddaert)

Yellow-wattled Lapwing

Habitat, Distribution and Status : Barren lands and fallow fields; generally dry biotope. Widespread resident.

Remarks : A regular bird of the Madayipara, becoming progressively rare due to habitat disturbance. Breeds from April to August. A total of 6 nests were observed during 2003 and 5 in 2004.

36. *Vanellus indicus indicus* (Boddaert)

Red-wattled Lapwing

Habitat, Distribution and Status : In the neighbourhood of water logged paddy fields, riverbanks and lateritic plains. Widespread resident.

Remarks : Common. More associated with temporary pools. Breeds from May to August. A total of 35 birds were counted during 2003 with 10 nests and 32 birds with 9 nests during 2004. Their population is also declining due to habitat disturbances and the consequent threat to its breeding habitat.

Family SCOLOPACIDAE

Sandpipers, Stints, Snipes, Godwits & Curlews

37. *Gallinago gallinago gallinago* (Linnaeus)

Common Snipe

Habitat, Distribution and Status: Wet paddy fields and swampy edges of backwaters. Winter visitor.

Remarks : Found in abandoned paddy fields near Parackulam. 5-6 birds were seen during the September and October months regularly.

38. *Lymnocyptes minimus* (Baird)

Jack Snipe

Habitat, Distribution and Status: Waterlogged paddy fields and swampy edges of backwaters. Winter visitor.

Remarks : One record of a single individual over-wintering in July 1997 at Madayipara.

39. *Numenius phaeopus phaeopus* (Linnaeus)

Whimbrel

Habitat, Distribution and Status: Winter visitor to the seacoast and coastal Mudflats, occasionally inland.

Remarks : 2-7 birds regularly over winter at Madayipara during May to August. They frequent the monsoon pools and the abandoned paddy fields at Thuvathadam for foraging.

40. *Numenius arquata orientalis* C.L.Brehm

Eurasian Curlew

Habitat, Distribution and Status : Tidal mudflats, seashore, mangroves and backwaters. A winter visitor, in small numbers.

Remarks : A regular winter visitor to the coastal mudflats and swamps. A single record of this species from the plateau.

41. *Tringa totanus* (Linnaeus)

Common Redshank

Habitat, Distribution and Status: Seashore, estuaries, tidal mudflats and riverbanks. Winter visitor. Common in north Kerala.

Remarks : A flock of 50-100 members regularly over-winter at Madayipara during rainy season. Their congregations are mainly found in the abandoned paddy fields, which are flooded during the rainy season.

42. *Tringa stagnatilis* (Bechstein)

Marsh Sandpiper

Habitat, Distribution and Status: Fresh water marshes, paddy fields and tidal mudflats. A winter visitor arriving in small numbers. Not uncommon.

Remarks : Found among the over-wintering flocks of Redshanks and Green Shanks. Up to 3 birds were observed.

43. *Tringa nebularia* (Gunner)

Common Greenshank

Habitat, Distribution and Status : Tidal mudflats, riverbanks, paddy fields and inland marshes. A fairly common winter visitor.

Remarks : Over-winter at Madayipara during rainy season; up to 20 individuals were observed.

44. *Tringa ochropus* Linnaeus
Green Sandpiper

Habitat, Distribution and Status : Mainly inland fresh water habitats. Lakes, tanks, paddy fields and marshes. A winter visitor; fairly common.

Remarks : A small number over-winter at Madayipara during the rainy season. A spurt in population also observed during the last week of August.

45. *Tringa glareola* Linnaeus
Wood Sandpiper

Habitat, Distribution and Status : Tidal mudflats, waterlogged paddy fields, edges of backwaters and mangroves. A winter visitor; common.

Remarks : Over-winter along with Red shanks; up to 3 individuals were noticed.

46. *Xenus cinereus* (Guldenstadt)
Terek Sandpiper

Habitat, Distribution and Status : A regular winter visitor to the estuarine mudflats of north Kerala, occasional in the south (Neelakantan et al 1993). Uncommon.

Remarks : 2-3 birds over-winter along with Sand plovers and red shanks. An increase in Population can be noticed during the first week of September, probably influenced by the influx of migratory population.

47. *Actitis hypoleucos hypoleucos* Linnaeus
Common Sandpiper

Habitat, Distribution and Status : Inland tanks, streams, ditches, riverbanks, paddy fields and also seashore, tidal mudflats and estuaries. A widespread common wader and a winter visitor.

Remarks : One of the earliest migrant species to reach at the Madayipara wetlands, latest by 18th July. An increase in population can be noticed during August and thereafter their number declines.

48. *Arenaria interpres interpres* (Linnaeus)
Ruddy Turnstone

Habitat, Distribution and Status : Small numbers along rocky seacoast, also at tidal mudflats. A winter visitor; uncommon.

Remarks : Small number over-winter during July and August. Up to 14 members were observed during the last week of August.

49. *Calidris alba* (Pallas)

Sanderling

Habitat, Distribution and Status : A regular winter visitor arriving in fairly good numbers at the seacoast and tidal mudflats. Common.

Remarks : A single sighting of 4 birds at Madayipara during July 2000.

50. *Calidris minuta* (Leisler)

Little Stint

Habitat, Distribution and Status : Marshy estuaries, mudflats, paddy fields and edges of backwaters. A winter visitor, arriving in small numbers. Fairly common.

Remarks : Rarely observed at the plateau. A small number over-winter along with other plovers.

51. *Calidris temminckii* (Leisler)

Temminck's Stint

Habitat, Distribution and Status : Tidal mudflats, coastal lagoons; also inland freshwater marshes and riverbanks. An uncommon winter visitor.

Remarks : A single record of 4 birds with the population of Little Stint during July 1995.

52. *Calidris alpina alpina* (Linnaeus)

Dunlin

Habitat, Distribution and Status : Seen in small numbers mostly on the tidal mudflats of estuaries in north Kerala (Neelakantan et al 1993). A winter visitor. Uncommon.

Remarks : Rare. Over-winter with Curlew Sandpiper in small number.

53. *Calidris ferruginea* (Pontoppidan)

Curlew Sandpiper

Habitat, Distribution and Status : Seashore, tidal mudflats at estuaries, squelchy paddy fields and marshes. A winter visitor. Uncommon.

Remarks : A regular visitor during the rainy season. Up to 24 members were recorded from the plateau during 1995.

Family BURHINIDAE

Stone-Curlews & Stone-Plovers

54. *Burhinus oedicephalus indicus* (Salvadori)

Stone-Curlew

Habitat, Distribution and Status : Resident; present in small numbers at open scrub in

the neighbourhood of cultivation lands and lateritic plains. Becoming excessively rare due to habitat disturbance.

Remarks : Uncommon. Up to 12 birds were sighted during early 1990s. Now their number has declined very much. During our recent survey, we observed a single bird from the locality.

Family GLAREOLIDAE
Coursers & Pratincoles

55. *Glareola maldivarum* J.R. Forstrer
Oriental Pratincole

Habitat, Distribution and Status : Marshes, tidal mudflats, paddy fields, fallow lands and grazing grounds. Recorded from Kole in Trichur district and north Kerala. Its only known breeding colony is at Kattampally, Kannur District (Sashikumar, 1997). Apparently a breeding visitor. Uncommon.

Remarks : Over-winter at Madayipara in small numbers during June and July.

56. *Glareola lactea* Temminck
Small Pratincole

Habitat, Distribution and Status : Seen around rivers with sand banks and around coastal marshes. Resident. Locally common.

Remarks : Locally migratory. Roosting population of more than 100 birds were sighted near Thuvathadam region of the plateau during November to January 1995.

Family LARIDAE
Gulls, Terns & Noddies

57. *Sterna sandvicensis sandvicensis* Latham
Sandwich Tern

Habitat, Distribution and Status: Regular winter visitor to the estuaries north of Purathur (Deepakumar 1991); occasional records from south Kerala also (Neelakantan et al 1993).

Remarks : Accidental visitor. A single record of the species with summer plumage during July 1998.

58. *Chlidonias hybrida indicus* (Stephens)
Whiskered Tern

Habitat, Distribution and Status: Backwaters, rivers, paddy fields, coastal lagoons and creeks. A widespread winter visitor. By far, the most numerous of our terns in large wetlands like the Kole in Trichur District. Common.

Remarks : Found in small numbers at Parackulam area of the plateau during March and April.

Order COLUMBIFORMES
Family COLUMBIDAE

Pigeons & Doves

59. *Columba livia intermedia* Strickland
Blue Rock Pigeon

Habitat, Distribution and Status: Around cultivation and human habitations. A widespread resident. Common.

Remarks : Found in large flocks during rainy season at the open grasslands of the plateau.

60. *Streptopelia chinensis suratensis* (Gmelin)
Spotted Dove

Habitat, Distribution and Status: A widespread resident found in open forests and amidst cultivation. Common.

Remarks : Found during September to January in good numbers.

61. *Chalcophaps indica indica* (Linnaeus)
Emerald Dove

Habitat, Distribution and Status : Moist forests, well-wooded groves and sacred groves of the midlands in north Kerala. Resident in low numbers, common.

Remarks : Rare. Can be seen at the sacred grove during November to February.

62. *Treron pompadora affinis* (Jerdon)
Pompadour Green-Pigeon

Habitat, Distribution and Status: A resident of the forests and well-wooded areas. Common.

Remarks : Found in large numbers during the fruiting season of *Ficus benghalensis* and *Ficus religiosa*.

63. *Treron phoenicoptera chlorigaster* (Blyth)
Yellow-footed Green-Pigeon

Habitat, Distribution and Status: Frequents forests and well-wooded countrysides. Resident. Fairly common.

Remarks : Irregular visitor to the fruiting fig trees in small numbers.

Order PSITTACIFORMES
 Family PSITTACIDAE
 Parakeets & Hanging Parrots

64. *Loriculus vernalis vernalis* (Sparrman)
 Indian Hanging Parrot

Habitat, Distribution and Status : Found in well-wooded areas and forests. Resident; fairly common.

Remarks : A spurt in population can be noticed during July and August.

65. *Psittacula krameri manilensis* (Bechstein)
 Rose-ringed Parakeet

Habitat, Distribution and Status : A widespread resident. Found in cultivation lands and coconut plantations. Common.

Remarks : A roosting population of more than 50 numbers can be observed near Kottakunnu during summer months.

66. *Psittacula cyanocephala cyanocephala* (Linnaeus)
 Plum-headed Parakeet

Habitat, Distribution and Status : Frequents deciduous and evergreen forests, and well-wooded midland region of north Kerala. Resident; fairly common.

Remarks : Can be sighted during November and December.

Order CUCULIFORMES
 Family CUCULIDAE
 Cuckoos, Malkohas & Coucals

67. *Clamator jacobinus jacobinus* (Boddaert)
 Pied Crested Cuckoo

Habitat, Distribution and Status : Seen in the drier areas. Apparently a summer (breeding) visitor.

Remarks : A regular monsoon visitor. Can be sighted during July and August near southern slopes of Madayipara adjacent to Mining Company.

68. *Hierococcyx varius varius* Vahl
 Brainfever Bird

Habitat, Distribution and Status : A widespread resident; found in light forests, cashew groves and homesteads.

Remarks : Common. Found throughout the season. More vocal during the summer months.

69. *Cuculus micropterus micropterus* Gould
Indian Cuckoo

Habitat, Distribution and Status : Frequents well-wooded villages and forests. Has become locally extinct in many villages midland areas in north Kerala in the last three decades. Apparently a summer (breeding) visitor.

Remarks : Rare. No recent record from Madayipara; scarcely reported during mid 1980s.

70. *Cacomantis sonneratii sonneratii* (Latham)
Banded Bay Cuckoo

Habitat, Distribution and Status : Resident; found in deciduous and semi-evergreen forests, cashew groves and well-wooded homesteads of villages in north Kerala.

Remarks : Many sightings; more vocal during summer months.

71. *Eudynamis scolopacea scolopacea* (Linnaeus)
Asian Koel

Habitat, Distribution and Status: A widespread resident; more abundant in towns and cities than in villages.

Remarks : Fairly well distributed.

72. *Phaenicophaeus viridirostris* (Jerdon)
Small Greenbilled Malkoha

Habitat, Distribution and Status : Found in open secondary growth and scrub as well as cashew groves with thorny scrub on the lateritic plains. Resident.

Remarks : Rare. A few sightings at the southern slopes of the plateau adjoining the mining company.

73. *Centropus sinensis parroti* Stresemann
Greater Coucal

Habitat, Distribution and Status : Found in open forests, cultivation lands, plantations and homesteads. Widespread resident.

Remarks : Common.

Order STRIGIFORMES

Family TYTONIDAE Barn Owls

74. *Tyto alba stertens* Hartert
Barn Owl

Habitat, Distribution and Status: A resident bird found around human habitations and cultivated lands.

Remarks : Rare. A few sightings at the barn house near Madayikavu and at the school building on the plateau.

Family STRIGIDAE
Owls

75. *Otus bakkamoena bakkamoena* Pennant
Collared Scops-Owl

Habitat, Distribution and Status : Frequents thin forests, well-wooded villages and towns. Resident.

Remarks : Common.

76. *Glaucidium radiatum malabaricum* (Blyth)
Jungle Owlet

Habitat, Distribution and Status : Found in forests and well-wooded villages. Resident, in north Kerala; this species is more common than the Spotted Owlet.

Remarks : Common.

77. *Athene brama brama* (Temminck)
Spotted Owlet

Habitat, Distribution and Status : Found around human habitations and towns.

Remarks : Uncommon.

78. *Ninox scutulata hirsuta* (Temminck)
Brown Hawk Owl

Habitat, Distribution and Status : Frequents evergreen and moist deciduous forests, and well-wooded villages.

Remarks : Uncommon. More vocal during November to January.

Family CAPRIMULGIDAE
Nightjars

79. *Caprimulgus indicus indicus* Latham
Indian Jungle Nightjar (Grey Nightjar)

Habitat, Distribution and Status : Found around scrub jungles and fallow lands in the villages. Resident.

Remarks : Rare. Can be heard during March and April.

80. *Caprimulgus asiaticus asiaticus* Latham
Common Indian Nightjar

Habitat, Distribution and Status : Frequents scrub jungles and fallow lands in the villages. Resident; fairly common.

Remarks : Their number has declined drastically in the recent past. 3-4 birds can occasionally be spotted near the Government Rest House.

Order APODIFORMES
Family APODIDAE
Swifts

81. *Collocalia unicolor* (Jerdon)
Indian Edible-nest Swiftlet

Habitat, Distribution and Status : Inhabits forests and cultivation lands seen in the coastal areas at Kannur district from October to January. Resident.

Remarks : Uncommon. However, large flocks can be seen flying over the plateau during November and December.

82. *Hirundapus gigantea indica* Hume
Brown-backed Needletail-Swift

Habitat, Distribution and Status : Found in forests, Shola-grasslands, foothills and the midlands of Kannur and Kasaragod districts in Kerala. Resident.

Remarks : Rare. A few sightings from the locality during November 2003.

83. *Cypsiurus balasiensis* (J.E. Gray)
Asian Palm Swift

Habitat, Distribution and Status : Met with in villages and cultivated lands with palms. Resident.

Remarks : Uncommon. Rare sightings from the slopes of the plateau.

84. *Tachymarptis melba nubifuga* Koelz
Alpine Swift

Habitat, Distribution and Status: Found on hills and coastal areas in north Kerala. Apparently a resident. Uncommon.

Remarks : A few sightings can be made from July to December.

85. *Apus affinis affinis* (J.E.Gray)
House Swift

Habitat, Distribution and Status : The most common and widespread swift of the region. Resident.

Remarks : A small flock frequents the northern slopes.

Order CORACIIFORMES
Family ALCEDINIDAE
Kingfishers

86. *Alcedo atthis taporbana* Kleinschmidt
Small Blue Kingfisher

Habitat, Distribution and Status : A widespread resident. Met with around coastal backwaters, canals in paddy fields and tanks.

Remarks : A few sightings from the Vadukunda lake area.

87. *Halcyon capensis capensis* (Linnaeus)
Stork-billed Kingfisher

Habitat, Distribution and Status : Seen near forest streams, inland wetlands and backwaters. Resident.

Remarks : Uncommon. Rarely sighted from the Parackulam area of the plateau.

88. *Halcyon smyrnensis fusca* (Boddaert)
White-breasted Kingfisher

Habitat, Distribution and Status : A widespread resident of almost all kinds of habitats.

Remarks : Common.

89. *Ceryle rudis travancoreensis* Whistler & Kinnear
Lesser Pied Kingfisher

Habitat, Distribution and Status : Found around coastal backwaters, tanks and rivers. A widespread resident.

Remarks : Common. A breeding population exists at the Judha kulam (Judha pond) area. Can be found breeding at the rocky crevices of the pond from March to May. Generally seen in a family party of up to 5 individuals.

Family MEROPIDAE

Bee-Eaters

90. *Merops orientalis orientalis* Latham

Small Bee-eater

Habitat, Distribution and Status : A widespread resident seen mainly in the plains.

Remarks : Common. Fairly well distributed.

91. *Merops philippinus philippinus* Linnaeus

Blue-tailed Bee-eater

Habitat, Distribution and Status : Mostly seen in the neighborhood of waterbodies in the midlands and the coastal area. A winter visitor, but some individuals stay back at Madayipara and Kattampally (Kannur district).

Remarks : Common. Even though a winter visitor, many over-winter at Madayipara during the rainy season. Up to 60 birds can be counted during the rainy season. Large roosts of more than 500 birds can be observed near Kottakunnu during December and January.

Family CORACIIDAE

Rollers

92. *Coracias benghalensis indica* Linnaeus

Indian Roller

Habitat, Distribution and Status : A widespread resident of the open areas in the midlands and coastal plains.

Remarks : Common. A pair could be sighted regularly near the main road on the plateau.

Family UPUPIDAE

Hoopoes

93. *Upupa epops ceylonensis* Reichenbach

Common Hoopoe

Habitat, Distribution and Status : Frequents thinly wooded areas and cultivation fields. Patchy and local in distribution.

Remarks : Rare. Met with from January to April.

Family BUCEROTIDAE

Hornbills

94. *Ocyrceros griseus griseus* (Latham)

Malabar Grey Hornbill

Habitat, Distribution and Status : The most widespread hornbill of the area. Inhabits evergreen and moist deciduous forests and large sacred groves of north Kerala. Resident.

Remarks : A single bird was observed during July and August 2004.

Order PICIFORMES
Family CAPITONIDAE
Barbets

95. *Megalaima viridis* (Boddaert)
White-cheeked Barbet

Habitat, Distribution and Status : A widespread resident; found in forests and villages.

Remarks : Common. Breeding recorded during the months of April and May.

96. *Megalaima rubricapilla malabarica* (Blyth)
Crimson-throated Barbet

Habitat, Distribution and Status : Met with in evergreen and moist deciduous forests. Resident.

Remarks : Uncommon. Local movements coincide with the fruiting pattern of fig trees.

97. *Megalaima haemacephala indica* (Latham)
Coppersmith Barbet

Habitat, Distribution and Status : Can be seen in open wooded areas and villages. Resident.

Remarks : Rare. A dead specimen was collected from Madayipara during July 2002.

Family PICIDAE
Woodpeckers

98. *Dendrocopus nanus cinericula* (Malherbe)
Brown-capped Pigmy Woodpecker

Habitat, Distribution and Status : Inhabits evergreen and moist deciduous forests, and well-wooded villages. Resident.

Remarks : Uncommon.

99. *Dendrocopus mahrattensis mahrattensis* (Latham)
Yellow-fronted Pied Woodpecker

Habitat, Distribution and Status : Usually met with in deciduous and moist deciduous forests, and thinly wooded groves. Resident.

Remarks Rare.

100. *Dinopium benghalense tehminae* (Whistler & Kinnear)
Lesser Golden-backed Woodpecker

Habitat, Distribution and Status : Can be seen in thin forests, well-wooded villages and homesteads. Resident.

Remarks : Fairly common.

Order PASSERIFORMES

Family PITTIDAE

Pittas

101. *Pitta brachyura brachyura* (Linnaeus)
Indian Pitta

Habitat, Distribution and Status : Inhabits evergreen and deciduous forests and well-wooded countryside. A winter visitor.

Remarks : Rare.

Family ALAUDIDAE

Larks

102. *Mirafra affinis* Blyth
Jerdon's Bush-Lark (Red-winged Bush-Lark, Ceylon Bush-Lark)

Habitat, Distribution and Status : Frequents dry paddy fields, scrubby lateritic plains and hillocks, and fallow lands. Resident.

Remarks : Uncommon.

103. *Eremopterix grisea* (Scopoli)
Ashy-crowned Sparrow Lark (Ashycrowned or Blackbellied Finch-Lark)

Habitat, Distribution and Status : Affects dry paddy fields, lateritic plains, fallow lands and grassy seacoasts. Resident.

Remarks : Uncommon. Local movements were noticed. A spurt in population can be noticed from March to May.

104. *Calandrella brachydactyla* (Leisler) [*Calandrella cinerea dukhuensis* (Sykes)]
Greater Short-toed Lark/ Rufous Short-toed Lark

Habitat, Distribution and Status : Affects dry paddy fields, fallow lands in the coastal areas of north Kerala. A winter visitor.

Remarks : Common. A regular winter visitor from October to February. More than 1000 birds were observed during the season.

105. *Galerida malabarica* (Scopoli)

Malabar Crested Lark

Habitat, Distribution and Status : Seen around fallow paddy fields, grass and scrubby lateritic plains and grassy hillsides. Resident.

Remarks : Common. Many breeding pairs were observed.

106. *Galerida deva* (Sykes)

Syke's Crested Lark

Habitat, Distribution and Status : Affects fallow paddy fields, grass and scrubby lateritic plains and grassy hillsides. Resident.

Remarks : A doubtful record.

107. *Alauda gulgula australis* Brooks

Eastern Skylark

Habitat, Distribution and Status : Seen around dry paddy fields and grassy lateritic plains of the coastal areas and midlands, and grassy hill slopes. Resident.

Remarks : Common. Many display song flights were noticed during rainy season. Breeding recorded during the months of July and August.

Family HIRUNDINIDAE

Swallows & Martins

108. *Hirundo rusica gutturalis* Scopoli

Common Swallow

Habitat, Distribution and Status : A widespread winter visitor to open country in all the three physiographical zones of Kerala.

Remarks : Uncommon. Mainly seen during December to March in small numbers near Vadukunda Lake.

109. *Hirundo smithii filifera* Stephens

Wire-tailed Swallow

Habitat, Distribution and Status : All records from north Kerala (Neelakantan et al 1993). Resident.

Remarks : Common. A breeding pair was sighted at Judha Pond area during March 2003.

110. *Hirundo daurica nipalensis* Hodgson

Habitat, Distribution and Status : Affects most of the areas in the coastal plains and the midlands, and occasionally in the hills also.

Remarks : A winter visitor. Usually found in small numbers.

Family MOTACILLIDAE

Wagtails & Pipits

111. *Motacilla alba dukhunensis* Sykes
White Wagtail

Habitat, Distribution and Status : Frequents grassy areas, usually near water mainly in the coastal plains. Seen in the hills also (Ali 1969). A winter visitor.

Remarks : Uncommon. An irregular winter visitor of Madayipara. More than 100 birds were noticed during November 1985.

112. *Motacilla maderaspatensis* Gmelin
Large Pied Wagtail

Habitat, Distribution and Status : A widespread resident; can be seen in the neighbourhood of water. Fairly common.

Remarks : Can be regularly seen frequenting the plateau during the wet phase.

113. *Motacilla flava thunbergi* Billberg
Yellow Wagtail

Habitat, Distribution and Status : Affects damp paddy fields and wetlands of the coastal area, mainly Kuttanad (Alapuzha and Kottayam districts) (Neelakantan et al 1993). A winter visitor.

Remarks : A Passage Migrant. Rare. Found only during October or November in good numbers.

114. *Motacilla cinerea cinerea* (Tunstall)
Grey Wagtail

Habitat, Distribution and Status: Frequents areas from the coastal plains to the hills. Winter visitor.

Remarks : Can be sighted rarely from November to February.

115. *Anthus richardi* Vieillot
Richard's Pipit

Habitat, Distribution and Status : Frequents wet paddy fields, marshes and grassy borders of tanks. A winter visitor.

Remarks : Uncommon. Visits the plateau from October to April.

116. *Anthus rufulus* Vieillot (*Anthus novaeseelandiae malayensis* Eyton)
Paddy field Pipit/ Malay Pipit

Habitat, Distribution and Status : A widespread resident seen in areas from the coastal plains to the hills; also can be seen around wet and fallow paddy fields and grasslands.

Remarks : Common. Mainly sighted during the wet phase of the plateau.

Family CAMPEPHAGIDAE

Cuckoo-Shrikes, Flycatcher-Shrikes, Minivets & Woodshrikes

117. *Coracina macei* (Lesson)
Large Cuckoo-Shrike

Habitat, Distribution and Status : Inhabits well-wooded villages and forests. Resident.

Remarks : Uncommon.

118. *Coracina melanoptera sykesi* (Strickland)
Black-headed Cuckoo-Shrike

Habitat, Distribution and Status: Inhabits village groves and thin forests. Resident.

Remarks : Rare.

119. *Pericrocotus cinnamomeus malabaricus* (Gmelin)
Small Minivet

Habitat, Distribution and Status : Seen at well-wooded homesteads, plantations, semi evergreen and moist deciduous forests. Resident.

Remarks Rare.

120. *Pericrocotus flammeus flammeus* (Forster)
Scarlet Minivet

Habitat, Distribution and Status : Inhabits evergreen and moist deciduous forests, well-wooded villages and sacred groves of north Kerala. Resident.

Remarks Uncommon.

Family PYCNONOTIDAE

Bulbuls & Finchbills

121 *Pycnonotus jocosus fuscicaudatus* (Gould)
Red-whiskered Bulbul

Habitat, Distribution and Status Seen in the villages and forests alike, at almost all altitudes. Resident.

Remarks : Common.

122. *Pycnonotus cafer cafer* (Linnaeus)
Red-vented Bulbul

Habitat, Distribution and Status : Seen in forests and villages. In north Kerala, the bird is found rather low in numbers when compared to the preceding species. Resident.

Remarks : Rare.

123. *Pycnonotus luteolus luteolus* (Lesson)
White-browed Bulbul

Habitat, Distribution and Status : Found in open scrubs in the lateritic midlands, bushes and scrub jungles. Patchy and local in distribution. Resident.

Remarks : uncommon. Not a regular bird. Up to 4 birds can be seen in the wooded area of the slopes at times.

124. *Hypsipetes indicus indicus* (Jerdon)
Yellow-browed Bulbul

Habitat, Distribution and Status : Inhabits evergreen and moist deciduous forests, nearby plantations, secondary jungles and sacred groves of north Kerala. Resident.

Remarks : Rare. A few sightings can be made during the rainy season at Madayikavu sacred grove.

Family IRENIDAE
Ioras, Chloropsis, Fairy Bluebird

125. *Aegithia tiphia multioclor* (Gmelin)
Common Iora

Habitat, Distribution and Status : Affects well-wooded villages, semi evergreen, moist deciduous and deciduous forests as well as secondary jungles. Resident.

Remarks : Common.

126. *Chloropsis cochinchinensis jerdoni* (Blyth)
Jerdon's Chloropsis

Habitat, Distribution and Status : Seen around well-wooded homesteads and groves in villages. Also seen in secondary jungles. Resident.

Remarks : Fairly common.

Family LANIIDAE
Shrikes

127. *Lanius cristatus cristatus* Linnaeus
Brown Shrike

Habitat, Distribution and Status : met with at forest edges, grassy hillsides, open areas in villages and towns in the midlands and the coastal area. A winter visitor.

Remarks : Rare. Mainly seen during October and November.

128. *Lanius schach caniceps* Blyth
Rufous-backed Shrike
(Southern Greybacked Shrike)

Habitat, Distribution and Status : Seen around forest clearings, grasslands with bushes and also around the backwaters, mangroves, cultivation lands. Resident.

Remarks : Uncommon. Can be sighted at times near the banks of Judha Pond and Vadukunda Lake.

Family MUSCICAPIDAE
Subfamily TURDINAE

Thrushes, Shortwings, Robins, Forktails, Wheatears

129. *Zoothera citrina cyanotes* (Jardine & Selby)
White-throated Ground Thrush

Habitat, Distribution and Status : Affects evergreen and moist deciduous forests, cardamom and coffee plantations and sacred groves of north Kerala. In the SW monsoon season, the species can be seen even in well-wooded house compounds of north Kerala. Resident.

Remarks : Rare. Seen only during rainy season.

130. *Copsychus saularis ceylonensis* Sclater
Oriental Magpie-Robin

Habitat, Distribution and Status : A widespread resident seen around human habitations and light forests.

Remarks : Common.

131. *Saxicoloides fulicata fulicata* (Linnaeus)
Indian Robin

Habitat, Distribution and Status : Found in dry stony and bush country in the midlands and the dry paddy fields of the coastal plains. Resident.

Remarks : Uncommon.

132. *Saxicola caprata nilgiriensis* Whistler.
Pied Bushchat

Habitat, Distribution and Status : Affects coastal wetlands, lateritic grassy scrub in the midlands and grassy hillsides up to an elevation of 2000m. Resident. Common in the hills and fairly common elsewhere.

Remarks : Common. Breeding records from the vicinity of Judha pond from March to April, every year.

133. *Oenanthe deserti deserti* (Temminck)
Desert Wheatear

Habitat, Distribution and Status : Recorded during winter in Palakkad district of Kerala from 1988 to 1991 and in Kannur district once in August 1988 (Neelakantan et al 1993). Affects dry fallow lands and lateritic plains. A winter visitor. Rare.

Remarks Accidental visitor. A single observation at Madayipara during August 1988.

Subfamily TIMALIINAE

Babblers, Laughingthrushes, Babaxes, Barwings & Yuhinas

134. *Pellorneum ruficeps ruficeps* Swainson
Spotted Babbler

Habitat, Distribution and Status : frequents evergreen and moist deciduous forests; sacred groves and surrounding well-wooded areas in the midlands of north Kerala. The race *olivaceum* occurs in south Kerala only up to the Palghat Gap; north Kerala and rest of the peninsula are occupied by the nominate race (Ali 1969). Resident.

Remarks : Rare. Can be heard during the month of March or April.

135. *Turdoides striatus malabaricus* (Jerdon)
Jungle Babbler

Habitat, Distribution and Status : Seen around well-wooded areas and forest edges. Resident.

Remarks : Common. Fairly well distributed.

136. *Turdoides affinis affinis* (Jerdon)
White-headed Babbler

Habitat, Distribution and Status : Occupies more open and dry areas than the preceding species, but co-existing with it at many places. Can be seen around homesteads and cultivation lands. Resident.

Remarks : Uncommon. A flock was observed near the Mining Company during 1995.

Subfamily SYLVINAE

Goldcrest, Prinias, Tesias, Warblers

137. *Cisticola juncidis salimalii* Whistler
Streaked Fantail-Warbler (Zitting Cisticola)

Habitat, Distribution and Status : Affects wet paddy fields in the coastal plains and swamps in the hills around 1500m elevation. Resident.

Remarks : Fairly common during the wet season.

138. *Prinia hodgsonii albogularis* Walden
Franklin's Prinia

Habitat, Distribution and Status : Frequents moist deciduous and deciduous forests, and grass and scrub jungles; also found in the cashew groves in the lateritic midlands of north Kerala. Resident.

Remarks : Common. Breeding records during the summer.

139. *Acrocephalus dumetorum* Blyth
Blyth's Reed-Warbler

Habitat, Distribution and Status : Affects reeds and grasses in the wetlands of the coastal area and also found in undergrowths and scrubs in the forests and plantations, up to an altitude of 2150m. A winter visitor.

Remarks : Uncommon. A regular visitor from October to March.

140. *Orthotomus sutorius guzuratus* (Latham) Common Tailorbird

Habitat, Distribution and Status : Seen in gardens in villages and towns, plantations, thin and open forests upto an altitude of 1050m. Resident.

Remarks : Common.

141. *Phylloscopus trochiloides viridanus* Blyth
Greenish Leaf-Warbler

Habitat, Distribution and Status : Affects well-wooded homesteads and plantations from the coastal area through the midlands and forests up to about 1500m in the hills. A winter visitor.

Remarks : Common. Can be seen fairly well distributed in the wooded areas of the plateau from September to March or April.

Subfamily MUSCICAPINAE

Flycatchers

142. *Muscicapa latirostris* Raffles

Asian Brown Flycatcher

Habitat, Distribution and Status : Frequents moist deciduous and deciduous forests, forest edges up to about 1050m in altitude, well-wooded areas in the midlands and coastal plains. A winter visitor with a small breeding population and sporadic breeding records (Neelakantan 1986).

Remarks : Uncommon. Irregular winter visitor found from November to February.

Subfamily MONARCHINAE

Monarch-Flycatchers & Paradise-Flycatchers

143. *Terpsiphone paradisi leucogaster* (Swainson) C,M

Asian Paradise-Flycatcher

Habitat, Distribution and Status : Affects forests, well-wooded areas and plantations, gardens in the plains as well as the hills. A winter visitor.

Remarks : Common. Can be seen fairly well distributed along the wooded part of the plateau from September to April.

Family DICAEDAE

Flowerpeckers

144. *Dicaeum agile agile* (Tickell)

Thickbilled Flowerpecker

Habitat, Distribution and Status : Frequents evergreen and moist deciduous forests, adjoining plantations and well-wooded areas at all altitudes. Resident.

Remarks : Uncommon.

145. *Dicaeum erythrorhynchos erythrorhynchos* (Latham)

Tickell's Flowerpecker

Habitat, Distribution and Status : Seen around moist deciduous forests, forest edges, plantations, groves, and homesteads. Resident.

Remarks : Common.

Family NECTARINIIDAE

Sunbirds & Spiderhunters

146. *Nectarinia zeylonica flaviventris* (Hermann)

Purple-rumped Sunbird

Habitat, Distribution and Status : affects homesteads, gardens, plantations and forests. A widespread resident.

Remarks : Common.

147. *Nectarinia asiatica asiatica* (Latham)

Purple Sunbird

Habitat, Distribution and Status : Frequents thin forests, gardens, villages, cashew and rubber plantations. Seen generally in drier areas compared to other sunbirds, but may co-exist at many places. Resident.

Remarks : Common.

148. *Nectarinia lotenia hindustanica* (Whistler)

Loten's Sunbird

Habitat, Distribution and Status : affects edges of evergreen forests, moist deciduous forest, plantations, well-wooded villages and gardens. Resident.

Remarks : Uncommon.

Family ESTRILDIDAE

Munias (Estrildid Finches)

149. *Lonchura striata striata* (Linnaeus)

White-rumped Munia (Whitebacked Munia)

Habitat, Distribution and Status : Met with in open forests, forest clearings and edges, homesteads, gardens and cultivation. Resident.

Remarks : Common. Breeds during April or May at the slopes of the plateau.

150. *Lonchura punctulata punctulata* (Linnaeus)

Spotted Munia

Habitat, Distribution and Status : Seen mainly around paddy fields in the midlands and coastal areas. Resident.

Remarks : Rare. A few sightings during the rainy seasons.

151. *Lonchura malacca malacca* (Linnaeus)

Black-headed Munia

Habitat, Distribution and Status : Frequents paddy fields, grass and reed beds in the backwaters; seen mainly in the coastal areas and midlands and occasionally in the hills too. Resident.

Remarks : Uncommon. An irregular visitor from June to August; up to 50 birds can be seen during the period.

Family PASSERIDAE
 Subfamily PASSERINAE
 Sparrows & Snowfinches

152. *Passer domesticus indicus* Jardine & Selby
 House Sparrow

Habitat, Distribution and Status : A widespread resident in villages and towns of all the three physiographical zones of Kerala.

Remarks : Uncommon. Rarely seen near Vadukunda temple area.

Subfamily PLOCEINAE
 Weavers

153. *Ploceus philippinus travancoreensis* Whistler
 Baya Weaver

Habitat, Distribution and Status : Seen around the paddy fields in the coastal plains and midlands. Resident with local movements.

Remarks : Uncommon. Sighted during rainy seasons in small numbers along with Black-headed Munia.

Family STURNIDAE
 Starlings & Mynas

154. *Sturnus malabaricus malabaricus* (Gmelin)
 Grey-headed Starling

Habitat, Distribution and Status: Affects forests, well-wooded villages and towns, and areas of cultivation. The race *malabaricus* is a winter visitor seen from November to April while *blythii* is resident.

Remarks : Uncommon. An irregular visitor (race *malabaricus*). Large flocks can be observed during November and December.

155. *Sturnus pagodarum* (Gmelin)
 Brahminy Starling

Habitat, Distribution and Status : Frequents open forests, scrub jungles, secondary growths, cultivation areas and villages. Patchy and local in distribution: rare in the northern districts of Kerala such as Kozhikode, Kannur and Kasaragod. Resident.

Remarks : Rare. A few sightings can be made during January and February.

156. *Sturnus roseus* (Linnaeus)
Rosy Starling (Rosy Pastor)

Habitat, Distribution and Status : a winter visitor arriving in small numbers at thin forests and villages in the coastal area and midlands.

Remarks : Uncommon. A regular visitor, in small numbers, from December to March. Frequently sighted on *Erythrina* flowers.

157. *Acridotheres tristis tristis* (Linnaeus)
Common Myna

Habitat, Distribution and Status : a widespread resident of the coastal plains, midlands and occasionally in higher altitudes also.

Remarks : Common.

158. *Acridotheres fuscus mahrattensis* (Sykes)
Jungle Myna

Habitat, Distribution and Status : Affects grasslands, paddy fields and open forests. Scarce and patchy in distribution at the coastal plains and midlands; replaces the Common Myna at higher elevations, e.g. Wynad and High ranges. Resident.

Remarks : Rare. A single observation during January 1995.

Family ORIOLIDAE
Orioles

159. *Oriolus oriolus kundoo* Sykes Eurasian
Golden Oriole

Habitat, Distribution and Status: Frequents evergreen and moist deciduous forests, well-wooded areas in all physiographical zones of Kerala. A winter visitor.

Remarks : Common.

160. *Oriolus xanthornus xanthornus* (Linnaeus)
Black-headed Oriole

Habitat, Distribution and Status : Seen around edges of evergreen forests, moist deciduous forests, house compounds and plantations. Resident.

Remarks : Common.

Family DICRURIDAE

Drongos

161. *Dicrurus macrocercus* Viellot

Black Drongo

Habitat, Distribution and Status : Affects open lightly wooded country, fallow lands, cultivation lands and homesteads. Resident.

Remarks : Common.

162. *Dicrurus leucophaeus longicaudatus* Hay

Ashy Drongo

Habitat, Distribution and Status : Frequents edges of evergreen forests, moist deciduous forests, well wooded house compounds in towns and villages. A winter visitor.

Remarks : Fairly common.

163. *Dicrurus aeneus aeneus* Viellot

Bronzed Drongo

Habitat, Distribution and Status : Affects evergreen and moist deciduous forests, cardamom and coffee plantations, well-wooded areas, sacred groves of north Kerala, plains and hills. Resident.

Remarks : Uncommon. A few sightings from the well-wooded areas of the slopes.

164. *Dicrurus paradiseus paradiseus* (Linnaeus)

Greater Racket-tailed Drongo

Habitat, Distribution and Status : Seen around evergreen and moist deciduous forests, adjacent plantations, well-wooded areas in the coastal plains and midlands of north Kerala.

Remarks : Common.

Family ARTAMIDAE

Wood swallows

165. *Artamus fuscus* Vieillot

Ashy Woodswallow (Ashy Swallow-Shrike)

Habitat, Distribution and Status : frequents open lands in the coastal areas and midlands and also in the highlands up to 1200m altitude. Resident.

Remarks : Common. A roost of 14 birds was observed near Madayi College on the electric line during November to February 2002.

Family CORVIDAE
Crows, Jays, Treepies, Magpies

166. *Dendrocitta vagabunda parvula* Whistler & Kinnear
Indian Treepie

Habitat, Distribution and Status : frequents semi-evergreen, moist deciduous and deciduous forests, secondary forests, house compounds and coconut groves from low country to hills (up to 1050m). Resident.

Remarks : Common.

167. *Corvus splendens protegatus* Madarasz
House Crow

Habitat, Distribution and Status : A widespread resident. Inseparable from human habitations. Abundant.

Remarks : Common.

168. *Corvus macrorhynchos culminatus* Sykes
Jungle Crow

Habitat, Distribution and Status : Prefers villages and well-wooded areas, compared to the preceding species; seen in the hills also. Resident; abundant.

Remarks : Common. Large roost of about 100 birds can be seen on the plateau during rainy seasons.

MAMMALIA

(Plate-7 : 4)

A total of 21 species of mammals were recorded from this region. There are local reports on sightings of tigers in the Madayipara hill 80 years back. The thickets, rocky boulders and crevices provide a good refuge to the existing mammals.

The most commonly seen mammal of the hill is the Jackal, *Canis aureus*. Large packs of these nocturnal animals freely roam around the hills even in the broad daylight. There are lots of variations in the coat colour and size in this species found here. Once in October 1998, a black melanic form of this animal could be seen from Kottakunnu area. It is assumed that the main prey of this animal is the Indian Gerbil, *Tatera indica* (Antelope Rat), a rodent species commonly found in the locality. Occasional reports of lifting of country chicken and goats from the vicinity are reported. The Indian Fox, *Vulpes bengalensis* has been sighted a few times during the survey. The population of Indian Fox is very much localized due to the over exploitation of the hills and their habitats. The Jungle Cat, *Felis chaus* is one of

the more elusive carnivores inhabiting the Madayipara hill. Their population has also been declining drastically during the recent years. In September 1997, we had observed a Jungle Cat with two young ones crossing a large boulder, close to the present mining company. The presence of this animal also has been confirmed by the finding of scats regularly, mostly in the 'Butterfly Park' area and Kottakunnu area of the hills. The main prey of this species may be the rat and gerbils abundant in the hills while occasional lifting of poultry are also reported in the locality.

Once these kinds of hills were abundant with a good population of Blacknaped Hares. Now their numbers are alarmingly low, almost wiped out, due to the indiscriminate killing for their meat. The droppings of this beautiful and agile animal are still being reported even near populated areas of the plateau. The sighting of an albino mongoose is worth mentioning. It was seen in the foothills of Payangadi in February 1995 and once again in March some distance away, near Madayi. The Palm Civet Commonly known as Toddy cat is rarely seen in the hills, but has been reported living on the roofs of old buildings nearby.

Indian Porcupine, *Hystrix indica*, a rare rodent species found in the locality is indiscriminately hunted and trapped by the local people. This is a species protected under Schedule II of Indian Wildlife (Protection) Act of 1972. Indirect evidences by way of its droppings and fallen quills occasionally seen near the "Butterfly Park" and near the slopes of Thubarathadam area of the plateau confirm its continued occurrence here. Apart from these animals, there are a variety of rats and bats recorded from the area. A roost of flying Fox was seen within the sacred grove of Madayikavu. The smallest bat, *Pipestrellus* sp. can be seen everywhere in the locality during the sunset. The False Vampire was also observed near Madayi College, feeding on frogs during the rainy season.

The present observations on the mammals of the area point to the fact that if the woodlands and grasslands around the hill are protected, the population of many of the mammals could be revived from the present low levels. As of now, their continued existence on the hill seems doomed due to the repeated and indiscriminate mining activities and poaching taking place in the area.

SYSTEMATIC LIST OF MAMMALS REPORTED FROM MADAYIPARA

Order INSECTIVORA

Family SORICIDAE

1. *Suncus murinus* (Linnaeus)

Lindsay Grey Musk Shrew/ Common House Shrew

Distribution : Indian Subcontinent, China, S.E. Asia and Indonesia.

Remarks : Uncommon. Found occasionally in and around houses located on the slopes of the plateau.

Order CHIROPTERA

Family PTEROPODIDAE

2. *Cynopterus sphinx* (Vahl)

Short-nosed Fruit Bat

Distribution : Indian subcontinent, Sri Lanka, S.E. Asia and Indonesia.

Remarks : Uncommon. Many of them were found to visit the flowers of banana plant during evening hours.

3. *Pteropus giganteus* (Brunnich)

Indian Flying Fox/ Great Indian Fruit Bat

Distribution : Indian subcontinent.

Remarks : Fairly common on the plateau. In the evenings, animals were found foraging around the villages for fruits. A large roost was observed near the sacred grove of Madayikavu.

Family MEGADERMATIDAE

4. *Megaderma lyra* E.Geoffroy

Large-eared Vampire Bat/Indian False Vampire

Distribution : India, Afghanistan, Pakistan, Sri Lanka, Myanmar, South China and S.E. Asia.

Remarks : Uncommon. A small roost of 4 animals was noticed near a building at

Kottakunnu. An attempted feeding of skipper frog by the bat was recorded during a rainy season.

Family VESPERTILIONIDAE

5. *Kerivoula picta* (Pallas)

Painted Bat

Distribution : Indian subcontinent, Myanmar, S.E. Asia, Indonesia and Philippines.

Remarks : Rare. A specimen was caught from the banana plant during August 2004 at the foothills of Madayipara.

6. *Pipistrellus* sp. (Kelaart)

Pipistrelle

Distribution : Indian subcontinent, Myanmar, S.E. Asia and Indonesia.

Remarks : Very common and could be seen during dusk while they are flying over the open areas for insects. Small roosts of 4-5 individuals can be found in holes and crevices of rocks, trees, walls and ceilings in the locality.

Order CARNIVORA

Family CANIDAE

7. *Canis aureus* Linnaeus

Jackal

Distribution : S.E. Europe, N. & E.Africa, Middle East, C. Asia to Indian subcontinent, Myanmar and Thailand.

Remarks : Common. Frequently observed singly or in pairs even in the broad daylight. It was reported to be most common in the foothills causing severe damage to the poultry and other smaller domestic stocks. But its population has dwindled severely due to the habitat degradation and random use of pesticides.

8. *Vulpes bengalensis* (Shaw)

Indian Fox.

Distribution : India, Pakistan, Bangladesh and Nepal.

Remarks : Rare. Local people reported foxes to be common in the recent past. However, during our survey we could observe only a single animal from the locality. Due to the indiscriminate use of pesticides and the habitat degradation the animal is locally threatened with extinction.

Family VIVERRIDAE

9. *Paradoxurus hermaphroditus* (Pallas)

Palm civet/Toddy Cat

Distribution : India, Sri Lanka, Bangladesh, Bhutan Myanmar, S. E.Asia, Indonesia and Philippines.

Remarks : Uncommon. Lives in tree holes, wooden roofs of old houses. Comes out of its hideouts during dusk to feed mainly on vegetables and fruits. Large number of droppings of this animal can be found in the area.

10. *Viverricula indica* (Desmarest)

Small Indian Civet

Distribution : India, Pakistan, Bangladesh, Bhutan, Sri Lanka, Myanmar, S. China and Indonesia.

Remarks : Rare. A single sighting from the area.

Family HERPESTIDAE

11. *Herpestes edwardsii* (Geoffroy)

Common Mongoose/ Indian Grey Mongoose

Distribution : E & C. Arabia to the Indian subcontinent.

Remarks : Common. An albino mongoose was sighted at the foothills.

Family FELIDAE

12. *Felis chaus* Guldenstaedt
Jungle Cat

Distribution : N. Africa, Middle East, India, Sri Lanka, Myanmar, Thailand and Vietnam.

Remarks : Uncommon. Lives in scrub jungles. Causes much damage to poultry. Animals were seen on a number of occasions in several places of the plateau.

Order LAGOMORPHA

Family LEPORIDAE

13. *Lepus nigricollis* F. Cuvier
Indian Hare/Blacknaped Hare

Distribution : India, Pakistan, Bangladesh, Nepal and Sri Lanka.

Remarks : Rare. Though once common in the locality, presently their population has declined due to tremendous hunting pressure and habitat destruction.

Order RODENTIA

Family SCIURIDAE

14. *Funnambulus palmarum* (Linnaeus)
Three striped Palm Squirrel

Distribution : C. & S. India and Sri Lanka.

Remarks : The commonest arboreal animal of the area.

Family MURIDAE

15. *Tatera indica* (Hardwicke)
Indian Gerbil/ Antelope Rat

Distribution : India.

Remarks : Uncommon. Their number has declined due to hunting pressure and habitat degradation.

16. *Bandicota bengalensis* (Gray)
Indian Mole Rat/Lesser Bandicoot Rat

Distribution : India, Pakistan, Bangladesh, Sri Lanka, Myanmar and Indonesia.

Remarks : Uncommon. A number of burrows were found on the plateau adjoining the abandoned paddy fields. Causes damage to the field crops.

17. *B. indica* (Bechstein)
Bandicoot Rat/Large Bandicoot Rat/ Pig Rat

Distribution : India, Nepal, Bangladesh, Sri Lanka, China, Vietnam and Indonesia.

Remarks : Uncommon. Found in lesser numbers around the plateau.

18. *Rattus rattus* (Linnaeus)
Common House Rat

Distribution : India, Bangladesh, Nepal and S.E. Asia.

Remarks : Most common in residential areas around the plateau. Considered as the serious pest of stored grains.

19. *Mus musculus* Linnaeus
House Mouse

Distribution : Worldwide.

Remarks : Most common. Found in houses, shops and godowns. Considered as a serious pest.

20. *M. booduga* (Gray)
Common Indian Field Mouse/ Indian Pigmy Field Mouse/ Indian Wild Mouse

Distribution : Indian subcontinent.

Remarks : Uncommon. Found mainly in the cultivated fields and open grasslands. Large number of burrows can be observed in the fields.

Family HYSTRICIDAE

21. *Hystrix indica* Kerr
Indian Porcupine

Distribution: Syria, Iraq, Saudi Arabia, Iran, Turkey, Tibet, Kazakhstan, India, Pakistan and Sri Lanka.

Remarks: Uncommon. A fairly good population thrives in the area. One can find a number of burrows on the hill slopes as well as quills and droppings of the animal in the locality.

DISCUSSION

In the recent past, man-made factors such as encroachment of the forests for habitation, extraction of timber and other forest produces, construction of dams, growing plantation crops, practicing shifting cultivation, opening up areas for grazing *etc.* have affected our environment to a large extent. Its implications are the habitat modification in vast stretches

leading to shrinkage and fragmentation of natural ecosystem communities and the consequent loss of biodiversity. Very recently, a new dimension to these problems has been added by way of large-scale mining operations, the glaring examples for which can be seen at Kudremukh in Karnataka and the state of Goa. One such activity that has now come into focus is at Madayipara (Plate-8), part of a unique laterite hill system in Kannur district of Kerala. The area falls under the biodiversity rich Western Ghats Biogeographic zone. The unique features of Madayipara and its wanton degradation due to clay and lignite mining activities are discussed here.

The Madayipara is a flat-topped hillock overlooking Payangadi town on the northern bank of Kuppam river, and located at latitude 12°2'N and longitude 75°16'E, about 21 km north of Kannur town. The top of this hillock at an elevation of about 120ft above M.S.L is a laterite plain of more than 365ha. in area.

The hillock is culturally, archaeologically and historically important to the people of the area due to the presence of two very ancient Hindu temples, one built in A.D.344 and the other much earlier; remnants of a fort believed to have been occupied by the dynasty of Kolathiris and later by Tippu Sultan; one of the oldest mosques in India estimated to have been built in A.D. 1124; a Judha pond bearing the historical testimony to the occupation of the area by Jews centuries ago and a travellers bungalow built by the British in 1793. Associated with the Hindu temples, there is a perennial fresh water lake (Vadukunda lake) of about 1.5 acres extent and a sacred grove (Madayikavu). Besides, the hillock is picturesque being endowed with marvellous scenic beauty of landscapes, thereby attracting large number of tourists everyday.

The laterite hillocks in the midlands of north Kerala have its own characteristic vegetation, dominated by scrub jungles on the hill slopes, grasslands and semi aquatic vegetation on the hilltops. Botanical explorations at Madayipara have revealed the occurrence of more than 250 species of plants. 38 species of grasses including 11 species endemic to Kerala occur here. Madayipara is the type locality of four species of plants viz-*Nymphoides krishnakesara*, *Justicia ekakusuma*, *Rotala malabarica* and *Lepidagathis keralaensis*. Another interesting plant of this locality is *Isoetes coromandelina*, a derivative of the ancient (Devonian) group of arborescent lycopods (Club-mosses). Madayipara is also one of the very few places in Kerala having a high concentration of insectivorous plants like *Drosera indica*, *Utricularia graminifolia*, *U. malabarica* and *U. reticulata*. The sacred grove of Madayikavu and its vicinities are well known in the locality for at least 50 medicinal plants.

Faunistically also the area presents some interesting features. 9 species of Rotifera occur in the Vadukunda Lake and Judha Pond. 42 species of dragonflies and damselflies breed in these waters. A total of 111 species of butterflies occur here. Of these, the species that need special mention are the Southern Bird wing, *Triodes minos* being the largest butterfly in India; Paris Peacock, *Papilio paris*, Buddha Peacock, *P. buddha* and the Clipper *Parthenos sylvia* being rare forest species; the Crimson Rose, *Pachliopta hector* and the Danaid Eggfly, *Hypolimnas misippus* being protected under Schedule I of Indian Wildlife Protection Act,

1972. Moth fauna comprises of 19 species including the rare Atlas Moth, *Attacus atlas* and Tussar Silk Moth, *Anthereae paphia*. Orthopteran and mantoid fauna are also well distributed in the laterite hill system of Madayipara with 35 and 9 species respectively.

The laterite hillock along with its vegetation provides ample refuge for many vertebrates. 14 species of Amphibians inhabit Madayipara including the Malabar Flying Frog, *Rhacophorus malabaricus*, a Madagascan faunal derivative and a limbless amphibian *Uraeotyphlus*, a genus endemic to the Western Ghats.

The Reptilian fauna of Madayipara comprises of 2 species of Testudines, 19 species of Snakes and 5 species of Lizards. Of these, the Flapshell Turtle, *Lissemys punctata* and the Monitor Lizard *Varanus bengalensis* are species protected under Schedule I & II respectively of the Indian Wildlife Protection Act, 1972.

Visible from sea, the unique topographic settings of the Madayipara with its elevated table like plateau has been an important landmark for the sailors in the past and a very distinct landmark for the migratory birds from the Palaearctic countries far beyond the Himalaya. About 168 species of birds have been observed here of which 96 are residents, 26 local migrants and the remaining 46 true migrants. Among the true migrants, the most abundant and regular winter visitors belong to the family Charadriidae. In Madayipara, migratory birds start arriving mostly in late August and most of them leave the hill in late October. Since the entire wetland area surrounding the plateau get flooded during the peak monsoon month of August, the incoming migrants naturally get attracted to the flat-topped, elevated table land of Madayipara which forms a good feeding ground by that time. Thus Madayipara acts as a staging point for the early migrants. Interestingly, 21 species of these migrants use the area as an over-wintering ground, a phenomenon that has not been studied well in India. Among the 94 species of resident birds, 20 use the Madayipara plateau as their breeding grounds.

Madayipara provide refuge to at least 21 species of Mammals. There are reports of sighting of Tigers in Madayipara 80 years back. The most obvious and commonly seen mammal of this locality is the Jackal, *Canis aureus*, which interestingly exhibit great variation in coat colour and size. There are reports of black (melanic) forms of this animal from the area. The main prey of the jackals in Madayipara appears to be the Indian Gerbil, *Tatera indica* (Antelope Rat), a rodent species very common to the locality. The Indian Fox, *Vulpes bengalensis* has also been sighted here. The Jungle Cat, *Felis chaus* and the Black-naped Hare, *Lepus nigricollis* occur in small populations. An occasional sighting of albino Mongoose, *Herpestes edwardsii* in the locality is worth mentioning. *Paradoxurus hermaphrodites*, the Palm Civet and the Indian Porcupine, *Hystrix indica* are also met with here. It is important to point out that the Jackal, Indian Fox, Jungle Cat, Blacknaped Hare and the Indian Porcupine are all species recommended to be protected under different schedules of the Indian Wildlife Protection Act. The sacred grove of Madayikavu is a regular roosting habitat of the Flying Fox, *Pteropus giganteus*. Besides, the smaller Bat, *Pipistrella* sp., the False Vampire, *Megaderma lyra* and the Short-nosed Fruit Bat, *Cynopterus sphinx*, Painted bat, *Kerivoula picta* also occur here.

From the anthropogenic angle Madayipara is of great hydrological significance to a population of 39,600 people (as per 2001 census) living in the Madayi Panchayat. During rainy season the large amount of water that falls on the 365 ha of land comprising Madayipara, is filtered into the ground. The discharge of this water from Madayipara is the only source of drinking water for the entire village during the summer months particularly because the area is otherwise prone to saline water intrusion from the proximal tidal rivers and the sea. Therefore this plateau is the lifeline of the entire village. The grasslands of Madayipara provide rich fodder. The thick growth of *Themeda* and other grasses fetch about Rs. 3000/- per season for each landowner. Local people have faith in medicinal plants and about 50 species of plants having therapeutic value are utilized from the locality.

Geologically the area is rich in China- clay and lignite. It is estimated that the Madayipara contains deposits of about 5.5 million tones (mt) of lignite and 29 mt. of

China clay that could be mined for 25 years. The Kerala Clays and Ceramic Products Ltd., a mining company situated on the southwestern side of the plateau has been extracting China clay for the past several years. The Company now having spread its operations to the vicinity of the Shiva temple and lake has become a major threat to the entire ecosystem. The damage inflicted to the hill in the recent past is so heavy that the adjoining areas of Madayi and Vengara are heavily marred by the scars generated by the open cast mining operations. Heaps of waste dissolved in the rainwater and the pollutants released from the waste have spread and penetrated into the ground water rendering large areas of cultivable land and several wells in the vicinity of the mine useless. Presence of *Moina brachiata*, an indicator species of Cladoceran Crustacea detected recently in the Vadukunda Lake suggests the polluted nature of the water, which is an alarming signal for this freshwater lake.

The vegetation covering an area of about 1.5 ha on the southwestern slope adjacent to the China clay Company is the microhabitat of 111 species of butterflies. The intense mining activity is the major threat to this unique butterfly habitat. The mining activities have greatly affected the populations of Monitor Lizards and they are now restricted to the sacred groves of Madayikavu. The recent decline in the number of ground nesting birds such as Yellowwattled Lapwing, *Vanellus malabaricus*, Malabar Crested Lark, *Galerida malabarica* and Stone Curlew, *Burhinus oedicnemus* indicate the present disturbed condition of the habitat. Among the mammals, population of the Indian Fox in the area has become very much localized. Populations of Jungle cat and Black-naped Hare have declined to an alarmingly low level during the recent years. Continued mining activity will eventually destroy the type locality of 4 species of plants described for the first time from Madayipara besides resulting in the loss of a number of rare and medicinal plants found here.

Continued mining operations are likely to drop the Madayipara's elevation considerably and would obviously disrupt the freshwater regime thereby directly affecting the villagers and ecology of the area. Some of the environmental problems normally associated with mining are: pollution due to the wash off of over burden wastes and discharge of mine waters, land degradation, loss of biodiversity, disruption of water regime, problem of noise and vibration

due to blasting and operation of machinery, human environment problems such as settlements, health *etc.* and damage to sites of cultural, historical and scenic importance. Mining operations at Madayipara is notoriously perfect in all these negative attributes thus demanding its immediate closure. The Madayipara having great cultural, historical, environmental and scenic importance is, therefore more than a mere place for the collection of clay and lignite.

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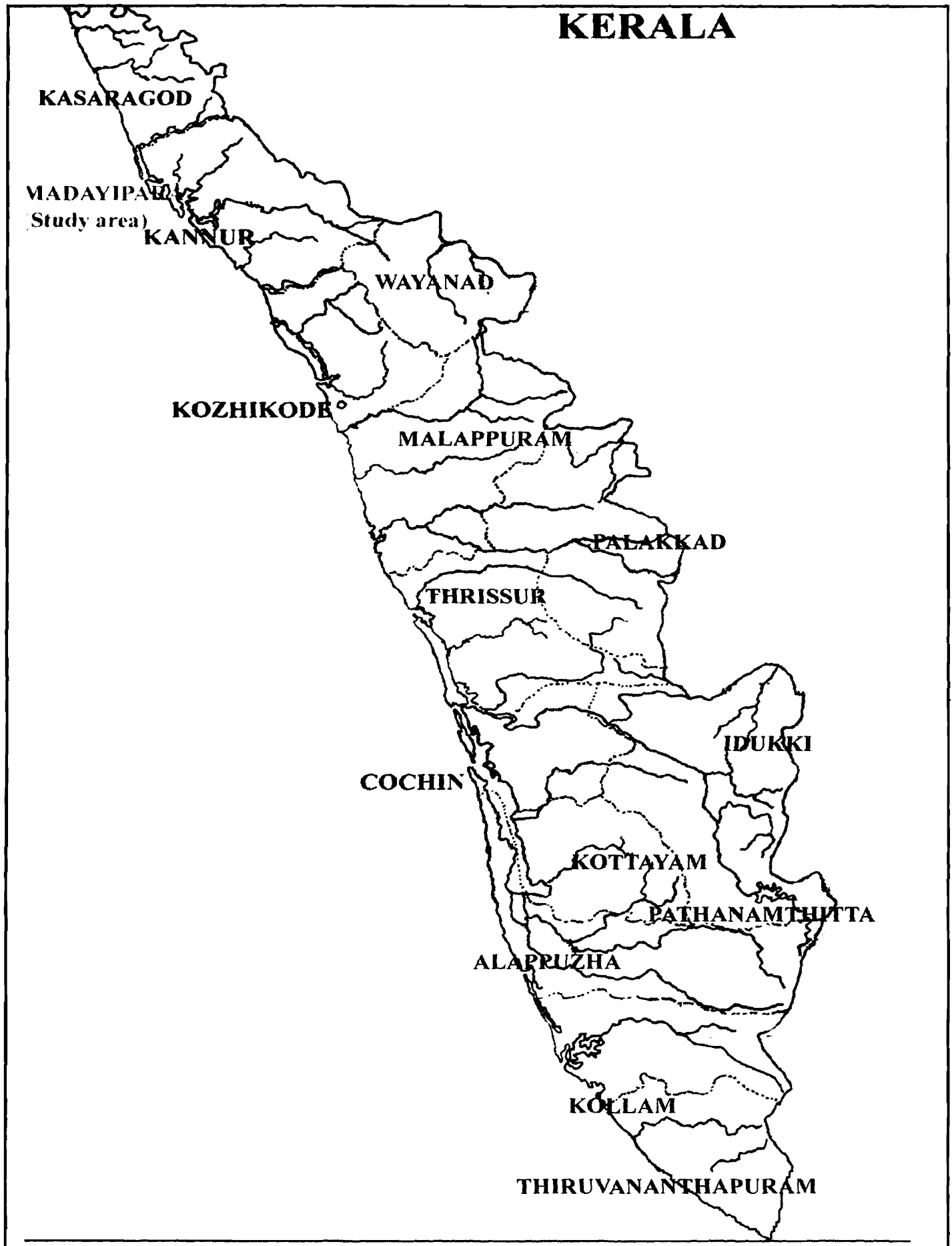
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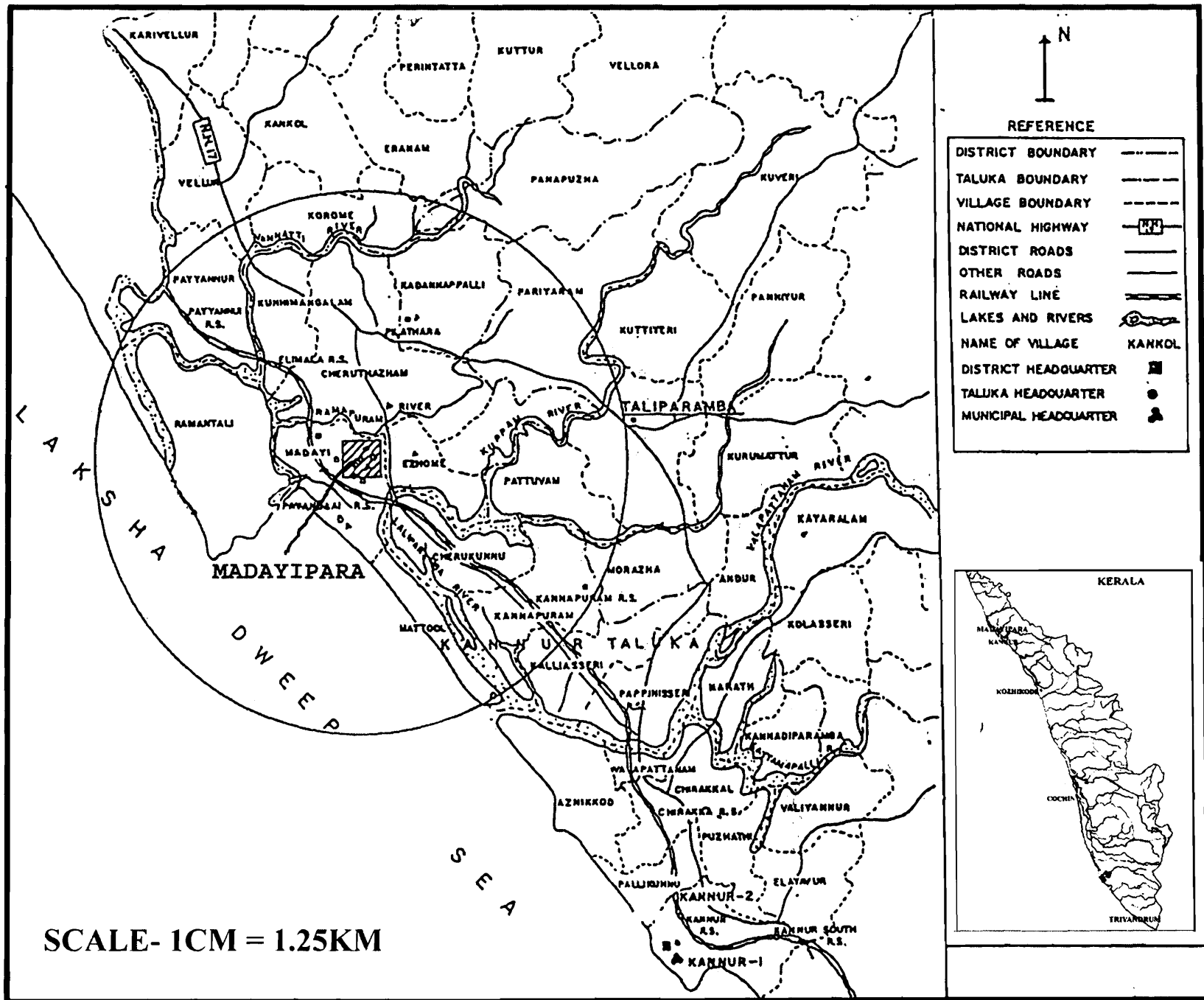
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Map 1 Map of Kerala showing the study area



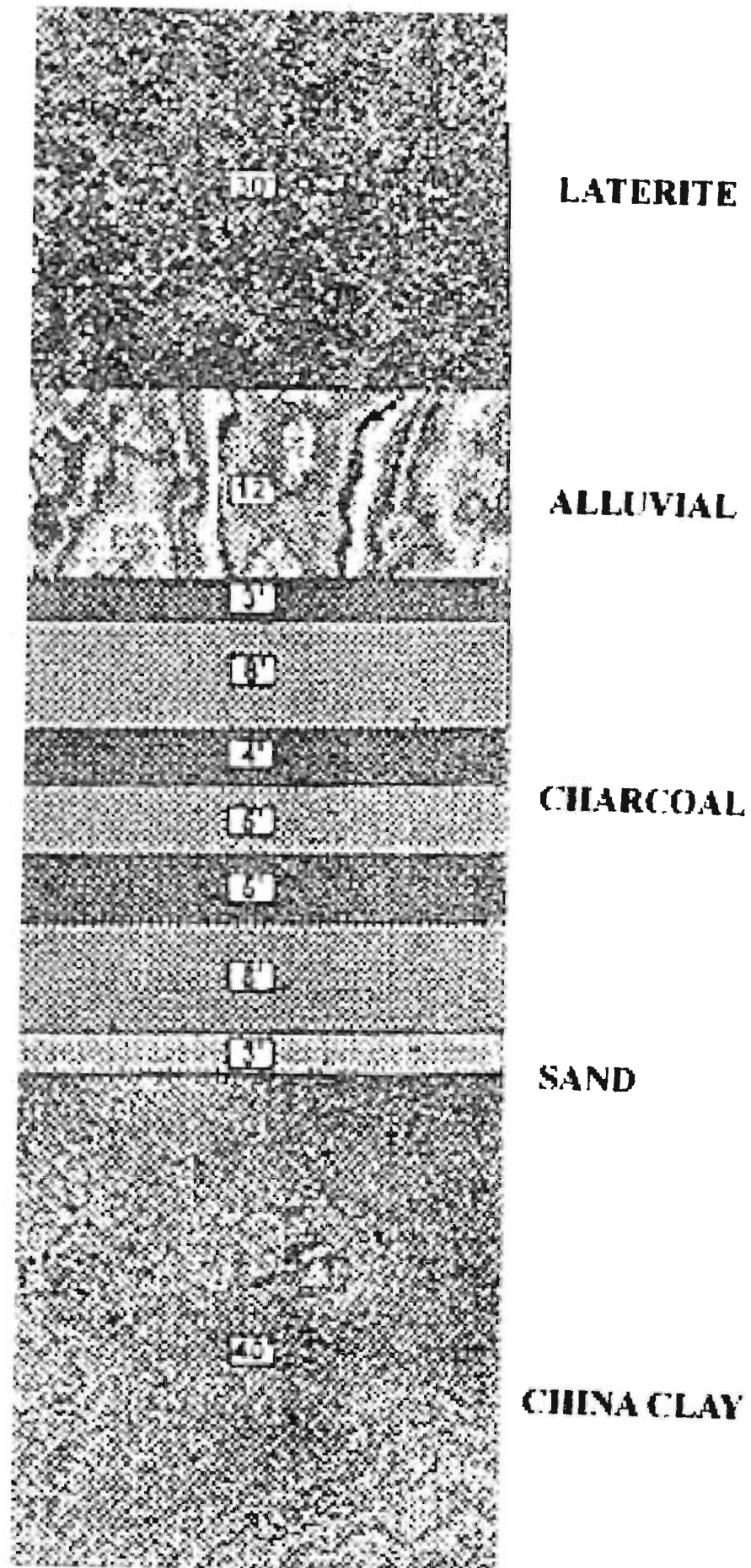


Fig 1 Soil Profile of Madayipara hill

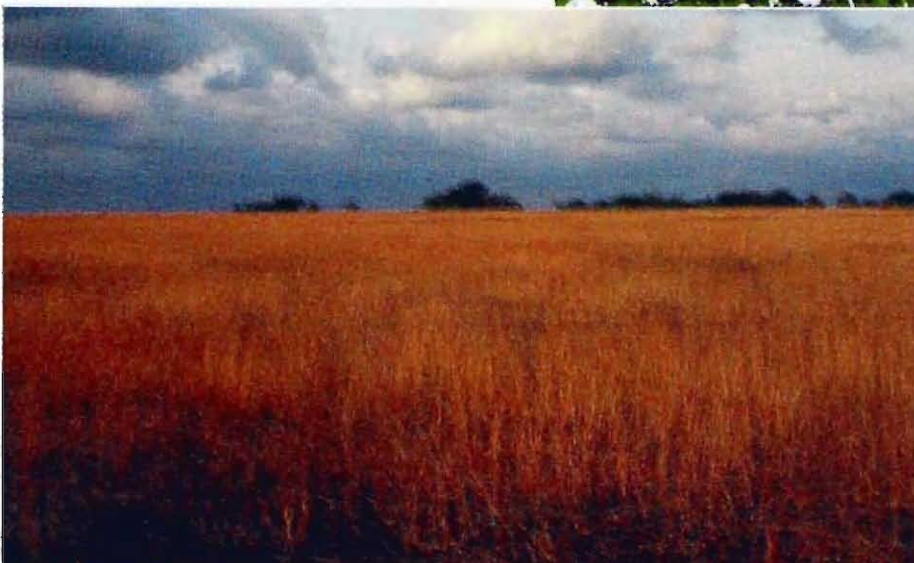
Plate 1. Glimpses of Madayipara



1. Madayipara - a distant view from Kuppam river



2. Madayipara during wet phase



3. Madayipara during dry phase

Plate 2. Major habitat types of Madayipara Plateau



1. Evergreen patches on the slopes



2. Scrub jungle on the rock



3. Madyikavu sacred grove



4. Kottakunnu grasslands



5. A Temporary pool



6. Judha Pond



7. Vadukunda Lake



8. Parackulam



9. Kulangara palli

Plate 3. Odonate fauna of Madayipara hill system



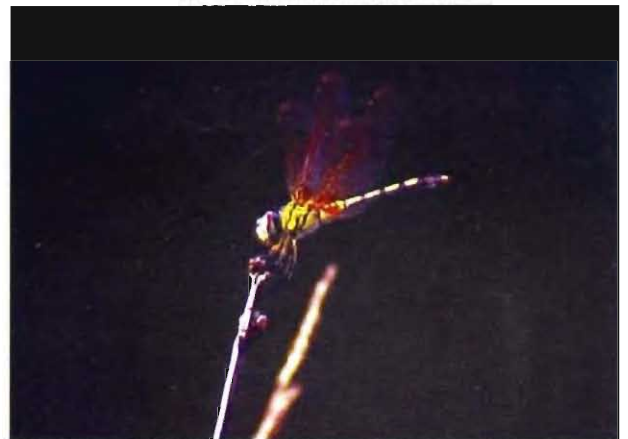
1. *Neurothemis fulva*



2. *Tramea limbata*



3. *Neurothemis tulia tulia*



4. *Trithemis pallidinervis*



5. *Trithemis aurora*



6. *Crocothemis servilia*



7. *Pseudagrion rubriceps*



8. *Ceriagrion cerinorubellum*

Plate 4. Lepidoptera fauna of Madayipara hill system



1. *Junonia atlites* (Linnaeus)



2. *Limenitis procris* Frushtorfer



3. *Cirrocroa thais* Fabricius



4. *Babasis sena sena* (Moore)



5. *Delias eucharis* (Drury)



6. *Appias lyncida* Moore



7. *Attacus atlas* Linnaeus



8. *Eutectona machoearalis* Walker

Plate 5. Other invertebrate fauna of Madayipara



1. *Aularches miliaris*



2. *Gongylus gongylodes*



3. *Hestiasula brunneriana*



4. *Hierodula (Hierodula) ventralis*



5. *Heteropoda venatoria*



6. *Pila globosa*



7. *Heterometrus malapuramensis*



8. *Scolopendra amazonica*

Plate 6. Herpetofauna of Madayipara



1. *Tomopterna rufescens* (Jerdon)



2. *Limnonectes brevipalmata* Peters



3. *Euphlyctis hexadactylus* Lesson



4. *Tomopterna breviceps* Schneider



5. *Melanochelys trijuga* (Schweigger)



6. *Lissemys punctata* (Lacepede)

Plate 6. Herpetofauna of Madayipara. Contd.



7. *Bungarus caeruleus* (Schneider)



8. *Vipera russellii* (Shaw)



9. *Dendrelaphis tristis* (Daudin)



10. *Sibynophis* sp.



11. *Ahaetulla nasuta* (Lacepede)



12. *Varanus bengalensis* (Daudin)

Plate 7. Some vertebrate fauna of Madayipara



1. A flock of over-wintering shorebirds at Madhayipara



2. Rosy Starling



3. A nest of Crested Lark



4. Indian Porcupine, *Hystrix indica*

Plate 8. Environmental hazards at Madayipara



China clay mining – a major threat to the Madayipara, laterite hill ecosystem



Waste disposal – a new threat to the pristine environs of Madayipara