STATE FAUNA SERIES 10

FAUNA OF MANIPUR

PART - 1
(Vertebrates and Animal Fossils)

ZOLOGICAL SURVEY OF INDIA
FAUNA OF MANIPUR
(PART–1)

Vertebrates
and
Animal Fossils

Edited by
The Director, Zoological Survey of India, Kolkata

Zoological Survey of India
Kolkata
STATE FAUNA SERIES
FAUNA OF MANIPUR

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FAUNA OF MANIPUR : AN OVERVIEW

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INTRODUCTION

Manipur literally means 'the jeweled land'. Folklore says the gods created this realm on earth to dance in abandon. The state is often described as "Switzerland of the East" with its cascading rapids, tripping rivers, carpet of flowers, exotic blooms and lakes. Having a varied and proud history from the earliest times, Manipur came under the British Rule as a Princely State after the defeat in the Anglo-Manipuri War of 1891. After independence of India, the Princely State of Manipur was merged in the Indian Union on October 15,1949 and became a full-fledged State of India on the 21st January, 1972.

GEOGRAPHICAL LOCATION

The state of Manipur located in the North-Eastern part of India, bounded by Nagaland on the north, Assam on the west, Mizoram on the south and along the east, shares a long international boundary (352 Km.) with Myanmar. Situated between latitudes 23° 80’ N to 25° 68’ N and longitudes 93° 03’ E to 94° 78’ E, Manipur covers a total geographical area of 22,327 Sq Km (8,620 sq m) of which, about nine-tenths constitute the hills surrounding the remaining one-tenth valley. These hills have altitudes ranging from 833 m to 3017 m above MSL, the highest being 2985 m (9843 ft, Cach Phung) in the north. Geographically, Manipur is divided into mountainous hill ranges running north-south abridging the Patkoi Hill range and the Lushai Hill range of the extended Arakan Yoma, and a central plain—the valley of Imphal roughly 48.27 km long and 31.18 km wide. The hills have an average height of 1,300 m (5,000 ft.); the valley, 660 m (2,500 ft) above sea level. The valley is the most densely populated area of Manipur. At its center, is the largest freshwater lake (Lake Loktak) in the north-east, covering an area of about 104 km².

The population of Manipur is 23,88,634, with 12,07,338 males and 11,81,296 females (Census – 2001 Provisional), giving an average density of 107 people per sq km. Imphal, one of the oldest state capitals of India, has a population of about 2,00,600. More than 60 per cent of Manipur’s population belongs to the Meithei ethnic groups, who are predominantly Vaishnavite Hindus and live in the central valley. The remaining third of Manipuris belong to one of 30 hill tribes.

SOIL AND CLIMATE

The soil cover can be divided into two broad types, viz. the red ferrogenous soil in the hill area and the alluvium in the valley. The soil generally contains small rock fragments, sand and sandy clay and other varieties, therefore, do not hold water. The topsoil on the steep slopes is very thin. In the plain areas, especially flood plains and deltas, the soil is of considerable thickness. Soil on the steep hill slopes is subjected to high erosion resulting into formation of sheets and gullies and barren rock slopes. Perpetual burning of vegetation due to shifting cultivation, in some parts of the hills, has rendered the soil devoid of humus. The soil from the central plain are greatly
Forest Cover Map of India–A satellite view

Map of Manipur showing different districts
Satellite view of North east States of India
transported from the surrounding hills through rains and contain high proportion of clay. The normal pH value is acidic ranging from 5.4 to 6.8.

The state of Manipur enjoys a typical monsoon climate with variants ranging from tropical to temporal conditions. The state is divided into four climatic zones, e.g. Tropical climate in regions comprising valley and hills up to 900 m above MSL with an annual rainfall varying from 157.48 cm to 396.24 cm. This covers Tamenglong, Jiri and Moreh. Montane sub-tropical climatic zone between altitudes 900-1800 m with annual rainfall of about 220 cm covering Chapikarong, Chandel, Sugnu, Nongmaiijing, Koubru, Laimaton. Montane temperate Climatic zone, ranging from 1800 to 2400 m with high rainfall and with mean minimum temperature of 3 degree centigrade. Lastly Sub-alpine climatic zone, above 2400m including Siroi, Koubru, Somra and other hill ranges above 2400 m. Manipur receives heavy rainfall from the SW and NE monsoons; records of variable rainfall from year to year, 982 mm in 1992, up to 1981 mm in 1991, the average being 1432 mm. The summer temperature is as high as 39 degree centigrade in Imphal and the winter as low as 0 Centigrade.

**PHYSIOGRAPHY**

Manipur is geographically divided into two distinct tracts—hills and plains. Manipur’s hill ranges form parts of the Indo-Burmese Mountain arc, often referred to as the eastern arm of the Himalayas. Though predominantly a hill state, it is watered by the rivers Imphal, Iril, Thoubal, Irang and Barak, which flow from north to south. At its centre is Lake Loktak into which several rivers drain. There are other lakes in the central area. The Loktak multi-purpose project completed in 1982, has made an impact on the economic development of north-eastern India, especially Manipur.

The State of Manipur, enjoys two major river basins, viz., the Barak River Basin and the Manipur River Basin. The total water resources of the two basins have been estimated to be 1.8487 million hectare metre in the form of annual yield. The Barak river originates from the northern hills and is joined by a number of tributaries such as Irang, Maku, Tuivai, Jiri etc. and thereafter enters Cachar District of Assam. The Manipur river basin has eight major rivers viz., Imphal, Iril, Nambul, Herok, Sekmai, Chakpi, Thoubal and Khuga. All these rivers originate from the surrounding hills. Almost all the rivers in the valley area in the mature stage and, therefore, deposit the load in the Loktak lake. The rivers draining the Manipur Hill Area are comparatively young due to the hilly terrain through which they flow. These rivers are corrosive in nature and assume turbulent form in rainy season. Important rivers draining the western area include Maku, Barak, Jiri, Irang and Leimatak. Rivers draining the eastern part of the State include Chamu, Khunou and other short streams. The total water discharge of the two river basins viz., the Barak River basin draining the western part and the Manipur River Basin draining the eastern half of the state including the Manipur Valley has been estimated to be 1.8545 M hectare meters (15.04 M acre ft.). Manipur River Basin accounts for 0.5192-hectare metre of annual run off against a total catchment’s area of 6332 sq.km. The Barak basin has a greater discharge capacity with 1.3295 M hectare metre against a catchments of 9042 sq. km. (Source: I.F.C.D., 1984).

As per the available record of the Central Ground Water Board (CGWB), the valleys have superficial alluvium, which are underlined by tertiary rocks of Barail series in Imphal valley and the Tipam formations in Jiribam valley. Ground water in top sandy and clayey formations occurs under water table conditions with the depth of water varying from 3 to 4 metres bgl. Groundwater is mostly exploited through open wells. Ground water in the deeper aquifers occurs under sub-artesian and artesian conditions. Granular zones are encountered at a depth of about 150 m in Imphal valley and at about 220 m in Jiribam valley. Tube wells have been installed at various places of the valley areas with the
yields ranging from 0.6 to 4 cu.m/hr. On the basis of the monitoring of water level in key/dug well network stations in the area, an annual recharge of 44 M.cu.m. has been estimated. Considering the clayey nature of formation in the top aquifer, development of this resource is not considered promising on a large scale in irrigation of water supply. However, it can be exploited for local water supplied through open wells, dug-cum-bore wells and tube wells. The partial chemical tests of these water samples have shown potability.

GEOLOGY

The rock formations occurring in the state of Manipur are the Cretaceous limestone, Eocene and Upper Cretaceous Disangs with serpentines, and Upper Eocene and Oligocene Barails and the Miocene Surmas and Tipams. The rock formation in the eastern part of the state consists of sandstone and shale siltstone, geosynclinal flyschs with minor bands of greywacke (Bhattacharya and Bhattacharya, 1984).

Historically, the state of Manipur, was a part of Tethys sea in Archean period and continues to receive sediments of conglomerates and shales, sandstones and limestones of archean rocks. Repeated organic movements accompanied by extensive igneous intrusions occurred in the successive periods that influenced the geologic and tectonic alignments of the region.

AGRICULTURE

This being the mainstay of the State’s economy engages 76% of the workers. The size of the cultivated area is, however, only 9.41% of the total geographical area of the state. Of this total cultivated area, 52% is confined to the valley. Therefore, half of the total valley area, which accommodates 67% of the total population, is occupied for agriculture purposes. The pressure on land in the valley is thus quite conspicuous. Agriculture plays a vital role, as it is the main backbone of the state economy till today. The agriculture is mainly dependent on monsoon, however, around 28.49% of area under cultivation is irrigated by canals. Moreover with a range of natural conditions and varied soil and topography, the state produces sizeable quantity of Paddy, Wheat, Maize, Pulses, Oilseeds (Mustard, groundnut, Soybeans, and Sunflower), Ginger, Turmeric and fruits like Pineapple, Lime/Lemon, Banana, Orange, Papaya, Plum and vegetables like Cauliflower, Cabbage, Tomato, Pea, Carrot, Pumpkin, etc. The existing area under fruits and vegetable crop is about 1.08% of the total geographical area and with such suitable agro-climatic conditions, the state still has lots of potential areas on the foot hills, mild hill slopes and along the river banks. The existing area under cultivation of different crops in Manipur is 2,85,000 hectares as against the available potential area of 3,25,500 hectares.

Rice, wheat, maize, oil seeds, potato and sugarcane etc. are the main crops in the state. Among these crops, cultivation of paddy is the largest both in the plains and hills, and covers 82% of the total cultivated area. Among the varieties of rice, there are two varieties, one locally named as “CHAK-HAO POIREITON” having its natural dark violet colour and a distinct flavour and the other “CHAK-HAO” having its natural white colour, scent and distinctive flavour. Next to paddy, maize is the second largest cultivated crop. It occupies about 40% of the gross cropped area and is grown mainly in the hills.

Manipur has vast potential for commercial plantation of citrus fruits like lemon, lime, orange, etc. and grapes, pineapple, banana, passion fruit, temperate fruits and other locally available fruits such as amla, olive, figs, mandrine andm Heirukokthong etc. The quality of the pineapple (Q-variety) so available in Manipur has distinctive taste and flavour. So far, identified potential area is estimated at 2,77,000 hectares. Out of this about 24,000 hectares are covered under different crops. A new thrust area in the state is cultivation of mushrooms, as there is a vast scope for commercial cultivation of mushrooms in India and specially in the North-East which offers ideal weather conditions for mushroom cultivation.
Among commercial crops, Tea grows wild in this state since time immemorial. However, Manipur Plantation Crops Corporation Limited in Jiribam has started plantation of tea for commercial production from the year 1981-82. Considering the increasing trend of yield and productivity and also to arrest unremunerative income from sale of green tea leaf, a modern tea factory is being set up at Manipur Tea Estate, Jiribam.

Rubber Plantation under Forest Department, Manipur started in 1977-78 in Jiribam, a non-traditional, potential area covering about 938 Ha with an optimum climate, edaphic factors ideal for the successful growth of the rubber crop. Besides, there is a good transport facility to connect the area with good markets of rubber crop. So far, a total of 15,000 nos of rubber trees are put for tapping under half spiral alternate daily system (1/2 s d/2 system). Some mature areas are not put under tapping because of many factors such as non-availability of mature and tappable trees at regular spacing. The production of raw rubber is maximum during September to January, the dry season in Jiribam.

Food Processing, yet another sector that plays a significant supportive role in diversification and commercialisation of agriculture. Horticulture, fisheries, poultry, animal husbandry and forest, improve value addition in the agricultural produce, employment generation thus providing income and production of agro-food products for export.

**MINERAL RESOURCES**

Report from the Findings of the Geological Survey of India revealed the presence of a substantial deposit of good quality limestone suitable for use in the manufacture of cement near Ukhrul, Hundung, Mova, Khonggoi, Lambui and Paoyi. In the Ukhrul area, limestone occurs in two bands. A reserve of 579 M tonnes has been proved by drilling to a depth of 105 meters. Other deposits are 0.26 M tonnes at Khonggoi and 1.88 M tonnes at Hundung. Similarly, Evaporities have been located which are the mineralised salt sediments from the evaporation of saline waters specially the sea waters and minor occurrences of magnesium and other salts in Kongai area of Chingai sub-division of Ukhrul District.

Chromite containing partly metallurgical grade ore, located at Kwatha and Khudengthabi in Chandel District and near Sirohi Peak in Ukhrul District at an altitude of 1120 m. Production of Chromite in 1993-94, 1994-95, 1995-96, 1996-97 are 643 MT, 784, 470 MT and 62 MT respectively. Nickeliferous magnetites, copper and cobalt have been located at Kwatha, Khudengthabi and Namphesha along the ultramaphic expositions near Moreh. Minor occurrences of Asbestos have been reported from the ultramaphic suites of rocks particularly in the Ukhrul and Moreh areas and Jadeite, a semi-precious mineral occurs in the Indo-Burma borders. The high chromic oxide content and hard lumpy character reveal that it is of metallurgical grade, which is in short supply in the country. Other compact coloured minerals include the serpentinites found in the same belt.

Lignite, a fossil fuel, have been located at Kangvai (Churachandpur District) and some other places but they have been found to be uneconomical as the study of borehole data revealed that in general the thickness of lenses down to a depth of 25 m ranged from 0.1 to 5 m. The Central Ground Water Board encountered gas emanations during exploratory drillings. Samples of oil and gas emanated at Lamphelpat indicated resemblances of crude oil. Coal is reported from the Jiribum subdivision of Manipur. The coal was friable in nature and dull in luster, giving a sulphurous smell on burning.

Nickel associated with serpentine body, was reported from Nampesh and Kwatha areas lying in the eastern fringes of the state. Geological findings of nickel revealed the presence of metallic nickel dispersed in the soil as high concentrations mostly in the order of 4,000 ppm. Besides nickel, Nickeliferous copper sulphides, chalcopyrite and chalcocite with cuprite and malachite were found at Nungan and Konal thana as small lenses and
viens in basic and ultrabasic rocks. Maximum values in a batch of eight grab samples collected from pits are 10.56 percent copper and 0.33 percent nickel.

**FOREST RESOURCES**

As per the records of the Forest Survey of India (2001), Manipur has 78.00 percent of its total geographical area covered by forests. This accounts for an area of 17,418 sq km under forest cover, the reserve forest occupying 1,467 km², protected forest occupying 4,171 km², and unclassified forests-11,780 km². The forest classification according to vegetation types goes well along vertical attitudinal stratification’s, as can be seen below. A broad classification of forests according to the status of forest cover interpreted from the Landsat imagery is being produced (Types of forest). The district wise forest cover is given below:

<table>
<thead>
<tr>
<th>District</th>
<th>Area</th>
<th>Dense forest</th>
<th>Open forest</th>
<th>Total</th>
<th>Percent</th>
<th>Scrub</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bishnupur</td>
<td>496</td>
<td>4</td>
<td>8</td>
<td>12</td>
<td>2.42</td>
<td>3</td>
</tr>
<tr>
<td>Chandel</td>
<td>3,313</td>
<td>812</td>
<td>1,906</td>
<td>2,718</td>
<td>82.04</td>
<td>49</td>
</tr>
<tr>
<td>Churachundpur</td>
<td>4,570</td>
<td>1,240</td>
<td>2,933</td>
<td>4,173</td>
<td>91.31</td>
<td>47</td>
</tr>
<tr>
<td>Imphal East</td>
<td>669</td>
<td>38</td>
<td>125</td>
<td>163</td>
<td>24.36</td>
<td>17</td>
</tr>
<tr>
<td>Imphal west</td>
<td>559</td>
<td>14</td>
<td>25</td>
<td>39</td>
<td>6.98</td>
<td>3</td>
</tr>
<tr>
<td>Senapati</td>
<td>3,271</td>
<td>788</td>
<td>1,554</td>
<td>2,342</td>
<td>71.60</td>
<td>40</td>
</tr>
<tr>
<td>Thamenglong</td>
<td>4,391</td>
<td>1,700</td>
<td>2,229</td>
<td>3,929</td>
<td>89.48</td>
<td>0</td>
</tr>
<tr>
<td>Thpual</td>
<td>514</td>
<td>3</td>
<td>21</td>
<td>24</td>
<td>4.67</td>
<td>7</td>
</tr>
<tr>
<td>Ukhrul</td>
<td>4,544</td>
<td>1,111</td>
<td>2,415</td>
<td>3,526</td>
<td>77.60</td>
<td>24</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>22,327</strong></td>
<td><strong>5,710</strong></td>
<td><strong>11,216</strong></td>
<td><strong>16,926</strong></td>
<td><strong>75.81</strong></td>
<td><strong>190</strong></td>
</tr>
</tbody>
</table>

**Minor Products**: Various forms of animal produce, bamboo and cane, fodder and fuel wood, grass and reeds, inces and perfume and medicinal plants form the minor forest produce, agarwood, dalchini and smilax form significant groups among these.

**LEGAL CLASSIFICATION**

The legal position of forest administration in the state is fluid. The government has extended its control to a small portion of the forest comprising 1,467 sq km of Reserved Forest and 4,171 sq km of Protected Forest which together constitute only 25.25% of the total area or 31.99% of the total forest area. The remaining 68.01% of forests are unclosed forests under the control of the tribal populations. These unclosed forests are subject to widespread exploitation by the hill people, who at some areas meticulously guard patches of tree growth.
Semi Evergreen Forests

**Location:** Western part of Manipur adjoining Cachar district of Assam.

**Composition:** Phoebe lanceolata, Cinnamom cecidodaphne, C. abutusifolium, Actinodaphne sikkimensis, A. aboyata, Machilus macrantha, M. parviflora, Litsaea salicifolia, Lindera merlastomaea (Family Lauraceae), Amoora rahituka, A. wallichii, Toona ciliata, Cedrela fusiformis, Dysoxylum binectariferum and D. hamiltoni (Melicaceae). Bauhinia as a codominant is represented by B. purpurea and B. variegata.

Other species like, Artocarpus chaplasha, Palaglam polyanthum, Cynometra polyandra, Tetrameles nudiflora, Eugenia sp., Vitea sp., Gmelina sp., Pasania sp., Alantus grandis, Schima wallichii, Sapium baccatu, Evodia meliaceola, Eleocarpus lancifolia, E. arista, Morus laevigata

**Climax forest:** Laurus-Melia Bauhinia association

**Extent:** 439.70 sq.km of Tree forest and 205.19 sq.km of the open forest (constitutes 5.5 of totals forest area in the state). Extensive lush growth of Muli bamboo (Melocanna basifera) can also be seen on the abandoned jhum fields.

Teak Gurjan Forests

**Location:** Eastern longitudinal strip of Indo-Burma border at low altitude under a tropical climate.

**Composition:** The dominant species of this belt are Tectona grandis, Dipterocarpus tuberculatus, D. teardinatus, Melanorrhoea usitata, Dillenia sp., Xylospora sp., Terminalia sp., Gmelina sp. and Bombax sp., etc.

**Extent:** 3.48 p.c. of total forest area.

Wet hill Forests

**Location:** upper slopes up to the top of the medium elevations (Saurauja-Beilschmiedia-Phoebe association).

**Composition:** The dominant species are, Saouraja nepalensis, S. panduana, S. roxburghiana, Phoebe lanceolata, P.paniculata, Beilschmiedia assamica, B.roxburghiana, Schima wallichii, Quercus sp., Nyssa sessiliflora, Cinnamom cecidodaphne, C. paucijlora, Eriobotrya bengalensis, Echinocarpus dasycarpus, M. roxburghiana, Litsea annamensis, L. khasiana, Eriobotrya bengalensis, Acer campbelli, Betula alnoides, Prunus cerasoides, Pyrus pashia, Osia giganta, Mahima manipurensis, Manglietia insignis, Illicium griffithii, Bucklandia populanea, Michlia manipurensis etc.

**Dominant species:** The high altitude dwarf bamboo, Arundinaria malina

**Extent:** 12.94 p.c. of the tree forests and 7.87 p.c. of the open forests.

Pinus Casia Forests

**Location:** Sub-montane zones of the north-eastern and southern hills of Manipur.

**Composition:** The dominant species are, Quercus sp., Pasania sp., Castanopsis sp. etc.

**Extent:** These form 12.94 p.c. of the tree forests and 7.87 p.c. of the open forests.

Wet Temperate Forests

**Composition:** Quercus lamellosa, Q. lineata, Q. glauca, Pasania xylocarpa, P. pachyphylla, P. truncata, Michelia lanugiosa, M. Campbell, Phoebe paniculata, Schima khasiana, Alseodaphane dunicola, Castanopsis tribuloides, Evodia fraxinifolia, Acer campbelli, Betula alnoides, Prunus cerasoides, Pyrus pashia, Osia giganta, Mahima manipurensis, Manglietia insignis, Illicium griffithii, Bucklandia populanea, Michlia manipurensis etc.

**Dominant species:** The high altitude dwarf bamboo, Arundinaria malina

**Extent:** 10.94 % while disturbed open forests account for only 1.41 p.c. of total forest area.

Sub-Alpine Forests

**Location:** Not many ranges reach a height beyond 2700M in Manipur.

**Composition:** Prunus sp., Pyrus sp., Taux sp., Ilex sp., Ternstroemia sp., Bucklandia populanea, Acer campbelli, Magnolia campbelli, Castanopsis arbuloides, Rhododendron madini, R. johnstoneana, R. manipurensis, R. Wattii, R. elliottii, and Primula sp. etc.

**Dominant species:** The high altitude dwarf bamboo, Arundinaria malina

**Extent:** 10.94 % while disturbed open forests account for only 1.41 p.c. of total forest area.

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Table 1. Forest types and composition

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<td>Teak Gurjan Forests</td>
<td>Eastern longitudinal strip of Indo-Burma border at low altitude under a tropical climate.</td>
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<td>3.48 p.c. of total forest area.</td>
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Forest Cover Map of Manipur

Source: Forest Survey of India, Dehra Dun
## FAUNAL EXPLORATIONS

Knowledge of the faunal resources of the state is well documented by the explorations conducted by various teams of scientists and naturalists. Blyth (1863), Jerdon (1867) were first to gave the list of mammals present in the Asiatic Society. Mention may be made on the faunal exploration by Godwin–Austen, (1868) who first procured mammal specimen for the taxonomic study. Later during, 1874-82, gave the systematic account of birds and equally worked on the Molluscan fauna of Manipur during (1875, 1882-88, 1889, 1920). Dobson (1876) first published the description and distribution of Chiroptera. Anderson (1881) and Sclater (1891) published the catalogue of mammalian species present in the Indian Museum. Works on the molluscs of Manipur by Annandale, Prashad and Amin-ud-Din (1921), Gude (1914) and Preston (1915) are worth mentioning.

The first record of moths and butterflies is from the work of Buttler (1885), Cotes & Swinhoe (1887-89), Elwes (1891-92); Hampson (1892) in Fauna of British India, Fruhstorfer (1913), Tytler (1914-15) in the Butterfly fauna of Manipur and Nagaland. Roepke (1944), Wynter-Blyth’s (1957) work on the moths and butterflies of the state are of importance. The work of A.O. Hume (1888), Oates (1883-90) on birds; Allen (1905) on game birds, Higgins (1913, 33-34) on birds are worth mentioning. The exploration of Burmese fauna by Lewis (1888-1894) on Coleoptera, Erichson’s (1834) first description on Cybister (Melanonectes) sugillatus from Manipur, Cameron (1930-39) on fauna of British India, Kapur (1952) on the description of a new coccinellid can also be noted. The first record of two species of Hemiptera from the state comes from the work of Distant (1908), similarly, the first record of Diptera from Manipur comes from the work of Rev. W. Pettigrew from Ukhrul during 1908, followed by the work of C.S. Guthrie (1842), McClelland (1844), Barraud (1922), Brunetti (1923), I. M. Puri (1932) and F. Schmid (1960) on insects. The first record of Ticks comes from the work of Kohls (1948), who described a new species from Manipur.

Among Vertebrates, the first record of a new species of fish Noemacheilus manipurensis by Chaudhury (1912) and the description of Fishes of Loktak from the work of Hora (1921) is of significance. Reports of staggering number of game birds shot by the British personnel during 1910-32 from Manipur (Higgins, 1933-34) and the wanton destruction of the species from the state, and its impact on the present day diversity and distribution is very significant in the faunal resources of the state.

Since there is no precise scientific inventory...
of the various faunal groups of the state, the present publication is an attempt by the scientists of the Zoological Survey of India to explore and to document the fauna of the state under the Action Plan of the Ministry of Environment & Forests.

FAUNAL DIVERSITY

The analysis of the faunal exploration and documentation brought out in two volumes reveal nearly 2601 species belonging to various categories in 1261 genera, 368 families, of which 5 are new to science, 509 species are new records to the state and 28 are new records to the country. Among these faunal groups insects dominate the number with 1220 species followed by birds with 586 species, fishes 141 species and molluscs 127 species. A brief description of the summary of inventiorisation is given in table 2.

78 species of free living and 8 species of parasitic protozoa are recorded for the first time from the state, among them, the Imphal district represents maximum number of species followed by Jiribum and Bishenpur. It is interesting to note that flagellates, rhizopods and ciliates of Lake Kangla, Imphal (10, 17, 20 species respectively) has more or less the same number of species as that of the Loktak lake, Bishenpur (9, 18, 18). Of the 34 species of parasitic nematodes described from the state, the following three species are new to science and the genera, Soboliphyme is entirely new to the country:

  - Pseudaprocta manipurelensis
  - Soboliphyme manipurensis
  - Spirura manipuri

Records of 52 species of freshwater molluscs and 75 species of land molluscs are available from the state, of which 9 freshwater species and 17 species of land molluscs are recorded for first time from the state. A large number of molluscs are of consumptive value, which is not taken to the National exchequer viz., Bellamya bengalensis, Cipangopaludina lecythis, Angulygra oxytropis, Brotia costula, Paludomus blanfordiana and Paludomus conica among gastropods and

  - Lamelliedens marginalis
  - L.corrieanus
  - L. generousu
  - Paresysa burmanus
  - P. oeeata
  - Trapezoideus exolens

among bivalves are available, and are sold in the local markets.

The phylum Arthropoda is remarkable in having the largest number of classes, orders, families, genera and species in India. Crustacea though a major class of the phylum is represented by only 9 species in the state. The Arachnida, another major class is known by 17 families under Acari and 11 families under Aranae represented by 27 and 30 genera and 41 and 52 species respectively. The other groups under the Arthropod except the Insecta are poorly known in the state. There is high degree of endemism among them but our knowledge is limited in the groups Crustacea, Insecta and as well as Arachnida.

India by virtue of her very rich evergreen and subtropical vegetation in the Eastern Himalayas and the adjoining areas in the state, has a highly rich fauna of coleoptera with 42 families, 188 genera, 335 species. However, in comparison to the other Northeastern states, the faunal composition of this group needs to be adequately explored. Perhaps the number of species known at present would be more than double in the long run. It is evident that the lepidopterous fauna is much more concentrated in the eastern Himalayas as far as the Myanmar border than in the other parts of the country. But the microlepidopterous fauna as well as several families of moths like Casteniidae, Neopseustidae, etc. are poorly known. On the basis of available information, it may be presumed that about 10-15% lepidopterans still await discovery. The present investigation reveals 61 families, 112 genera and 183 species, of which 26 are threatened (Schedule-I = 10 spp., Schedule-II = 16 spp.). Major concentration of hymenopterous species is in the hilly and densely forested areas with 19 genera and 35 species in the state. A great diversity of hemipterous insects is found in the state, with 31 families, 174 genera and 290 species. In fact, aphids attracted much more attention than several other groups. Likewise the other Himalayan belt and the Manipur hills
Table 2. Details of present Faunal Inventorisation by Zoological Survey of India

<table>
<thead>
<tr>
<th>No.</th>
<th>Group</th>
<th>Family</th>
<th>Genera</th>
<th>Species</th>
<th>New to Science</th>
<th>New record to the State</th>
<th>New to India</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PROTOZOA</td>
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<td>54</td>
<td>86</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>NEMATODE (PARASITIC)</td>
<td>34</td>
<td>3</td>
<td>34</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>MOLLUSCA</td>
<td>45</td>
<td>127</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>4</td>
<td>CRUSTACEA: DECAPODA</td>
<td>3</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>INSECTA</td>
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<td></td>
<td>Thysanura</td>
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<td>2</td>
<td>1</td>
<td></td>
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<td>Collembola</td>
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<td>6</td>
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<td></td>
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</tr>
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<td>41</td>
<td>68</td>
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<tr>
<td></td>
<td>Orthoptera</td>
<td>2??</td>
<td>56</td>
<td>71</td>
<td>52</td>
<td>4</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Blattaria</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>8</td>
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<tr>
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<td>Isoptera</td>
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<td>7</td>
<td>6</td>
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<td></td>
<td>Hemiptera</td>
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<td>174</td>
<td>290</td>
<td>10</td>
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<tr>
<td></td>
<td>Coleoptera</td>
<td>42</td>
<td>188</td>
<td>335</td>
<td>159</td>
<td>15</td>
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</tr>
<tr>
<td></td>
<td>Diptera:</td>
<td>12</td>
<td>56</td>
<td>91</td>
<td>1 ssp</td>
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<td>4</td>
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<tr>
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<td>Trichoptera</td>
<td>13</td>
<td>25</td>
<td>114</td>
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<tr>
<td></td>
<td>ACARI: ORIBATID MITES</td>
<td>17</td>
<td>27</td>
<td>41</td>
<td>34</td>
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<tr>
<td></td>
<td>ARANEAE: SPIDERS</td>
<td>11</td>
<td>30</td>
<td>52</td>
<td>1</td>
<td>52</td>
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<td>6</td>
<td>PISCES</td>
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<td>64</td>
<td>141</td>
<td>10</td>
<td>4</td>
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<td>7</td>
<td>AMPHIBIA</td>
<td>5</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very common – 3, Common – 3, Rare– 8,</td>
</tr>
<tr>
<td>8</td>
<td>REPTILIA: SQUAMATA</td>
<td>5</td>
<td>6</td>
<td>9</td>
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<td>586</td>
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</tr>
<tr>
<td>10</td>
<td>MAMAMLIA</td>
<td>22</td>
<td>55</td>
<td>69</td>
<td></td>
<td></td>
<td></td>
<td>75 Species &amp; Subspecies</td>
</tr>
<tr>
<td>11</td>
<td>FOSSIL ANIMALS</td>
<td>82</td>
<td>134</td>
<td>167</td>
<td></td>
<td></td>
<td></td>
<td>102 spp Protozoa, 4 species of coelenterata,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 species of bryoza, 5 species of crustacea,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>37 species of mollusca.</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>450</td>
<td>1395</td>
<td>2601</td>
<td>5</td>
<td>509</td>
<td>28</td>
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</tr>
</tbody>
</table>
Insect Species diversity (Manipur)

Orders of Insecta

Faunal diversity of Manipur (other than insects)

Species
exhibit maximum concentration of the dipterous insects both qualitatively and quantitatively with 12 families, 56 genera and 91 species recorded in the state. It is true that the known fauna is far from satisfactory and it is estimated that the number of species still undiscovered, may exceed known ones from the state.

Besides the above major groups, the Orthoptera is ranked below with over 71 species. There are other orders, viz., the Trichoptera with 25 genera and 114 species, Thysanura with single genera and two species, Ephemeroptera with 5 genera and 6 species and Odonata with 41 genera and 68 species. It is extremely difficult at this stage to estimate the actual diversity unless systematic exploration is undertaken all over the state. Several insect orders such as Neuroptera, Phthiraptera, Dermaptera, Siphonaptera, Embioptera, Mecoptera and the Strepsiptera are insignificantly known. The Blattaria are represented by 6 genera and 8 species. It is mentionable that maximum diversity of these insects is encountered in the tropical rain forest areas of the state.

The Indian fish diversity represents 11.72% of the world, comprising of 2546 species under 969 genera, 254 families and 40 orders. 1570 are marine and 930 are freshwater inhabitants (Jayaram, 1999). The state of Manipur is now represented by 64 genera and 141 species of freshwater fishes, representing 15.16 of the total Indian freshwater fishes of the country.

The Indian amphibia comprises of 229 species under 40 genera, 9 families and 3 orders, and the species are not evenly distributed throughout India; the highest concentration is found in Western Peninsula followed by North-east. Interestingly all the three living orders of Amphibia viz. Gymnophiona, Caudata and Anura are distributed in North-east India, but the state of Manipur is represented by a limited number, 14 species, which is an underestimate to the state. The reptile fauna is equally under represented by 6 genera and 9 species in the state.

The state of Manipur is well represented as far as the aves are concerned, out of total 1232 species and subspecies of birds known from the subcontinent (Alfred et.al. 2001), as many as 586 are represented in the state, which accounts nearly 48 percent of the total record. Among them 32 of 138 species are under threat as per IUCN guidelines. One out of nine listed is Critically Endangered (Gyps bengalensis), two out of ten species are Endangered (Cairina scutellata and Buceros bicornis); 17 out of 57 are classified as Vulnerable (Anas formosa, Aythya baeri, Aquilla clanga, Falco naumanni, Perdicula manipurensis, Tragopan blythii, Syrmaticus humiae, Grus monacha, Grus antigone, Heliopais personata, Gallinago nemoricola, Columba punicea, Aceros nipalensis, Spelaeornis longicaudatus, Turdoides longirostris, Turdus obscurus and Sitta Formosa) and 12 species out of 52 are classified as Near Threatened (Birdlife International, 2001). Important Bird Areas Programme of Bird Life International has also identified, Ango Hills, Dzuko, Kailam, Siroi, Yangoupokpi, Bunning Wildlife Sanctuaries, the Loktak and Keibul Lamjo National Park, as conservation sites for birds in the state.

75 species and subspecies under 55 genera and 22 families of mammals are recorded from the state out of 397 species in the country. District wise distribution indicates the mammalian distribution is more concentrated in Imphal district with 36 species, followed by Senapati 28 species and Chandel 24 species. Among primates, two species Nycticebus coucang (Slender Loris) and Macaca arctoides (Stump tailed Macaque) are restricted to Chandel district, Macaca mulatta and M. assamensis in Imphal while the Bunopithecus hoolock and Presbytes pileatus is restricted to the Senapati district. Of the 75 recorded species from the state, nearly 22 species are conserved under Wildlife Protection Act, 1972, besides including 5 species under Vulnerable, 4 species under Near Threatened (Lower Risk) and 2 with Data Deficient as per the IUCN guidelines. Mention may be made of a lone species of Cervus eldi eldi restricted to the state of Manipur and now under protection at Keibul Lamjao National Park, (declared on 28th March, 1977),
with an area of 40 km² located at an altitude of 767-788 m and at Latitude 24°27' - 24°31' N, Longitude 93°53' E - 93°55' E. This has an ideal condition for the Manipur Brow Antlered Deer to be conserved, as the area has a combination of aquatic wetland and terrestrial ecosystem. The Sangai, (as they are popularly called) population, in the National Park is as given below:

<table>
<thead>
<tr>
<th>Year</th>
<th>Type of Survey</th>
<th>Stag</th>
<th>Hind</th>
<th>Fawn</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>Aerial census</td>
<td></td>
<td></td>
<td></td>
<td>76</td>
</tr>
<tr>
<td>1991</td>
<td>Ground census</td>
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<td>104</td>
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<td>1992</td>
<td>Aerial census</td>
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<td>62</td>
</tr>
<tr>
<td>1993</td>
<td>Ground census</td>
<td></td>
<td></td>
<td></td>
<td>98</td>
</tr>
<tr>
<td>1994</td>
<td>Ground census</td>
<td></td>
<td></td>
<td></td>
<td>137</td>
</tr>
<tr>
<td>1995</td>
<td>Ground census</td>
<td>58</td>
<td>69</td>
<td>25</td>
<td>152</td>
</tr>
<tr>
<td>1998</td>
<td>Ground census</td>
<td>56</td>
<td>62</td>
<td>28</td>
<td>156</td>
</tr>
<tr>
<td>1999</td>
<td>Ground census</td>
<td>63</td>
<td>61</td>
<td>25</td>
<td>149</td>
</tr>
<tr>
<td>2000</td>
<td>Ground census</td>
<td>54</td>
<td>76</td>
<td>32</td>
<td>162</td>
</tr>
</tbody>
</table>

(Source: Forest Department, Manipur)

The first survey by a team from Zoological Survey of India, during 1972-75 yielded substantial result in the conservation of the species, as this formed the baseline for future biocological as well as conservation measures to be adopted to save this animal from extinction.

The present book also deals with 167 species of fossilised animals, 2 trace fossils and 23 species of calcareous nannofossils. The major composition of fossils consists of 68 species of foraminifera, 34 species of radiolaria, 4 species of coelenterata, 3 species of bryozoa, 5 species of crustacea, and 37 species of mollusca. The assemblage of microfauna of Ophiolite belt of Ukul area was referred to late cretaceous age, while the fauna associated with the exotic blocks were of varying age from Paleocene to Upper Eocene.

**Loktak Lake**: Largest freshwater of Northeast India, designated as the Wetland of International Importance during 1990. Loktak have considerable economic, ecological as well as cultural value to the state of Manipur. The important character feature of the lake is the presence of floating islands covered with vegetation, often called as the “Phumdis” of varying thickness. The largest and the continuous mat of Phumdis are located on the southern part near the Keibul Lamjao National Park, which is the home for the Sangai. Phumdis are locally used by the fishermen community for fishing in the lake, more than 2000 people live on Phumdis. Besides fishing, plant communities present on Phumdis are locally used for medicine, food, fodder as well as fuel. It is also believed that the phumdis play an important role in the ecological processes and functions of the lake, as they provide key nutrient and acts as biological sink to the key nutrients. The lake ecology has been altered by the construction of Ithai barrage across the Manipur River for the storage of water to generate electricity. This has also resulted in rapidly eroding the rich biodiversity of the lake.

**PROTECTED AREA NETWORK**

Environmental awareness, education and dwindling faunal resources in the state of Manipur due to demographic pressure has necessitated the state authorities to increase the area under
Protected Area Network and its management, for the conservation of Wildlife species in the state. As a result, the following action has been initiated for conservation and management of wildlife besides enforcement of Wildlife (Protection) Act, 1972 and the Biodiversity Act.

<table>
<thead>
<tr>
<th>In-situ Conservation site</th>
<th>Location (District)</th>
<th>Area in sq km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keibul Lamjao National Park</td>
<td>Bishenpur</td>
<td>40.00</td>
</tr>
<tr>
<td>Yangoupokpi Lokchao Wildlife Sanctuary</td>
<td>Chandel</td>
<td>184.80</td>
</tr>
<tr>
<td>Bunning Wildlife Sanctuary</td>
<td>Tamenglong</td>
<td>115.80</td>
</tr>
<tr>
<td>Zeliad Wildlife Sanctuary</td>
<td>Tamenglong</td>
<td>21.00</td>
</tr>
<tr>
<td>Keilam Wildlife Sanctuary</td>
<td>Churachandpur</td>
<td>187.50</td>
</tr>
<tr>
<td>Jiri-Makru Wildlife Sanctuary</td>
<td>Tamenglong</td>
<td>198.00</td>
</tr>
<tr>
<td>Shiroi Hill National Park</td>
<td>Ukhrul</td>
<td>41.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ex-situ Conservation sites</th>
<th>Location (District)</th>
<th>Area in sq km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manipur Zoological Garden</td>
<td>Imphal (Iroishemba)</td>
<td>0.08</td>
</tr>
<tr>
<td>2nd Home of SANGAI</td>
<td>Imphal (Iroishemba)</td>
<td>0.60</td>
</tr>
<tr>
<td>Orchid Preservation Centre</td>
<td>Imphal (Khonghampat)</td>
<td>0.50</td>
</tr>
</tbody>
</table>

**ACKNOWLEDGEMENT**

The authors wish to express their deep felt thanks to the State Government Authorities, for their help during the survey and compilation. Thanks are also due to the Director, Indian Institute of Remote Sensing, Dehradun and to Forest Survey of India for providing the IRS map.
INTRODUCTION

Out of a total of 4,629 species of mammal known from the world, 372 species occur in the Indian union (Corbet & Hill 1986), 397 Alfred et al. 2001. Of these, 69 Species (75 species and subspecies) are being reported from Manipur.

Our knowledge about the mammalian fauna of Manipur is rather patchy. Lt. Col. H. H. Godwin-Austen (1868) appears to be the first who procured specimens of mammals from Manipur, for taxonomic study. A few examples of mammals were collected by a party of the Zoological Survey of India from the Naga Hills and Manipur during February-March 1936. After the II world war, Dr. M. L. Roonwal of the Zoological Survey of India, as leader of the Field Typhus Research Team to investigate Tsutsugamushi disease, collected mammalian specimens during the period June-December 1945, mostly from central Manipur. After the Eastern Regional Station of the Zoological Survey of India was established at Shillong in 1959, various workers of that Regional Station surveyed different parts of Manipur and obtained mammalian specimens.

After the initiation of the project on the fauna of Manipur, scientists from ZSI surveyed different parts of Manipur in March 1992 and November-December 1992 for the study of mammals.

The larger mammals, especially the game animals, of Manipur are more or less well known, and accounts are available in Allen (1905) and Higgins (1934). A. O. Hume made collections in Manipur in the last quarter of the 19th century, which was reported upon by Thomas (1886). Annandale (1921) casually mentioned that otters are plentiful in Manipur but did not name the species. Blyth (1863) listed all specimens of mammals present in the museum of the Asiatic Society, including that State. Jerdon (1867) provided a preliminary descriptive account of mammals of India, which also included those from Manipur. Dobson (1876) published his monumental work on the Asiatic Chiroptera in which description, distribution, etc., of all the bats known from Manipur up to that time were provided. The first complete faunal account on Indian mammals was authored by Blanford (1888, 1891). During this period, Anderson (1881) and Sc1ater (1891) published catalogues of mammalian specimens present in the Indian Museum, which naturally included those from the present state of Manipur. Later, Pocock’s fauna of British India on Primates and Carnivora (1939, 1941), Ellerman’s Fauna of India on Rodentia (1961) and Ellerman & Morrison-Scott’s checklist (1951, 1966), all included faunal accounts of mammals from Manipur.

While the surrounding districts of Assam and Myanmar were fairly surveyed for mammals by the Mammal Survey of India conducted by the Bombay Natural History Society in the early part of twentieth century, and later reported by various workers (Wroughton 1918, 1919), Manipur remained more or less unsurveyed. A detailed account of the ecology, bionomics and systematic aspect of mammals of Manipur are available in Roonwal (1949, 1950). His study included 35
species and subspecies of mammals belonging to six orders. Of these 3 were new subspecies of rats and mice. Very recently Mandal et al. (1993, 1994) recorded three bats and one shrew and Sinha (1994) also reported some bats from Manipur.

The Present paper is based on the specimens of mammals, from Manipur present in the Zoological Survey of India, Kolkata and its Eastern Regional Station, Shillong, as also on published literature.

Complete synonyms have not been given, as these are available in Blyth (1863), Jerdon (1867), Dobson (1876), Anderson (1881), Blanford (1888, 1891), Sclater (1891), Pocock (1939, 1941), Ellerman & Morrison-Scott (1951) and Ellerman (1961). Current Synonymies have, however, been discussed under ‘Remarks’.

Measurements have been expressed in millimetre (except where stated otherwise) and have been taken after Pocock (1939, 1941) for Primates and Carnivora, Khajuria (1953) for Chiroptera, and Ellerman (1961) for Rodentia.

Following is a list of abbreviations used for various measurements: apf = length of anterior palatal foramina; b = length of bulla; c′ – c′ = distance between cingula of upper canines; cb = condylobasal length; ccl = condylocanine length; cr = cranial rostrum; cw = cranial width; d = length of diastema; E = length of ear; Fa = length of forearm; F & Cl = length of foot and claw; H & B = length of head and body; Hf = length of hindfoot; iw = least interorbital width; l = greatest length of skull; m – m = distance between outer surfaces of first upper molars; m′ – m′ = distance between outer surfaces of third upper molars; ml = mandibular length; mtr = length of maxillary tooth-row; mw = maxillary width; n = nasal length; on = occipitonasal length; orb = length of orbit; pl = palatal length; pow = postorbital width; Tb = length of tibia; Tl = length of tail; Tr = length of tragus; ZSI = Zoological Survey of India; zw = zygomatic width.

**SYSTEMATIC ACCOUNT**

**Order SCANDENTIA**

Squirrel-like in appearance with long snout; whiskers absent.

The Order Scandentia comprises of a single family Tupaiidae.

**Family TUPAIIDAE**

Only one genus *Tupaia* of the family Tupaiidae occurs in Manipur.

**Genus Tupaia** Raffles, 1821

The genus *Tupaia* is represented in Manipur by a single species and subspecies.


**Common name**: Northern Tree Shrew (Eng.).

**Material examined**: Senapati district: 1♂, 26 km N of Imphal on Dimapur Road (c 1067 m), coll. M. L. Roonwal, 27.xi.1945; Chandel district: 1 unsexed, Moreh (c 177 m), coll. M. L. Roonwal, 10.viii.1945.

**Measurements**: None.

**Diagnosis**: Tail shorter than head and body; colour grizzled yellowish-brown on the back, ventral colour yellowish buff or orange buff; fur long, soft and thick, with long dark brown hairs.

**Distribution**: India: Manipur: Chandel district, Senapati district (Roonwal 1950); Arunachal Pradesh; Assam; Nagaland; Tripura.

**Order INSECTIVORA**

Animals usually small in size. Snout pointed and projecting far beyond the lower jaw. Body covered with short closely-set fur. Eyes and ears small. Orbits open posteriorly. Limbs short and five-toed. Zygomatic arch may be present or absent.
The order is represented in Manipur by two families, namely, Talpidae and Soricidae.

**Key to the families of the order INSECTIVORA**

— Zygomatic arches present, bulla ossified ......
   ..................................................... TALPIDAE
— Zygomatic arches absent, bulla imperfect ......
   ................................................... SORICIDAE

**Family TALPIDAE**

One genus of the family Talpidae occurs in Manipur.

Genus *Talpa* Linnaeus, 1758

Body covered with very short velvety fur; eyes minute; pinna absent; forepaws broad, with outwardly directed heavy claws; small tail, scantily haired.

One species of the genus *Talpa* occurs in Manipur.


*Common name*: Eastern Mole, Short-tailed Mole (Eng.).

*Material examined*: None.

*Measurements*: Nil.

*Diagnosis*: Animal with a very small tail, almost concealed by fur; colour steely black or brown; snout and feet flesh-coloured; premolars 4/4 in number.

*Distribution*: India: Manipur: Imphal district (Roonwal 1950); Arunachal Pradesh; Assam; Meghalaya; Nagaland; Sikkim; West Bengal.

*Elsewhere*: Nepal and Bangladesh.

*Remarks*: Commonly found between 1000 m and 1500 m altitudes where it lives in deep beds of vegetable moulds.

**Family SORICIDAE**

Mouse-like small animals with velvety fur; muzzle elongated and narrow; eyes very small; ear-conch small; limbs short; zygomatic arches absent; auditory bones of annular shape.

Four genera of the family Soricidae occur in Manipur.

**Key to the genera of the family SORICIDAE**

1. Ear-conch small; tail very short ..................
   ................................................... *Anourosorex*
2. Teeth tipped brown ......................... *Soriculus*
   Teeth entirely white ..........................
3. 18 teeth in upper jaw ....................... *Suncus*
   16 teeth in upper jaw .................... *Crocidura*

**Genus Soriculus** Blyth, 1854

Fur soft and velvety. Tail, slender, tapering gradually like that of mouse, with no scattered hairs on it; ears concealed within the fur. Teeth white, tipped with ferruginous or pitch colour.

One species of the genus *Soriculus* is found in Manipur.


*Common name*: Hodgson’s Brown-toothed Shrew (Eng.).

*Material examined*: None.

*Measurements*: Nil.

*Diagnosis*: Tail slender and of the same length as head and body. Hind feet slender, with short claws. Ears hairy and partially hidden in the fur. The second upper incisor larger than the third and exceeds the canine in length.

*Distribution*: India: Manipur (Ellerman and Morrison-Scoft 1966); Sikkim; Uttar Pradesh; West Bengal.

*Elsewhere*: Nepal and Myanmar.

**Genus Suncus** Ehrenberg, 1833

The genus *Suncus* is represented by a single
species *Suncus murinus* and two subspecies, in Manipur.

**Key to the subspecies of Suncus murinus**

Tail circular in outline, gradually tapering towards tip, inter-spersed with long hairs .......... 

.................................................. *S. m. griffithi*

Tail rather long, swollen at base and densely haired ................. *S. m. fulvocinereus*

4. *Suncus murinus griffithi* (Horsfield)


**Common name**: House Shrew (Eng.).


**Measurements**: External: 2♂: HB 134.0, 123.0; TI 74.0, 75.0; Hf 19.6, 21.2; E 12.8, 12.0. 2♀: HB 106.0, 92.0; TI 65.0, 72.0; Hf 18.5, 19.4; E 12.0, 11.0. Cranial: 1♂: l 35.5., 32.5; cb 34.4, 30.8; pl 15.2, 14.4; cw 14.8, 13.2. 2♀: l 29.9, 31.1; cb 28.5, 30.0; pl 13.3, 13.7; cw 12.0, 12.3.

**Diagnosis**: Dorsal colour brown with rusty wash; ventral colour lighter; hair thick and long, more than 8.0 mm.

**Distribution**: India: Manipur: Imphal district, Senapati district, Tamenglong district, Ukhrul district, Churachandpur district; Arunachal Pradesh; Assam; Meghalaya; Nagaland; Uttar Pradesh; West Bengal.

**Elsewhere**: Bhutan and Bangladesh.

5. *Suncus murinus fulvocinereus* (Anderson)


**Common name**: House Shrew (Eng.).

**Material examined**: Imphal district: 5♂, 4♀: 16 miles N of Imphal on Dimapur Road, coll. M. L. Roonwal, 8-22. xi.1945, 28.xii.1945.

**Measurements**: None.

**Diagnosis**: Similar to *Suncus murinus griffithi* in appearance, but tail rather long, swollen at base and densely haired.

**Distribution**: India: Manipur: Imphal district (Roonwal 1950); Meghalaya; Assam.

**Genus Crocidura** Wagler, 1832

One species of the genus *Crocidura* is found in Manipur.

6. *Crocidura attenuata rubricosa* Anderson


**Common name**: Grey Shrew (Eng.).

**Material examined**: Ukhrul district: 1♂: Ukhrul (c 1800 m), coll. Ajoy Kumar Mandal, 17.xi.1992.

**Measurements**: External: 1♂: HB 75.0; TI 70.0; Hf 16.5; E 10.0. Cranial: 1♂: l 21.5.

**Diagnosis**: Dorsal colour dark or reddish brown, ventral colour grey-brown, with silvery sheen; tail more or less tetragonal, not swollen at base; snout well-clad with hairs; ears sparsely clad with hairs; condylobasal length less than 21.6 mm.

**Distribution**: India: Manipur: Ukhrul district; Arunachal Pradesh; Assam; Jammu & Kashmir; Meghalaya; Punjab; Uttar Pradesh; West Bengal.

**Elsewhere**: Bhutan.

**Remarks**: Anderson (1877, 1881) described *Crocidura kingiana* and synonymised it with *C. rubricosa*. Ellerman and Morrison-Scott (1951) treated both *rubricosa* and *kingiana* as separate subspecies of *C. attenuata*, without assigning any definite reason. On an examination of the type
series of rubricosa and kingiana, no difference in the external and cranial characters could be detected. Hence, Crocidura kingiana is treated here as a synonym of Crocidura attenuata rubricosa and this species constitute its first record from Manipur.

Genus Anourosorex Milne Edwards, 1872

The genus Anourosorex is monotypic.

7. Anourosorex squamipes Milne-Edwards


Common name : Szechuan Burrowing Shrew (Eng.).


Measurements : External : 2♂ : HB 100.8, 88.5; TI 13.2, 13.5; Hf 15.5, 14.3; E 8.7, 8.5, 2♀ : HB 82.0, 116.0; TI 13.0, 13.0; Hf 16.5, 16.0; E 9.0, 8.5. Cranial : 2♂ : l 26.2, 25.8; cb 24.5, 24.6; pl 11.2, 10.9; cw 14.2, 14.2; mtr 11.9, 11.1. 2♀ : l 25.8, 26.6; cb 24.5, 25.3; pl 11.1, 11.4; cw 13.3, 14.6; mtr 11.5, 11.6.

Diagnosis : Seminude snout; feet naked; tail small, naked and scaly.

Distribution : India : Manipur : Senapati district, Ukhrul district, Tamenglong district; Arunachal Pradesh; Assam; Meghalaya.

Elsewhere : Bhutan, Myanmar, Southern China, Taiwan, Vietnam, Thailand.

Remarks : From the study of specimens from Manipur, it is quite evident that the ranges of the head and body length and the greatest length of the skull covered both the larger and smaller forms from Assam-NEFA and South-eastern China as stated by Mandal and Das (1970). Therefore, in our view Ellerman and Morrison-Scott (1966) were quite justified in synonymizing assamensis with the nominate subspecies, Anourosorex squamipes squamipes Milne-Edwards. This species was recorded for the first time from Manipur (Mandal, et al. 1974).

Order CHIROPTERA

Order Chiroptera is the only order of mammals which has wings and is capable of true flight.

The order Chiroptera is divided into two suborders.

Suborder MEGACHIROPTERA

Bats of this suborder are characterised by the absence of nose-leaf and tragus; tail reduced, rod-like and often absent.

The suborder Megachiroptera consists of a single family Pteropodidae.

Family PTEROPODIDAE

Five genera of the family Pteropodidae occur in Manipur. Each of the genera is represented by a single species and subspecies.

Key to the genera, species and subspecies of the family PTEROPODIDAE

1. Tongue moderate, usually the tip does not protrude out of the mouth in dead specimen; inner margin of nostril projecting; a claw present on second fore finger .................2

— Tongue long, usually a portion of the tip protrudes out of the mouth in dead specimen; no projecting margin of nostril; no claw on second fore finger .................Eonycteris spelaea

2. Upper part of body of one colour throughout ........................................3

— Hind neck and shoulders paler than back ......... Pteropus giganteus giganteus

3. Five upper and six lower cheek-teeth .......... Rousettus leschenaulti leschenaulti

— Four upper and five lower cheek-teeth .......4

4. Two pairs of lower incisors ........................................ Cynopterus sphinx sphinx
One pair of lower incisor.........................

...................... Megasaerops niphaeae

Genus Rousettus Gray, 1821

The genus Rousettus is represented by a single species and subspecies in Manipur.

8. Rousettus leschenaulti leschenaulti

(Desmarest)


Common name : Indian Fulvous Fruit Bat (Eng.).

Material examined : None.

Measurements : Nil.

Diagnosis : Medium-sized fruit bat, with large eyes and longish muzzle; tail rod-like and reduced; dorsal colour light brown with russet tone, ventral colour of lighter shade; back of neck and shoulders sparsely haired; last lower molar elliptical.

Distribution : India : Manipur : Imphal district, Tamenglong district, Senapati district; widely distributed throughout the mainland.

Elsewhere : Pakistan, Sri Lanka, Nepal, Bangladesh, Bhutan, Myanmar, Southern China including Tibet, Hong Kong, Thailand, Laos, possibly Cambodia, and Vietnam.

Remarks : This bat was seen flying in the evening during our field trips to Manipur.

Genus Pteropus Brisson, 1762

Only one species and subspecies of the genus Pteropus occurs in Manipur.

9. Pteropus giganteus giganteus (Brünnich)

1782. Vespertilio gigantea Brünnich, Dyrenes Historie, 1 : 45 (West Bengal, India).

Common name : Indian Flying Fox (Eng.).


Measurements : None.

Diagnosis : Largest bat of Manipur; rufous-brown around head and neck; an orange band across upper back; lower back blackish brown; ventral parts dark chestnut brown; no external tail; a narrow flap of skin present inside each leg.

Distribution : India : Manipur : Imphal district (Roonwal 1950); widely distributed throughout the Indian union, including Andaman Islands (Mason 1908).


Genus Cynopterus F. Cuvier, 1824

Only one species and subspecies of the genus Cynopterus occurs in Manipur.

10. Cynopterus sphinx sphinx (Vahl)


Common name : Short-nosed Fruit Bat (Eng.).


Measurements : External : 2♂ : Fa 64.0, 70.5; E 13.5, 22.0; Tb 26.0, 28.6; F & Cl 15.0, 15.5. 2♀ : Fa 70.2, 67.5; E 19.0, 19.0; Tb 27.2, 25.4; F & Cl 12.1, 12.0. Cranial : 2♂ : l 31.6, 33.2; cb 29.7, 30.4; cr 8.3, 8.6; mtr 10.8, 11.3; c1-c1 6.6, 6.7; cw 13.3, 14.3; zw 19.7, 20.7; m1-m1 9.6, 10.0; ml 23.1, 24.5. 2♀ : l 31.5, 29.7; cb 29.9, 28.5; cr 7.7, 7.0; mtr 10.9, 9.9; c1-c1 6.7, 6.8; cw 13.8, 13.3; zw 19.4, 19.7; m1-m1 9.4, 9.5; ml 24.9, 22.7.

Diagnosis : Medium-sized fruit bat, with white margin to ears; metacarpals and phalanges whitish; nostrils divergent with deep inter-narial groove; dorsal colour grey or greyish brown, paler ventrally (often with a broad russet or chestnut coloured area around shoulders and throat); tail reduced and rod like.
**Distribution**: India: Manipur: Churachandpur district, Imphal district, Tamenglong district; widely distributed throughout the mainland of Indian Union.

**Elsewhere**: Pakistan, Sri Lanka, Nepal, Bangladesh and Myanmar.

**Genus Megaerops** Peters, 1865

The genus *Megaerops* is represented by one species in Manipur.

**11. Megaerops niphanae** Yenbutra & Felten


**Common name**: Niphan's Fruit Bat (Eng.).

**Material examined**: Tamenglong district: 1♂, Tamenglong (c 1280 m), coll. Ajoy Kumar Mandal, 22.xi.1992. Imphal district: 1♀, Uchathol (c 175 m), coll. Ajoy Kumar Mandal, 28.xi.1992.

**Measurements**: External: 1♂, 1♀: Fa 59.4, 59.0; E 19.2, 17.5; Tb 23.0, 22.7; F & Cl 14.0, 14.0. Cranial: 1♂, 1♀: l 28.0, 26.3; cr 6.3, 6.3; mtr 8.6, 8.3; iw 5.0, 5.0; cw 12.4, 12.0; zw 17.8, 17.6; ml 20.0, 19.0.

**Diagnosis**: Much like the Short-nosed Fruit bat, but nostrils are more subtubular, no external tail; ears without white edges; wing membranes attached to second phalanx of first toe; colour dusky brown above, light greyish brown below.

**Distribution**: India: Manipur: Tamenglong district, Imphal district; West Bengal.

**Elsewhere**: Thailand and Vietnam.

**Remarks**: Koopman (1989) identified the specimen from Pashok (Darjeeling district, West Bengal) as *Megaerops niphanae* instead of *Megaerops ecaudatus* by Hill (1983). *M. niphanae* is the largest among the four species known of the Indo-Malayan genus *Megaerops*. This species was recorded for the first time from Manipur (Mandal, *et al.* 1993).

**Genus Eonycteris** Dobson, 1873

The genus *Eonycteris* is monotypic.

**12. Eonycteris spelaea** (Dobson)


**Common name**: Dobson’s Long-tongued Fruit Bat (Eng.).

**Material examined**: None.

**Measurements**: Nil.

**Diagnosis**: Very much like the Indian Fulvous Fruit bat, but second finger lacks a claw; small reniform perianal gland present on either side of anus; fur short and scanty; back brownish, ventral surface rather greyish; adult males with yellowish red buff on neck.

**Distribution**: India: Manipur: Imphal district (Sinha 1994); Andaman & Nicobar Islands; Andhra Pradesh; Arunachal Pradesh; Assam; Karnataka; Meghalyaya; Sikkim; Utter Pradesh; West Bengal.

**Elsewhere**: Myanmar, Southern China, Vietnam, Laos, Cambodia, Thailand, Malay Peninsula and nearby Islands, Sumatra and possibly Borneo.

**Suborder MICROCHIROPTERA**

The suborder Microchiroptera is represented by two families, in Manipur.

**Key to the families of the suborder MICROCHIROPTERA**

Tail entirely enclosed in inter-femoral membrane.

A. A nose-leaf but no tragus present..................

.................................................. RHINOLOPHIDAE

B. No nose-leaf but a tragus present..................

.................................................. VESPERTILIONIDAE

**Family RHINOLOPHIDAE**

Small to rather large-sized bats with complicated nose-leaf, large ears, small eyes and tail entirely enclosed in inter-femoral membrane (except *Coelops*). The nose-leaf essentially consists of three main portions, viz., anterior rounded horizontal portion popularly called the
horse shoe, the central portion and the posterior vertical portion.

The family Rhinolophidae is represented by one genus in Manipur.

Genus Hipposideros Gray, 1831

The genus Hipposideros is represented by two species, in Manipur.

Key to the species and subspecies of the Genus Hipposideros

A. Posterior nose-leaf narrower than anterior nose-leaf; a large frontal sac present ......................... Hipposideros armiger armiger

B. Posterior nose-leaf not narrower than anterior nose-leaf; a frontal sac absent ............................... Hipposideros lankadiva


Common name : Great Himalayan Leaf-nosed Bat (Eng.).

Material examined : Tamenglong district : 1♀ : Tharon Cave (30 km N of Tamenglong, c 1280 m), coll. Ajoy Kumar Mandal, 23.xi.1992.

Measurements : External : 1♀ : Fa 89.1; E 26.0; Tb 37.6; F & Cl 16.5.

Diagnosis : Largest (forearm may reach 96.0 mm and above) leaf-nosed bat of Manipur; ears large, broad and acutely pointed, slightly thickened at anti-tragal region; nose-leaf with four supplementary leaflets, the fourth rudimentary; upper edge of posterior nose-leaf flattened, thickened and trilobiate; frontal sac prominent in males, smaller in females.

Distribution : India : Manipur : Tamenglong district (Mandal, et al. 1993); Assam; Meghalaya; Sikkim; Uttar Pradesh; West Bengal.

Elsewhere : Sri Lanka.

Remarks : Brosset (1962) considered this species as monotypic. Ellerman & Morrison-Scott (1951) recognised three subspecies of Hipposideros lankadiva from the Indian mainland. Hill (1963) has maintained all the mainland subspecies as lankadiva.

Family VESPERTILIONIDAE

Bats of the family Vespertilionidae have tragus but no nose-leaf; the tail is approximately as long as the forearm and is enclosed in the interfemoral membrane up to the tip or penultimate joint.

Only one sub-family of the family Vespertilionidae, namely Vespertilioninae, occurs in Manipur.

Subfamily VESPERTILIONINAE

Key to the genera of the subfamily VESPERTILIONINAE

1. Upper premolars 2-2........................................2
   — Upper premolars 1-1.................................3

2. Outer upper incisor not extending beyond singulum of inner...................... Scotozous
— Outer upper incisor extending distinctly beyond cingulum of inner ...................... Pipistrellus
3. Upper incisors 2-2 .................. Tylonycteris
— Upper incisors 1-1 .................. Scotophilus

Genus Pipistrellus Kaup, 1829

Two species and subspecies of the genus Pipistrellus occur in Manipur.

Key to the species and subspecies of the genus Pipistrellus

Forearm less than 29 mm .................. Pipistrellus minus

Forearm more than 29 mm .................. Pipistrellus coromandra

The nominate subspecies of P. coromandra occurs in Manipur.

15. Pipistrellus coromandra coromandra


Common name: Indian Pipistrelle (Eng.).

Material examined: None.

Measurements: Nil.

Diagnosis: A small-sized pipistrelle (forearm 31 mm, on average); dorsal fur blackish brown, tips of hairs slightly rufescent; ventral fur slightly paler brown; tragus curving forward and bluntly rounded; calcarial lobe small.

Distribution: India: Manipur: Imphal district; widely distributed in peninsular India, north to Jammu & Kashmir (Sharma & Sharma 1976, Chakraborty 1983); east to north-eastern states including Tripura (Agrawal & Bhattacharyya 1977); also reported from Car Nicobar Island (Bhattacharyya 1977).


Remarks: Following recent revisions (Sinha 1980, Hill & Harrison 1987), Pipistrellus minimus has been considered as monotypic.

Genus Scotophilus Dobson, 1875

The genus Scotophilus is represented by a single species.

17. Scotophilus dormeri Dobson


Common name: Dormer’s Bat (Eng.).


Measurements: External: 1♂: Fa 28.1; Tl 29.2; E 10.0; Tb 11.5; F & Cl 6.0. 1♀: Fa 29.2; Tl 27.0; E 11.0; Tb 12.0; F & Cl 5.5. Cranial: 1♂: I 11.1; mtr 3.5; cw 6.2; zw 7.2; iw 3.5; m1–m2 4.7; c1–c1 3.6; ml 7.5. 1♀: mtr 3.7; cw 6.4; iw 3.7; m1–m2 4.8; c1–c1 3.7; ml 7.6.

Diagnosis: Smallest (forearm around 28.0 mm) Pipistrelle of Manipur; fur dense and short; dorsal coloration bistre brown, base of hairs almost black; ventral fur lighter; face, ears and wing-membranes almost black; ears small and scarcely triangular; tragus short and curved forward; postcalcarial lobe-present.

Distribution: India: Manipur: Imphal district; widely distributed throughout the mainland of Indian Union.


Remarks: Following recent revisions (Sinha 1980, Hill & Harrison 1987), Pipistrellus mimius has been considered as monotypic.

Genus Pipistrellus Kaup, 1829

Two species and subspecies of the genus Pipistrellus occur in Manipur.

16. Pipistrellus minus Wroughton


Common name: Indian Pygmy Pipistrelle (Eng.).


Measurements: External: 2♀: Fa 34.5, 34.5; E 13.0, 12.0; Tb 13.5, 14.5; F & Cl 7.5, 8.0.
Cranial: 2φ : l 12.7, 13.6; mtr 4.9, 5.0; c1–c4 4.7, 4.9; iw 3.8, 3.9; cw 7.0, 7.4; zw (1) 8.9; m1–m3 6.1, 6.4; ml 10.0, 10.4.

Diagnosis: Very small, similar to Kelaart’s Pipistrelle, but second upper incisor very small, not extending beyond cingulum of inner incisor; underparts whitish, often lemon-yellow in live and freshly killed specimens.

Distribution: India: Manipur: Imphal district; widely distributed in the Indian mainland from Jammu & Kashmir (Chakraborty 1983), south at least to Karnataka, and from Gujarat east to West Bengal.

Elsewhere: Pakistan (Roberts 1977), and possibly Taiwan.

Remarks: This constitutes the first record of this bat from Manipur.

Ellerman & Morrison-Scott (1951) recognised two subspecies of P. dormeri. But Agrawal (1973) has synonymised Pipistrellus dormeri caurinus (Thomas, 1915) with the nominate subspecies.

Genus Tylonycteris Peters, 1872

The genus Tylonycteris is represented in Manipur by one species and subspecies.

18. Tylonycteris pachypus fulvida (Blyth)


Common name: Club-footed Bat (Eng.).

Material examined: None.

Measurements: Nil.

Diagnosis: Reddish brown above and below; ear shorter, tip rounded; tragus short; fleshy pads at junction of thumb and second finger, and on soles; skull dorsoventrally flattened, braincase and rostrum at same level.

Distribution: India: Manipur (Das, et al. 1995); Andaman Islands (Dobson 1876); Karnataka; Kerala; Meghalaya; Sikkim; Tripura; West Bengal.


Remarks: The Club-footed Bat has only once been seen at Ukhrul. As such, it appears to be a rare bat of this state.

Genus Scotophilus Leach, 1821

The genus Scotophilus is represented in Manipur by one species and subspecies.

19. Scotophilus heathi heathi (Horsfield)


Common name: Greater Yellow Bat (Eng.).

Material examined: Imphal district : 2♂, 4♀, Jiribam (c 175 m), coll. Y.P. Sinha, 2.v.1990.

Measurements: Nil.

Diagnosis: Ears small with rounded tips; tragus semilunar, posterior border convex, anterior border concave, slender tip pointing forward; tip of tail free; fur short, dense and sleek, dorsal colour olive-brown, ventral colour lemon-yellow or orange-yellow.

Distribution: India: Manipur: Imphal district; widely distributed throughout the Indian mainland, east at least to Tripura.

Elsewhere: Afghanistan (Meyer-Oehme 1965), Pakistan, Nepal (Agrawal & Chakraborty 1971), Sri Lanka, Bangladesh (Hutton 1872), and Myanmar.

Remarks: Ellerman & Morrison-Scott (1951) have recognised two subspecies of the Greater Yellow Bat, viz. S. h. heathi and S. h. belangeri (I. Geoffroy, 1834), for the Indian populations. Siddiqi (1961) has synonymised belangeri with the nominate subspecies.

Order PRIMATES

Primates, evolved from arboreal ancestors, hence retain this characteristic in prehensile hands and feet, the thumb and big toe opposable to other digits; each digits tipped with a flat nail. Other characters include an increase in the size and complexity of brain; complete bony rim around orbits; reduced dentition; complete set of collar bones; well developed brain.
Three families of the order Primates occur in Manipur.

**Key to the families of the Order PRIMATES**

1. Fore limbs much longer than hind, tail absent
   ........................................................................................................ HYLOBATIDAE
   — Fore limbs not longer than hind, tail present
   ........................................................................................................ 2

2. All digits with nails... CERCOPITHECIDAE
   — Second digit of hind limb with small claw
   ...................................................................................................... LORISIDAE

**Family LORISIDAE**

One genus of the family Loricidae occurs in Manipur.

*Genus Nycticebus* E. Geoffroy, 1812

One species and subspecies of the genus *Nycticebus* occurs in Manipur.

20. *Nycticebus coucang bengalensis* (Lacépède)


*Common name*: Slow Loris (Eng.).

*Material examined*: Nil.

*Measurements*: None.

*Diagnosis*: About the size of a half-grown cat; with short ears and stumpy tail almost hidden in thick fur; fur varies in colour; brown ring round the eyes; brown streak on crown and back.

*Distribution*: India: Manipur: Chandel district; Arunachal Pradesh; Assam; Meghalaya; Mizoram; Nagaland.

*Elsewhere*: Bangladesh, Myanmar and Thailand.

*Remarks*: Information regarding occurrence of slow Loris at Chandel district was collected from local inhabitants during recent survey trips there. Ramakantha (1991) reported its occurrence in Manipur but did not mention any locality.

**Family CERCOPITHECIDAE**

In Manipur, the family Cercopithecidae is represented by two genera.

**Key to the genera of the family CERCOPITHECIDAE**

— Cheek-pouches present; tail generally smaller than head and body; face reddish
   .......................... *Macaca*

— Cheek-pouches absent; tail always longer than head and body; face blackish
   .......................... *Presbytis*

**Genus Macaca* Lacépède, 1799

Three species of the genus *Macaca* occur in Manipur.

**Key to the species of the genus Macaca**

1. Tail inconspicuous, reduced to a stump and seldom longer than 30.0 mm... *M. arctoides*
   — Tail conspicuous, generally about half the length of head and body
   .......................... 2

2. Hindquarter of the body brighter (of orange-red hue) than the forequarter; buttocks naked around ischial callosities... *Macaca mulatta*
   — Hindquarter of body not more brightly coloured than the forequarter; buttocks clad up to the edge of callosities
   .......................... *Macaca assamensis*

21. *Macaca mulatta mulatta* (Zimmermann)


*Common name*: Rhesus Macaque (Eng.).

*Material examined*: Imphal district: 1♀, 6 km N of Imphal on Dimapur Road, coll. M. L. Roonwal, 6.xi.1945.

*Measurements*: External: 1♀: HB 460; Tl 225; Hf 140; E 35.
Diagnosis: Medium-sized, with a short tail (about half of the head and body length). Face light pink. Crown hairs grow back from brows. Upper back olive in colour; loins, rump and base of tail of orange-red hue, face flesh-coloured.

Distribution: India: Manipur: Imphal district (Roonwal 1950); Andhra Pradesh; Arunachal Pradesh; Assam; Bihar; Delhi; Gujarat; Himachal Pradesh; Jammu & Kashmir; Madhya Pradesh; Meghalaya; Orissa; Punjab; Rajasthan; Sikkim; Tripura (Agarwal & Bhattacharyya 1977), Uttar Pradesh; West Bengal.

Elsewhere: Bhutan, Bangladesh, Myanmar, China, Thailand and Vietnam.

Remarks: The Rhesus Macaque, though common in other parts of India, is rather uncommon in Manipur as noticed during recent surveys.

Macaca assamensis (M’clelland)

The nominate subspecies of Macaca assamensis occurs in Manipur.

22. Macaca assamensis assamensis (M’Clelland)


Common name: Assamese Macaque (Eng.).

Material examined: Assamese Macaque (Eng.).

Measurements: External: 1 sub ad. α, HB 410; Tl 201; Hf 137; E 38.

Diagnosis: Almost like the Rhesus Macaque, but distinguished by absence of orange-red hue on loins and rump.

Distribution: India: Manipur: Imphal district (Roonwal 1950); Arunachal Pradesh; Assam; Meghalaya; Nagaland.

Elsewhere: Bangladesh, Myanmar, east to Vietnam, Southern China.

Remarks: During recent surveys a troop of about sixty monkeys of this species was observed around a temple near Imphal town.

23. Macaca arctoides (I. Geoffroy)


Common name: Stump-tailed Macaque (Eng.).

Material examined: None.

Measurements: Nil.

Diagnosis: Tail stump-like, almost naked, not more than 50 mm in length. Colour of body dark brown, with bare red face.

Distribution: India: Manipur: Chandel district; Arunachal Pradesh; Assam; Meghalaya.

Elsewhere: Myanmar, southern China, erstwhile Indochina, northern Malay Peninsula.

Remarks: A troop of five Stump-tailed Macaques were seen near Moreh on the Indo-Burma border. However, it is rare in Manipur.

Genus Presbytis Eschscholtz, 1821

Only the nominate subspecies of Presbytis pileatus occurs in Manipur.

Presbytis pileatus (Blyth)


Common name: Capped Monkey (Eng.).

Material examined: Senapati district: 1α, Kalanaga Barcil Range, coll. ZSI party, ...ii.1936

Measurements: Nil.

Diagnosis: A slender-build monkey, with a crown of erect, long hairs, directed backwards from forehead; colour dark grey on back and limbs, yellowish white on cheeks and underparts.

Distribution: India: Manipur: Senapati district; Assam; Meghalaya; Nagaland.

Elsewhere: Bangladesh.

Remarks: The Capped Monkey is very rare in Manipur.
Family  **HYLOBATIDAE**

The family Hylobatidae consists of the lone genus *Hylobates*. It is the only ape found in India.

**Genus Hylobates** Illiger, 1811

Only one species of the genus *Hylobates* occurs in Manipur.

**25. Hylobates hoolock** (Harlan)


*Common name*: Hoolock Gibbon (Eng.).

*Material examined*: Senapati district: 1♂, Kalanaga Barcil Range, coll. ZSI party, −.ii.1936.

*Measurements*: Nil.

*Diagnosis*: Body devoid of a tail; head and body length about 600 mm; arms much longer than the legs; males black, adult females yellowish-grey; eye-brows white.

*Distribution*: India: Manipur; Assam; Meghalaya; Tripura.

*Elsewhere*: Bangladesh, Myanmar and China.

*Remarks*: The Hoolock Gibbon is not common in Manipur.

Order  **PHOLIDOTA**

Elongated, tapering body; dorsal area of head, body and tail covered with large overlapping scales; ventral surface covered with coarse, bristly hairs; limbs short; toes with powerful claws; jaws devoid of teeth; vermiform tongue, highly protrusible.

Order Pholidota consists of a single family Manidae.

**Family MANIDAE**

The family Manidae consists of only one genus, *Manis*.

**Genus Manis** Linnaeus, 1758

One species and subspecies of the genus *Manis* occurs in Manipur.

**26. Manis pentadactyla aurita** Hodgson


*Common name*: Chinese Pangolin (Eng.).

*Material examined*: None.

*Measurements*: Nil.

*Diagnosis*: Body covered with 15-18 rows of longitudinal overlapping scales; dark brown in colour; bare skin of ventral surface flesh-coloured.

*Distribution*: India: Manipur; Chandel district, Senapati district; Assam; Meghalaya; Nagaland.

*Elsewhere*: Nepal, Myanmar and southern China.

*Remarks*: The Chinese Pangolin was observed at night in the hilly jungles of Chandel and Turibari during recent surveys.

Order  **CARNIVORA**

Six small, equal-sized incisors; a pair of large conical canines; last upper premolar and first lower molar, having sharp edged lobes, developed into carnassial (flesh-cutting) teeth.

Six families of the Order Carnivora occur in Manipur.

**Key to the families of the order CARNIVORA**

1. Bulla much dilated, rounded, but not divided into chambers by a septum .......... **CANIDAE**
   — Bulla much dilated, rounded, but divided into chambers by a septum .................. 2
   — Bulla not rounded but inflated, and not divided by a septum .......................... 4

2. 3-4 teeth in upper molar series of each jaw; toes 5-4; claws curved, sharp and retractile; head short and somewhat roundish, with shortened muzzle ......................... **FELIDAE**
   — 6 teeth in molar series of each jaw (except *Prionodon*); toes usually 5-5; claws variable; head elongated ............................. 3

3. Ears moderate in size, with well-developed
bursa; auditory bulla oval or subconical; no bony tube to auditory orifice; claws curved and more or less retractile; pre-scrotal gland generally present .................. VIVERRIDAE

— Ears small and rounded, with vestigeal bursa; auditory bulla somewhat pear-shaped; a well-developed bony tube to the auditory orifice; claws lengthened, exserted, non-retractile; pre-scrotal gland absent .......... HERPESTIDAE

4. True molars 1-1 in upper jaw, 2-2 in lower jaw; ........................................ MUSTELIDAE

— True molars 2-2 in upper jaw, 3-3 in lower jaw .................................................. URSIDAE

Family CANIDAE

Family Canidae is represented by two genera and two species in Manipur.

Key to the genera and species of the family CANIDAE

1. A frontal sinus present; post-orbital process smooth and convex above; tail less than half the length of head and body ...................... Canis (C. aureus)

— No frontal sinus; postorbital process concave above; tail more than one-half the length of head and body ............................................................................. Vulpes (V. bengalensis)

Genus Canis Linnaeus, 1758

One species of the genus Canis occurs in Manipur and is represented by one subspecies.

27. Canis aureus indicus Hodgson


Common name: Asiatic Jackal (Eng.).

Material examined: Imphal district: 1♀, Imphal Valley (North of Imphal on Dimapur Road); 14.xi.1945; 1♀, Imphal Valley (south-east of Imphal, c 914 m), 4.xii.1945; coll. M. L. Roonwal.

Measurements: External: 2♀: HB 675, 720; Tl 175, 188; Hf 142, 150; E 73, 74.

Diagnosis: Smaller than wolf; lacks the arching brows and elevated forehead. Dorsal colour typically a mixture of black and white, washed with buff at the shoulders, ears and legs.

Distribution: India: Manipur: Imphal district (Roonwal 1950), Ukhrul district, Chandel district; Arunachal Pradesh; Assam; Bihar; Meghalaya; Nagaland; Sikkim; Tripura; West Bengal.

Elsewhere: Bhutan, Myanmar and Thailand.

Remarks: Asiatic Jackals were seen at Ukhrul and Chandel districts during recent survey trips.

Genus Vulpes Oken, 1816

One species of the genus Vulpes occurs in Manipur.

28. Vulpes bengalensis (Shaw)


Common name: Bengal Fox (Eng.).

Material examined: Nil.

Measurements: None.

Diagnosis: A grey-coloured, slender-limbed animal; back of ears sandy brown; tail-tip black.

Distribution: India: Manipur: Chandel district, Imphal district, Senapati district; occur throughout India.

Elsewhere: Pakistan, Nepal and Bangladesh.

Remarks: The Bengal Fox is not very common in Manipur. One specimen each was, however, seen at Chandel, Turibari and Jiribam, during recent survey trips.

Family FELIDAE

One genus of the family Felidae namely Felis occurs in Manipur.

Genus Felis Linnaeus, 1758

Two species of the genus Felis occur in Manipur.

Key to the species of the genus Felis

— Outer chamber of bulla relatively large,
partition arising from some distance of orifice; tip of postorbital process about the middle of skull ................................................... *F. chaus*

— Outer chamber of bulla small, partition arising close to orifice; tip of postorbital process in front of the middle of skull ... *F. bengalensis*

29. *Felis chaus* Güldenstaedt


*Common name*: Jungle Cat (Eng.).

*Material examined*: Senapati district: 1♂, 1♀, Imphal valley, c 1067 m, 30 Km N of Imphal, coll. M. L. Roonwal, 29,30.xi.1945. Imphal district: 1♂, Imphal Valley, c 1067 m, 16 km SE of Imphal on Imphal-Palel Road, Coll. M. L. Roonwal, 4.xii.1945.

*Measurements*: External: 1♂: HB 655; TI 215; HF 147; E 73. 1♀: HB 615; TI 245; HF 140; E 75.

*Diagnosis*: Medium-sized, head and body 60-75 cm in length; tail shorter, tipped black; general colour light reddish-grey, unspotted except on lower flanks and elbow; black horizontal stripes present on inner side of fore-legs; ears reddish chestnut with rudimentary hair tuft.

*Distribution*: India: Manipur: Senapati district, Imphal district (Roonwal 1950); Andhra Pradesh; Arunachal Pradesh; Assam; Maharasthra; Meghalaya; Nagaland; Orissa; Karnataka; Kerala; Tamil Nadu; Tripura; West Bengal.

*Elsewhere*: Bangladesh, Myanmar, Thailand, Yunnan and erstwhile Indo-China.

*Remarks*: Not a single specimen could be seen during recent survey trips.

30. *Felis bengalensis bengalensis* Kerr


*Common name*: Leopard Cat (Eng.).

*Material examined*: Imphal district: 1♂, Kangla Tongbi, c 1068 m, 17 km N of Imphal on Dimapur road, coll. M. L. Roonwal, 28.xi.1945.

*Measurements*: External: 1♂: HB 465; TI 250; HF 106; E 46.

*Diagnosis*: Colour variable, pelage ornamented with blackish brown spots; back of ears black, with a whitish round spot in the centre; four longitudinal black bane run from forehead to neck, break up into short bands or elongated spots on shoulders; tail spotted above.

*Distribution*: India: Manipur: Imphal district (Roonwal 1950); Andhra Pradesh; Arunachal Pradesh; Assam; Maharasthra; Meghalaya; Nagaland; Orissa; Karnataka; Kerala; Tamil Nadu; Tripura; West Bengal.

*Elsewhere*: Bangladesh, Myanmar, Thailand, Yunnan and erstwhile Indo-China.

*Remarks*: Not a single specimen could be seen during recent survey trips.

Family HERPESTIDAE

The family Herpestidae is represented, in Manipur, by a single genus *Herpestes*.

Genus *Herpestes* Illiger, 1811

The genus *Herpestes* is characterised by its elongated body and short, rounded ears, mostly concealed by hairs; contour hairs banded with pale and darker annulations, giving a speckled appearance; post-dental part of palate extending to back side halfway over the mesopterygoid fossa.

Two species of the genus *Herpestes* occur in Manipur.

**Key to the species of the genus Herpestes**

— A conspicuous white stripe present on the sides of the neck ......................... *H. urva*

— Absence of any stripe on sides of neck; muzzle dark brown ......................... *H. auropunctatus*

31. *Herpestes urva* (Hodgson)


*Common name*: Crab-eating Mongoose (Eng.).

*Material examined*: Senapati district: 1♀, Modbung Village (c 1067 m), 26 km N of Imphal on Dimapur Road, coll. M. L. Roonwal, 1.xii.1945.
Measurements: External: 1♀: HB 400; Tl 258; HF 90; E 25.

Diagnosis: A white stripe present on each side of the neck running up to shoulders; fur, coarse, ragged, dusky iron-grey in colour; under fur woolly, dark brown at base, brownish-yellow at tips.

Distribution: India: Manipur: Senapati district (Roonwal 1950); Arunachal Pradesh; Assam; Meghalaya; Nagaland; Tripura; West Bengal.

Elsewhere: Bangladesh, Myanmar, Thailand, China, Taiwan and Vietnam.

Remarks: Crab-eating Mongoose is not common at present and not a single specimen was seen during recent survey trips there.

32. Herpestes auropunctatus (Hodgson)


Common name: Small Indian Mongoose (Eng.).

Material examined: Nil.

Measurements: None.

Diagnosis: Sleek in appearance; about 25 cm in head and body length; tail shorter than head and body; fur, soft, silky, olive-brown to golden in colour.

Distribution: India: Manipur: Senapati district, Chandel district, Churachandpur district, Imphal district, Bishenpur district; Assam; Bihar; Gujarat; Madhya Pradesh; Meghalaya; Orissa; Sikkim; Uttar Pradesh; West Bengal.

Elsewhere: Nepal, Bhutan and Bangladesh.

Remarks: Small Indian Mongoose appears to be very common and was observed at Chandel, Turibari, Churachandpur, Toubal and Jiribam during recent survey trips.

Family MUSTELIDAE

Key to the genera of the family MUSTELIDAE

1. Body long and slender; limbs short; ears small; claws short, sharp and partially retractile; metatarsal pads absent ....................................................... 2
   - Body stout, bear-like; feet broad; claws strong, long and non-retractile; metatarsal pads present .............................................................................. 3

2. Muzzle, limbs and tail longer; body less elongated and cylindrical; ears larger; total 38 teeth in upper and lower jaws ........... Martes
   - Muzzle, limbs and tail shorter; body more elongated and cylindrical; ears smaller; total 34-36 teeth in upper and lower jaws .......... ........................................................................ Mustela

3. Smaller animals; head and body under 400 mm; distinctive black and white facial marks; ears with bursa; feet narrower; plantar pads strongly arched ........................................... Melogale
   - Larger animals; head and body over 550 mm; poorly marked facial marks; ears without bursa; feet broader and plantigrade; plantar pads not arched ................................................. Arctonyx

Genus Martes Pinel, 1792

The genus Martes is represented by one species and subspecies in Manipur.

33. Martes flavigula flavigula (Boddaert)


Common name: Yellow-throated Marten (Eng.).

Material examined: Nil.

Measurements: None.

Diagnosis: Head and body length 40-65 cm, with equally long bushy tail; colour variegated; the crown, nape and extremities black; throat and cheeks white; chest yellow; rest of the coat light brown.

Distribution: India: Manipur: Chandel district, Imphal district; Arunachal Pradesh; Assam; Himachal Pradesh; Jammu & Kashmir;
Meghalaya; Nagaland; Sikkim; Uttar Pradesh; West Bengal.

Elsewhere: Afghanistan, Pakistan, Nepal, Bhutan, Myanmar and China.

Remarks: Yellow-throated Marten was seen at Chandel and Uchathol during survey trips.

Genus **Mustela** Linnaeus, 1758

One species of the genus *Mustela* occurs in Manipur.

34. *Mustela kathiah* Hodgson


Common name: Yellow-bellied Weasel (Eng.).

Material examined: Nil.

Measurements: None.

Diagnosis: Small, about 280 mm in head and body length. Coat dark chocolate-brown above, and rich yellow below. Tail not bushy.

Distribution: India: Manipur: Senapati district; Arunachal Pradesh; Assam; Meghalaya; Nagaland; Sikkim; Uttar Pradesh; West Bengal.

Elsewhere: Bhutan, Myanmar and China.

Remarks: Yellow-bellied Weasel is not common in Manipur. Two specimens were seen during recent survey trips there, one at Senapati (on Dimapur-Imphal Road) and the other near None (on Silchar-Imphal Road).

Genus **Melogale** I. Geoffroy, 1831

One species and subspecies of the genus *Melogale* occurs in Manipur.

35. *Melogale moschata millsi* (Thomas)


Common name: Chinese Ferret-Badger (Eng.).

Material examined: Nil.

Measurements: None.

Diagnosis: Coat deep purplish grey to brown; light facial markings and under side yellowish or buffy-white; narrow whitish stripe runs from the crown of the head down the middle of the back to belly; molar teeth small and narrow-crowned.

Distribution: India: Manipur: Chandel district (Ramakantha 1992); Nagaland.

Elsewhere: Northern Myanmar.

Remarks: During recent survey trips, a specimen of the species was found crossing the road while returning back to Chandel from Moreh at night.

Genus **Arctonyx** F. Cuvier, 1825

One species and subspecies of the genus *Arctonyx* occurs in Manipur.

36. *Arctonyx collaris collaris* F. Cuvier


Common name: Hog-Badger (Eng.).

Material examined: Nil.

Measurements: None.

Diagnosis: Short-tailed animal; head and body length 55-70 cm; squat bear-like body; snout long, like that of a pig; legs stumpy, claws powerful; coat coarse, grey, and rough; head with longitudinal black streaks.

Distribution: India: Manipur: Chandel district, Imphal district; Arunachal Pradesh; Assam; Meghalaya; Nagaland; Sikkim; West Bengal.

Elsewhere: Nepal and Bangladesh.

Remarks: Two specimens of this species could be seen during the recent surveys, one at Chandel and the other at Jiribam.

Family **URSIDAE**

One genus of the family Ursidae occurs in Manipur.

Genus **Selenarctos** Heude, 1901

The genus *Selenarctos* is represented in Manipur by one species.
37. *Selenarctos thibetanus* (G. Guvier)


*Common name:* Asiatic Black Bear (Eng.);
*Material examined:* Nil.
*Measurements:* None.

*Diagnosis:* Large-sized bear, 140-190 cm in head and body length; coat short, smooth and black; claws black; a white or buff coloured V-shaped breast patch present.

*Distribution:* India: Manipur: Ukhrul district (Ramakantha 1991), Churachandpur district (Ramakantha 1991); Jammu & Kashmir; Meghalaya; Mizoram; Sikkim; Uttar Pradesh; West Bengal.

*Elsewhere:* Pakistan and Bangladesh.

**Family VIVERRIDAE**

Four genera of the family Viverridae occur in Manipur.

**Key to the genera of the family VIVERRIDAE**

1. Feet terrestrial and digitigrade; carpal pad single; metacarpal pads absent; scent glands opening into highly specialised pouches .... 2
   — Feet scansorial and semi-plantigrade; carpal and metacarpal pads double; glandular pouches less specialised .................................................. 3

2. Anterior edge of ears widely separated due to broad forehead; a dorsal crest of hairs extends posteriorly at least from shoulders ... *Viverra*
   — Anterior edge of ears set close together due to narrow forehead; no dorsal crest of long hairs .......................................................... *Viverricula*

3. A definite pattern of dorsal stripes and lateral spots present at least in new coat.................
   .................................................................................. *Paradoxurus*
   — No stripes or spots present.................. *Paguma*

**Genus Viverra** Linnaeus, 1758

One species and subspecies of the genus *Viverra* occurs in Manipur.

38. *Viverra zibetha zibetha* Linnaeus


*Common name:* Large Indian Civet (Eng.);
*Material examined:* Nil.
*Measurements:* None.

*Diagnosis:* Markings of body indistinct and cloudy; complete dark and light rings on tail; crest of long, black, erectile hairs present on the back; anterior upper molar distinctly triangular.

*Distribution:* India: Manipur: Chandel district; Arunchal Pradesh; Assam; Bihar; Madhya Pradesh; Meghalaya; Mizoram; Nagaland; Sikkim; Tripura; West Bengal.

*Elsewhere:* Bangladesh, Myanmar, Thailand, Vietnam, Malaysia and Singapore.

*Remarks:* A single specimen was seen during the night on way to Chandel from Moreh.

**Genus Viverricula** Hodgson, 1838

One species and subspecies of the genus *Viverricula* occurs in Manipur.

39. *Viverricula indica indica* (Desmarest)


*Common name:* Small Indian Civet (Eng.);
*Measurement:* External 19: HB 483; TI 315; Hf 84; E 36.

*Diagnosis:* Body pattern consists of small spots on the fore-quarters, larger spots tending to run into longitudinal lines on the flanks, and form six to eight stripes down the back; tail ringed with black and white; muzzle short and weak; no dorsal crest of long hairs on back; claws unprotected by sheaths of skin.

*Distribution:* India: Manipur: Imphal district (Roonwal 1950); Andra Pradesh; Arunchal Pradesh; Assam; Bihar; Goa; Gujarat; Himachal Pradesh; Jammu & Kashmir; Karnataka; Kerala;
Madhya Pradesh; Maharashtra; Meghalaya; Orissa; Sikkim; Tamil Nadu; Tripura; Uttar Pradesh; West Bengal.

Elsewhere: Sri Lanka, Bhutan and Bangladesh.

Remarks: A single specimen was seen at Uchathol during the recent survey.

Genus *Paradoxurus* Cuvier, 1821

One species of the genus *Paradoxurus* occurs in Manipur.


Common name: Common Palm Civet, Toddy Cat (Eng.).

Material examined: Nil.

Measurements: None.

Diagnosis: About 55 cm in head and body length, with tail nearly as long; fur long, coarse and ragged, an indistinct mixture of black and grey; muzzle and extremities blackish; young often spotted or striped.

Distribution: India: Manipur: Imphal district; widely distributed throughout India.

Elsewhere: Sri Lanka, China, Malaysia, Indonesia and Philippines.

Remarks: A single specimen was seen at Uchathol during recent survey trips to that area.

Genus *Paguma* Gray, 1831

One species and subspecies of the genus *Paguma* occurs in Manipur.


Common name: Masked Palm Civet (Eng.).

Material examined: Nil.

Measurements: None.

Diagnosis: Absence of spots or stripes on body and presence of white whiskers distinguishes it from other Indian civets. Coat colour grey to tawny; underparts white. A white band on forehead, nose, and beneath ears; a blotch below eyes.

Distribution: India: Manipur: Chandel district; Assam; Meghalaya; Nagaland; Sikkim.

Elsewhere: Myanmar.

Remarks: A single specimen was seen at Chandel during recent survey trip to that area.

Order ARTIODACTYLA

Animals belonging to this order are even-toed; axis of foot passes between third and fourth toes; toes enclosed in horny hooves of approximately equal size and gives the appearance of a single hoof, split down in the middle.

The order is represented by two families in Manipur.

Key to the families of the Order ARTIODACTYLA

— Upper incisors present; animals devoid of horns and antlers ........................................ SUIDAE
— Uppers incisors absent; antlers present, at least in males ....................................... CERVIDAE

Family SUIDAE

The family Suidae is represented in India by a single genus, *Sus* Linnaeus, 1758; and by a single species, *Sus scrofa* Linnaeus, 1758 (subspecies *S. scrofa cristatus* Wagner) in Manipur.


Common name: Wild Boar (Eng.).

Material examined: Nil.

Measurements: None.

Diagnosis: Coat coarse, a crest of black bristle present from nape to back; tail long, thin, fringed at tip, reaching nearly to hocks; coat in young striped dark brown lengthwise, with buff.
Distribution: India: Manipur: Chandel district; Senapati district; Imphal district; throughout India in forested tracts.


Remarks: Wild Boar is now rare in Manipur. The main reason of its decline is poaching for flesh.

Family CERVIDAE

Two genera of the family Cervidae occur in Manipur.

Key to the genera of the family CERVIDAE

Upper canine tusk-like in males; antlers short, consisting of a short brow-tine and an unbranched beam ......................... Muntiacus

Upper canine, when present, not tusk-like; antlers long and branched .................. Cervus

Genus Muntiacus Rafinesque, 1815

One species and subspecies of the genus Muntiacus occurs in Manipur.


Common name: Barking Deer (Eng.).

Material examined: Nil.

Measurements: None.

Diagnosis: Antlers small, consisting of a short brow-tine and an unbranched beam, placed on hairy bony pedicel, which extend down on either side of the face as bony ridges; coat deep chestnut in colour, darker on the back, paler below, with black streaks along the face-ridges; throat, groin, and under-side of tail white.

Distribution: India: Manipur: Imphal district; Arunachal Pradesh; Assam; Bihar; Meghalaya; Sikkim; Tripura; Uttar Pradesh; West Bengal.

Elsewhere: Bhutan, Bangladesh, northern Myanmar, Yunan, northern Vietnam.

Remarks: Roonwal (1950) observed Barking Deer to be very common at Kanglatongbi village near Imphal during 1945. Now a days it is very rare in Manipur probably due to poaching for flesh.

Genus Cervus Linnaeus, 1758

One species and subspecies of the genus Cervus occurs in Manipur.


Common name: Thamin or Brow-antlered Deer (Eng.); Sangnai, Sangai, Sanghai (Manipuri).

Material examined: Nil.

Measurements: None.

Diagnosis: A long muzzled deer (head over 90 cm); coat coarse and sparse, shaggy in winter; its colour varies seasonally, dark brown in winter, yellowish brown in summer; tail with black mark along the top; the antlers looks like a letter ‘C’ tip of brow-tine to the point of beam is in one continuous curve; number of terminal tines varies from two to ten; fawns are spotted.

Distribution: India: Manipur: Bishenpur district.

Remarks: The distribution of this beautiful deer, in Manipur, is restricted to Keibul Lamjao National Park where they are being conserved. During recent survey trip there a group of one stag and five females were seen grazing.

Order RODENTIA

Rodents are worldwide in distribution. They are characterised by the presence of a pair of chiselshaped incisors in each jaw and a distinct diastema between incisors and cheek-teeth. In Manipur they are represented by four families.

Key to the families of the Order RODENTIA

1. Fur modified into quills or long stiff hairs; Cheekteeth 4/4 in number ... HYSTRICIDAE
— Fur not modified into quills ...................... 2
2. Skull with distinct postorbital process; premolars two on each side in upper jaw, except in the genus *Ratufa*, only one in the lower ........................................ SCIURIDAE
— Skull with no postorbital process; premolars absent ........................................ 3
3. Slender in form; tail long, scaly and clothed with short hairs ...................... MURIDAE
— Form heavy, cylindrical, mole-like; tail short or rudimentary, almost naked and not scaly; limbs short .................. RHIZOMYIDAE

Family SCIURIDAE

Seven genera of the family Sciuridae occur in Manipur.

Key to the genera of the family SCIURIDAE

1. Flying membrane present on both sides of the body ........................................ 2
— Flying membrane absent ...................................... 4
2. Surface-pattern of lower molar teeth simple and possesses a central depression ........................................ *Hylopetes*
— Surface-pattern of lower molar teeth excessively wrinkled, and lacks a central depression ........................................ 3
3. Interfemoral membrane absent; ear-tufts present; size small, less than 200 mm in head and body length ........................................ *Belomys*
— Interfemoral membrane present; ear-tufts absent; size large, more than 300 mm in head and body length ..................... *Petaurista*
4. Size large, over 280 mm in head and body length; maxillary teeth 4 in number .. *Ratufa*
— Size small, less than 280 mm in head and body length; maxillary teeth 5 in number .. 5
5. Dorsal surface of body prominently striped; stripes more than one in number; median stripes of body black ............................ *Tamiops*
— Dorsal surface of body unstriped or with a faint black stripe ...................................... 6

6. Length of nasal exceeds interorbital width of skull ................................. *Dremomys*
— Length of nasal does not exceed interorbital width of skull .......................... *Callosciurus*

Genus *Belomys* Thomas, 1905

One species and subspecies of the genus *Belomys* occurs in Manipur.


*Common name*: Hairy-footed Flying Squirrel (Eng.).

*Material examined*: Nil.

*Measurements*: None.

*Diagnosis*: Dorsal colour dark brown to reddish brown, grizzled, with profuse white tipped hairs; underside, including the chest, white; tuft of long hairs at base of each ear-conch; upper cheek-tooth-row 9 mm or less.


*Elsewhere*: Myanmar, and erstwhile northern Indo-China.

*Remarks*: During recent survey trips a specimen of this species was seen at Turibari, Senapati district, during night when it managed to avoid the mist nets placed for collection of bats.

Genus *Petaurista* Link, 1795

One species and subspecies of the genus *Petaurista* occurs in Manipur.


*Common name*: Red-and-White Flying Squirrel (Eng.).
**Material examined**: Tamenglong district: 1♂, Tamenglong, Killed by local tribals.

**Measurements**: None.

**Diagnosis**: Size large, hind foot over 80 mm; shoulder patch very indistinct; the head including forehead, white, strongly contrasted with the back; ears white.

**Distribution**: India: Manipur: Bishenpur district (Ellerman 1961), Tamenglong district, Chandel district; Assam; Meghalaya; Nagaland.

**Elsewhere**: Myanmar.

**Remarks**: A number of skins of Red-and-white Flying Squirrel were found kept inside the houses of local tribals as decorative at Tamenglong and Chandel after the flesh was consumed as food.

**Genus** *Hylopetes* Thomas, 1908

Two species and subspecies of the genus *Hylopetes* occur in Manipur.

**Key to the species and subspecies of the genus *Hylopetes***

- Larger species; occipitonasal length 42.5 mm or more, hind foot 36 mm or more............... ..................*H. alboniger alboniger*

- Smaller species; occipitonasal length less than 42 mm; hind-foot less than 34 mm............. ..................*H. phayrei phayrei*

47. *Hylopetes phayrei phayrei* (Blyth)


**Common name**: Phayre’s Flying Squirrel (Eng.).

**Material examined**: Nil.

**Measurements**: None.

**Diagnosis**: As given above in key.


**Elsewhere**: Thailand, Myanmar.

**Remarks**: Not a single specimen was seen during recent survey trips. Though ‘Manipur’ has been shown in the range of distribution of this species by earlier workers, it’s occurrence in Manipur at present is doubtful.

48. *Hylopetes alboniger alboniger* (Hodgson)


**Common name**: Parti-coloured Flying Squirrel (Eng.).

**Material examined**: Senapati district: 1 Juv. ♂, Modbung (c 1219 m), c 26 km N of Imphal of Dimapur Road, coll. M. L. Roonwal, 10.xii.1945. Ukhrul district : 1 Adult ?, Ukhrul (c 900 m), coll. T. Bhagirath.

**Measurements**: External: 1 Juv ♂ : lIB 196; TI 178; Hf 45; E 32. 1 Adult ? : HB 240.0; TI 390.0; Hf 140.0; E 25.0. Cranial: 1 Adult ? : On 49.6; n 14.0; p 24.5; mtr 10.8; b 9.2; iw 10.3.

**Diagnosis**: Dorsal colour greyish to reddish brown; white or light patches present in the region of shoulder; undersurface greyish; throat and chest tends to be whitish. Occipitonasal length mostly over 45 mm.

**Distribution**: India: Manipur: Senapati district (Roonwal 1950), Ukhrul district; Arunachal Pradesh (Saha 1985); Meghalaya; Nagaland; West Bengal.

**Elsewhere**: Nepal, Bangladesh, Myanmar and China.

**Genus** *Callosciurus* Gray, 1867

Two species and subspecies of the genus *Callosciurus* occur in Manipur.

**Key to the species of the genus *Callosciurus***

- Frontal width usually approximates to one-third of the occipitonasal length or less ......... ..................*C. pygerythrus blythi*

- Frontal width clearly more than one-third of the occipitonasal length .................................*C. erythraeus erythrogaster*

49. *Callosciurus erythraeus erythrogaster* (Blyth)

**Common name**: Pallas’s Squirrel (Eng.).

**Material examined**: Imphal district: 1♀, Kanglatongbi, c 1068 m, 17 km N of Imphal on Dimapur Road, coll. M.L. Roonwal, 24.ix.1945. Tamenglong district: 1♂, 1♀, Luanglong Khulen (c 991 m), c 100 km W of Imphal on Silchar Road, ZSI Naga Hill & Manipur Survey, 10.ii.1936.

**Measurements**: External: 1♀: HB 236.0; Tl 204.0; Hf 53.0; E 23.0. 1♂: HB 207.0; Tl 274; Hf 55; E 21. Cranial: 1♂: on 54.9; n 16.8; p 26; iw 18.2; orb 18.0; b 9.8.

**Diagnosis**: As given above in key.

**Distribution**: India: Manipur: Imphal district (Roonwal 1950), Senapati district, Chandel district, Tamenglong district; Assam; Meghalaya; Mizoram; Nagaland.

**Elsewhere**: Bangladesh and Myanmar.

**Remarks**: Specimens of Pallas’s Squirrel were seen at Noney, Tamenglong, Moreh and Chandel during recent survey trips there.


**Common name**: Irrawaddy Squirrel (Eng.).

**Material examined**: Nil.

**Measurements**: None.

**Diagnosis**: As given in Key.

**Distribution**: India: Manipur: Imphal district (Roonwal 1950), Senapati district, Chandel district, Tamenglong district; Assam; Meghalaya; Mizoram; Nagaland.

**Elsewhere**: Bangladesh and Myanmar.

**Remarks**: During recent survey trips specimens of Irrawaddy Squirrel were seen at Chandel, Uchathol and Turibari.

Genus *Tamiops* J. Allen, 1906

One species and subspecies of the genus *Tamiops* occurs in Manipur.


**Common name**: Himalayan Striped Squirrel (Eng.).

**Material examined**: Temenglong district: 1♂, Luanglong Khuten (c 991 m), c 100 km W of Imphal on Silchar Road, coll. ZSI Naga hill and Manipur Survey, 10.ii.1936.

**Measurements**: None.

**Diagnosis**: Dorsal surface of body varies from greyish to brownish and striped, median stripe being black; ventral surface greyish white; ear tufts black, with conspicuous white tip.

**Distribution**: India: Manipur: Imphal district, Chandel district, Tamenglong district, Ukhrul district; Arunachal Pradesh; Assam; Meghalaya; Mizoram; Nagaland; Sikkim.

**Elsewhere**: Nepal, Bhutan, and Myanmar.

**Remarks**: Specimens were seen at Uchathol, Chandel, Tamenglong and Ukhrul during recent survey trips to that area.

Genus *Dremomys* Heude, 1898

One species and subspecies of the genus *Dremomys* occurs in Manipur.


**Common name**: Orange-bellied Himalayan Squirrel, Macmillan’s Squirrel (Eng.).

**Material examined**: Imphal district: 8♂, 3♀, 1 unsexed, Kanglatongbi (c 1068 m), c 20 km N of Imphal on Dimapur Road, coll. M.L. Roonwal, 20.x-18.xii.1945. Tamenglong district: 1♂, Luanglong khuten (c 991 m), c 100 km w of Imphal on Silchar Road, coll. ZSI Naga hill & Manipur Survey, 10.ii.1936.


**Diagnosis**: More or less like the Irrawaddy Squirrel in appearance, except that a mid-dorsal black stripe occasionally present; belly washed with buff or yellowish; ear patches rufous.
Distribution: India: Manipur: Imphal district, Senapati district, Tamenglong district; Assam; Meghalaya; Nagaland; Tripura.

Elsewhere: Myanmar.

Remarks: Though not common, two specimens of Orange-bellied Himalayan Squirrel were seen at Turibari.

Genus *Ratufa* Gray, 1867

One species and subspecies of the genus *Ratufa* occurs in Manipur.


Common name: Malayan Giant Squirrel (Eng.).

Material examined: Tamenglong district: 2♀, Nanglea Atrow (c 991 m), c 100 km W of Imphal on Silchar Road, coll. ZSI Naga hill and Manipur Survey, 10,11.i.1936.

Measurements: None.

Diagnosis: A large-sized diurnal squirrel; dorsal colour varies from brown to black; venter buff.

Distribution: India: Manipur: Tamenglong district; Arunachal Pradesh; Assam; Meghalaya; Nagaland; Sikkim; Tripura; West Bengal.

Elsewhere: Bhutan, Myanmar and China.

Remarks: Not a single specimen of Malayan Giant Squirrel was seen during recent survey trips there.

Family HYSTRICIDAE

Fur more or less modified into long spines or quills; angular portion of mandible arises from the bony socket of lower incisor.

Two genera, namely, *Hystrix* and *Atherurus* occur in India, of which only the former genus is known to occur in Manipur.

Genus *Hystrix* Linnaeus, 1758

One species of the genus *Hystrix* occurs in Manipur.


Common name: Crestless Himalayan Porcupine, Chinese Porcupine (Eng.).

Material examined: Senapati district: 1 subad ♀, 30 km N of Imphal on Dimapur Road (c 1067 m), coll. M.L. Roonwal, 29.xi.1945.

Measurements: External: 1 subad ♀: HB 555; Tl 120; Hf 85; E 37. Cranial: 1 subad ♀: on 119.0; cb 117.0; n 66.2; pl 55.0; d 32.0; b 17.2; ml 75.5.

Diagnosis: No crest of bristles present on the crown; quills bear only dark band in the middle, rest white; tail less than one fifth of head and body length; caudal rattling quills of tail more open and more developed.

Distribution: India: Manipur: Senapati district (Roonwal 1950); Nagaland.

Elsewhere: Myanmar, Thailand, southern China, Malay, Sumatra, Borneo and erstwhile Indo-China.

Family RHIZOMYIDAE*

The family is represented by two genera in India and both of them occur in Manipur. Both the genera, *Rhizomys* and *Cannomys* are adapted to subterranean mode of life. They have large procodont incisors, small eyes and ears, short limbs armed with strong claws.

Key to the genera of the family RHIZOMYIDAE

— Size large, condylobasal length of skull not less than 57.0 mm; sole of feet granulated; mammae 10; M.1 is larger than M.2 .......... Rhizomys

— Size small, condylobasal length of skull less than 55.0; sole of feet not granulated; mammae 8; M.1 is often smaller than M.2 .......... Cannomys

*Wilson and Reeder (1992) treated this Family Rhizomyidae as Subfamily Rhizomyinae under Family Muridae.*
Genus *Rhizomys* Gray, 1831

One species and subspecies of the genus *Rhizomys* occurs in Manipur.


*Common name*: Hoary Bamboo Rat (Eng.).

*Material examined*: Tamenglong district: 1♀, Luanglong Khulen (c 991 m), c 100 km W of Imphal on Silchar Road, coll. ZSI Naga hill & Manipur Survey, 9.ii.1936.

*Measurements*: None.

*Diagnosis*: Much larger than any other rodent, head and body length 20 to 30 cm or more; colour dark brown, grizzled; tail about 10 cm or so; palatal length 32.2 mm.

*Distribution*: India: Manipur: Tamenglong district, Bishenpur district (Ellerman 1961); Assam; Meghalaya; Nagaland.

*Elsewhere*: Myanmar, Thailand, erstwhile Indo-China and China.

Genus *Cannomys* Thomas, 1915

One species and subspecies of the genus *Cannomys* occurs in Manipur.


*Common name*: Bay Bamboo Rat (Eng.).

*Material examined*: Tamenglong district: 1♂, 2♀, Luanglong Khulen (c 991 m), c 100 km W of Imphal on Silchar Road, coll. ZSI Naga Hill & Manipur Survey, 9.ii.1936.

*Measurements*: None.

*Diagnosis*: Smaller than *Rhizomys*; head and body 19 to 20 cm; colour chestnut bay or ashy brown, not grizzled; tail about 7 cm or so.

*Distribution*: India: Manipur: Tamenglong district, Bishenpur district (Ellerman 1961); Arunachal Pradesh; Assam; Meghalaya; Mizoram; Nagaland.

*Elsewhere*: Nepal, Bhutan, Bangladesh, Myanmar, China, Thailand and Cambodia.

Family MURIDAE

In Manipur, the family Muridae is represented by eight genera.

**Key to the genera of the family MURIDAE**

1. Postero-internal cusp of upper molars present ........................................................................... *Chiropodomys*

— Postero-internal cusp of upper molars absent ............................................................................... 2

2. Hallux opposable; hallux and fifth toe having a flat nail ......................................................... *Vandeleuria*

— Hallux not opposable; hallux and fifth toe provided with a claw ............................................... 3

3. Condylobasal length exceeds or equal to occipitonasal length; anterior palatal foramina more than 7 mm in length ........... *Bandicota*

— Condylobasal length less than occipitonasal length; anterior palatal foramina less than 7 mm ........................................................................... 4

4. First upper molar more than half the length of cheektooth row, and its antero-internal cusp distorted inwards to reach the level of second lamina; third molar extremely reduced .......... ................................. *Mus*

— First upper molar less than half the length of cheektooth row, and its antero-internal cusp not distorted inwards to reach the second lamina; third molar not so reduced .......... 5

5. Occipitonasal length more than 33.2 mm ......................................................... 6

— Occipitonasal length less than 33.2 mm .......... 7

6. Palate short, less than one-half of occipitonasal length; anterior palatal foramina less than one-fifth of occipitonasal length ........... *Niviventer*

— Palate long, more than one-half of occipitonasal length; bulla more than 15% of occipitonasal length .................................................. *Rattus*

7. Bullae large, about 19% of the occipitonasal length .................................................. *Diomys*

— Bullae rather small, not reaching 19% of the occipitonasal length .......................................... *Hadromys*
Genus *Chiropodomys* Peters, 1868

One species and subspecies of the genus *Chiropodomys* occurs in Manipur.

57. *Chiropodomys gliroides gliroides* (Blyth)


*Common name:* Pencil-tailed Tree Mouse (Eng.).

*Material examined:* Nil.

*Measurements:* None.

*Diagnosis:* Relatively small climbing mice, head and body length under 100 mm; tail long, over 130% of head and body length, wholly dark, tufted terminally; fur soft, brown above, white or dirty white below; feet usually light.

*Distribution:* India: Manipur (Anderson 1881); Assam; Meghalaya.

*Elsewhere:* Myanmar, Malaysia, southern China, Vietnam and Thailand.

*Remarks:* Anderson (1881) recorded this species from Manipur without mentioning any exact locality.

Genus *Vandeleuria* Gray, 1842

One species and subspecies of the genus *Vandeleuria* occurs in Manipur.

58. *Vandeleuria oleracea dumeticola* (Hodgson)


*Common name:* Indian Long-tailed Tree Mouse (Eng.).

*Material examined:* Tamenglong district; 1σ, Tamenglong (c 1280 m), coll. Ajoy Kumar MandaI, 24.xi.1992.

*Measurements:* External: 1σ : HB 92.0-140.0 (123.5); TL 121.0-135.0 (128.4); Hf 24.0-27.0 (25.5); E 15-19 (17.3). Cranial: 6σ : on 30.8-32.3 (31.8); pl' 13.2-13.6 (13.5); b 4.5-5.1 (4.9).

*Diagnosis:* Dorsal colour dark salt-and-pepper coloured, with rusty tinge on the rump; ventral colour dirty white, tinged with buff; hands and feet buff-coloured; foot with five toes, the fifth toe and the hallux, both clawed; tail horay black above, pale pinkish below.

*Distribution:* India: Manipur: Senapati district, Bishenpur district (Roonwal 1950); Assam.

*Elsewhere:* Southern China.

Genus *Rattus* Fischer, 1803

Four species of the genus *Rattus* occur in Manipur.

**Key to the species of the Genus Rattus**

1. Tail unicolour ...........................................2
   — Tail bicolour ..........................................3
2. Nasal long, usually exceeding 38% of occipitonasal length ......................... *R. nitidus*
   — Nasal short, usually less than 38% of occipitonasal length .................... *R. rattus*
3. Diastema more than 31% of occipitonasal length ........................................... *R. manipulus*

—Diastema less than 31% of occipitonasal length ........................................... *R. mackenziei*

*Rattus rattus* (Linnaeus, 1758)

*Rattus rattus* is represented in Manipur by three subspecies. Commonly found in houses, fields, forests and other habitats.

**Key to the subspecies of *Rattus rattus***

1. Underparts of body white or dirty white .... 2

—Underparts of body dull or dark coloured .... .......................... *Rattus rattus tistae*

2. Size large; head and body length over 160 mm; tail short, being 100% of head and body length ................. *Rattus rattus bullocki*

—Size smaller; head and body length below 160 mm; tail longer, being 123-131% of head and body length ........... *Rattus rattus brunneusculus*


*Common name: House Rat (Eng.).

*Material examined*: Nil.

*Measurements*: None.

*Diagnosis*: Size smaller; head and body length below 160 mm; tail larger, being 123-131% of head and body length.

*Distribution*: India: Manipur: Senapati district, Chandel district (Roonwal 1950).


*Common name*: The Common Manipur White-bellied Rat (Eng.).

*Material examined*: Senapati district : 1♀ (Holotype), c 26 km N of Imphal on Dimapur Road (c 1070), coll. M. L. Roonwal, 4.viii.1945.

*Measurements*: External : 1♀ : HB 166; TI 167; Hf 33; E 21. Cranial : 1♀ : on 41.3; cb 38.1; zw 21.0; iw 6.1; cw 16.5; b 7.4; n 15.6; d 12.7; apf 7.5; mtr 6.8; ml 23.1.

*Diagnosis*: Dorsal colour of body dark grey to ochraceous tawny, ground colour more grey than tawny; ventral colour pure to ivory white, with hoary buff or pale yellow streaks or patches.

*Distribution*: India: Manipur: Senapati district, Chandel district (Roonwal 1950).


*Common name*: House Rat (Eng.).


*Measurements*: External : 2♂ : HB 155.0, 198.0; TI 135.0, 180.0; Hf 32.0, 37.0; E 20.0, 23.0. 1♀ : HB 170.0, TI 140.0; Hf 33.0; E 20.0. Cranial : 2♂ : on 38.8, 46.1; n 14.7, 18.2; pl 19.8, 25.0; apf 7.0, 8.6; mtr 6.7, 6.9; b 6.1, 6.9; d 10.4, 12.8. 1♀ : on 41.7; n 16.3; pl 22.9, apf 7.6; mtr 6.7; b 6.3, d 11.5.

*Diagnosis*: Underparts of body dull or dark coloured; occipitonasal length normally not reaching 42 mm; toothrow mostly over 6.6 mm.

*Distribution*: India: Manipur: Bishenpur district (Roonwal 1950), Chandel district, Churachandpur district, Senapati district, Ukhrul district, Tamenglong district; Arunachal Pradesh; Assam; Meghalaya; Nagaland; Sikkim; West Bengal.

*Elsewhere*: Bhutan (Chakraborty 1975).
63. *Rattus nitidus obsoletus* Hinton


**Common name**: Himalayan Rat (Eng.).

**Material examined**: Tamenglong district: 1♂, Regailous Camp (c 991 m), c 101 km W of Imphal on Silchar Road, coll. ZSI Naga Hill & Manipur Survey, 11.ii.1936. Senapati district: 1♂, 26 km N of Imphal on Dimapur Road (c 1067 m), coll. M.L. Roonwal, 8.xii.1945.

**Measurements**: External: 2♂: HB 155, 150; TI 140, 138; Hf 34, 35, E 25, 25. Cranial: 1♂: on 37.2; cb 35.0; iw(1) 7.5; n 15.0; p 17.6; d 9.6; apf 6.2, mtr 6.6; ml 20.7.

**Diagnosis**: Harsher-furred rat; tail subequal to head and body length.

**Distribution**: India: Manipur: Senapati district (Roonwal 1950), Tamenglong district (Roonwal 1950).

**Elsewhere**: Myanmar.

64. *Rattus mackenziei* (Thomas)


**Common name**: Mackenziei's Rat (Eng.).

**Material examined**: Tamenglong district: 2♂, Luanglong Khulen (c 991 m), c 101 km W of Imphal on Silchar Road, ZSI Naga hill & Manipur survey, 9.ii.1936.

**Measurements**: External: 3♂: HB 205, 205; TI 245, 237; Hf 48,50. Cranial: 2♂: on 50.2, 48.8; iw(1) 7.5; n 20.5, 19.7; b 6.6, 6.5; pl 23.8, 23.1; d 15.6, 14.6; apf 9.4, 9.2; mtr 7.9, 8.4.

**Diagnosis**: A giant size rat, hind foot about 50 mm in length; opisthodont incisors; small bullae; 3+2 mammae.

**Distribution**: India: Manipur: Bishenpur district (Ellerman 1961), Tamenglong district (Roonwal 1961); Meghalaya (Blanford 1891).

**Elsewhere**: Myanmar and Thailand.

**Genus Niviventer** Marshall, 1976

One species, namely *Niviventer niviventer*, occurs in Manipur. Tail in this genus is generally bi-coloured; underside normally white or dirty white. It is represented by two subspecies.

**Key to the subspecies of N. niviventer**

— Smaller race, occipitonasal length less than 34.0 mm .......................... *N. niviventer niviventer*

— Larger race, occipitonasal length more than 35.0 mm .......................... *N. niviventer mentosus*

66. *Niviventer niviventer niviventer* (Hodgson)


**Common name**: White-bellied Rat (Eng.).

**Material examined**: Nil.

**Measurements**: None.

**Diagnosis**: Smaller race; occipitonasal length below 34.0 mm; bullae more than 13% of occipitonasal length; underparts white, lacking midventral stripe.
Distribution: India: Manipur; Chandel district (Roonwal 1950); Himachal Pradesh; Uttar Pradesh; West Bengal.

Elsewhere: Bhutan (Chakraborty 1975) and Myanmar.

67. Niviventer niviventer mentosus (Thomas)


Common name: White-bellied Rat (Eng.).

Material examined: Nil.

Measurements: None.

Diagnosis: Larger Race; occipitonasal length varying between 35.3 and 42.5 mm; bullae most often below 13% of occipitonasal length.

Distribution: India: Manipur: Imphal district (Roonwal 1950); Arunachal Pradesh; Assam; Meghalaya.

Elsewhere: Myanmar.

Genus Mus Linnaeus, 1775

Three species of the genus Mus occur in Manipur.

Key to the species of the genus Mus

1. Tail unicoloured and longer than head and body .................. \( M. \) musculus

   — Tail bicoloured (pale below) and equal to or shorter than head and body .................. 2

2. Ventral colour silvery grey ..... \( M. \) cervicolor

   — Ventral colour dark brown ......... \( M. \) famulus

\( M. \) musculus Linnaeus

Three subspecies of \( M. \) musculus occur in Manipur. All of them are known to do considerable damage to household articles.

Key to subspecies of \( M. \) musculus

1. Undersurface of body light grey .................. \( M.m. \) homourus

   — Undersurface of body light or dark brown .2

2. Dorsal surface of body dark brown .......... \( M.m. \) castaneus

   — Dorsal surface of body light brown .......... \( M.m. \) urbanus

68. Mus musculus castaneus Waterhouse


Common name: House Mouse (Eng.).

Material examined: Senapati district: 2\( \sigma \), Turibari (c 1250 m), 5 km W of Kangpokpi, coll. Ajoy Kumar Mandal, 10.xi.1992.

Measurements: External: 2\( \sigma \): HB 75.0; 79.0; T 85.0; 90.0; Hf 12.0; 16.0; E 11.8; 12.5. Cranial: 2\( \sigma \): on 20.1, 21.3; n 7.4, 8.7; pl 9.8, 10.7; mtr 3.2, 3.4; b 3.5, 3.4; apf 4.5, 5.1; d 5.0, 5.3.

Distribution: India: Manipur: Senapati district; Andhra Pradesh; Assam; Bihar; Delhi; Gujarat; Jammu & Kashmir; Karnataka; Kerala; Meghalaya; Orissa.


Remarks: The present record includes Manipur in the range of distribution of this Mouse. It was found common near houses.

69. Mus musculus homourus Hodgson


Common name: Southern Himalayan House Mouse (Eng.).

Material examined: Senapati district: 1\( \sigma \), 26 km N of Imphal on Dimapur Road (c 1067 m), coll. M.L. Roonwal, 21.ix.1945.

Measurements: External: 1\( \sigma \): HB 80.0; T 71.0; Hf 14.0; E 11.0. Cranial: 1\( \sigma \): on 20.4; cb 19.8; zw 10.7; n 7.6; mtr 3.5; cw 9.6; apf 4.9.

Distribution: India: Manipur: Senapati district (Roonwal 1950); Assam; Himachal Pradesh; Jammu & Kashmir; Meghalaya; Nagaland; Sikkim; Tamil Nadu; Uttar Pradesh; West Bengal.

Elsewhere: Nepal, Myanmar, China, Formosa, Vietnam and Java.
70. *Mus musculus urbanus* Hodgson


*Common name*: House Mouse (Eng.).


*Measurements*: External: 1♂: HB 80.0; TI 98.0; Hf 16.0; E 14.0. 2♀: HB 72.0, 71.4; TI 85.0, 83.0; Hf 16.4, 16.0; E 13.0, 12.2. Cranial: 1♂: on 22.2; n 9.2; pl 11.3; apf 4.9; d 5.7; b 3.4; mtr 3.3. 2♀: on 19.7, 20.8; n 7.1, 8.0; pl 9.8, 10.4; apf 4.6, 4.7; d 4.7, 5.1; b 3.3, 3.3; mtr 3.2, 3.2.

*Distribution*: India: Manipur: Churachandpur district, Imphal district, Senapati district; Andaman Islands; Assam; Maharashtra; Rajasthan; Sikkim; Tamil Nadu; Uttar Pradesh; West Bengal.


*Remarks*: Colour of under surface varies from grey to brown, and tail from wholly dark to bicolar. This constitutes the first record of this subspecies from Manipur.

71. *Mus cervicolor imphalensis* Roonwal


*Common name*: The Manipur Jungle Mouse (Eng.).


*Measurements*: External: 1♀: HB 86.0; TI 59.0; Hf 15.0; E 13.0. Cranial: 1♀: on 21.4; cb 19.7; zw 10.0; iw 3.7; cw 9.6; b 3.8; n 8.4; d 6.2; apf 5.0; mtr 3.6.

*Diagnosis*: Dorsal colour blackish grey, mid-dorsal area darker than head and shoulder; ventral colour whitish grey, hairs dark basally, white terminally; tail sharply bicoloured, black above, white below.

*Distribution*: India: Manipur: Bishenpur district (Ellerman 1961); Bihar.

*Genus* *Diomys* Thomas, 1917

The genus *Diomys* is monotypic and occurs in Manipur.

73. *Diomys crumpi* Thomas


*Common name*: Crump's Mouse (Eng.).

*Material examined*: Nil.

*Measurements*: None.

*Diagnosis*: 70-90 mm in head and body length; tail bicolour, more than 90% of head and body length; body colour light brown above, a little darker below.

*Distribution*: India: Manipur: Chandel district (Ellerman 1961); Nagaland.

*Elsewhere*: Myanmar.

*Genus* *Bandicota* Gray, 1873

Two species of the genus *Bandicota* occur in Manipur.
Key to the species of the genus *Bandicota*

- Size large, head and body length more than 220 mm; anterior palatal foramina equally broad at both ends; nasals more than one third of occipitonasal length ................. *B. indica*

- Size small, head and body length less than 220 mm; anterior palatal foramina narrower posteriorly; nasals short, less than one-third of occipitonasal length .............. *B. bengalensis*

74. *Bandicota bengalensis bengalensis* (Gray)


*Common name*: Lesser Bandicoot Rat (Eng.).

*Material examined*: Nil.

*Measurements*: None.

*Distribution*: India: Manipur: Imphal district (Subiah & Singh 1984), Senapati district (Roonwal 1950), Chandel district (Roonwal 1950); Churachandpur district; throughout India.


*Remarks*: Most predominant rodent species. Found in the fields as well as godowns, causing considerable damage to grains. Breeds throughout the year.

Though no specimen of this species could be collected from Imphal and Churachandpur districts, its burrows were observed in both these districts.

75. *Bandicota indica nemorivaga* (Hodgson)


*Common name*: Large Bandicoot Rat (Eng.).

*Material examined*: Nil.

*Measurements*: None.

*Distribution*: India: Manipur: Imphal district; Assam; Bihar; Meghalaya; Sikkim; West Bengal.

*Elsewhere*: Nepal, Bangladesh, Thailand and Formosa.

Remarks: A single specimen of this rat was trapped at Jiribam, but escaped while handling.

**SUMMARY**

An account of the mammalian fauna of Manipur, based mainly on the old and recent collections present in the Zoological Survey of India as well as those recorded in the literature, has been provided. Altogether 75 species and subspecies (69 species) belonging to 55 genera, 22 families and 8 orders have been reported.

Keys and diagnostic characters for identification of all the species have been given.

Detailed district-wise distribution in Manipur, along with distributional range in India and outside for each described form have also been included.

_Crocidura attenuata rubricosa, Anourosorex squamipes squamipes, Megaerops niphanae, Hipposideros lankadiva, Hipposideros armiger armiger, Scotozous dormeri_ have been reported for the first time from Manipur.

Taxonomic comments on the above mentioned species have been given.

Relative abundance of a number of large and small mammals has also been given.

**ACKNOWLEDGEMENTS**

The authors are grateful to Dr. J.R.B. Alfred, Director, Zoological Survey of India, for providing necessary facilities for this work. Sincere thanks are due to Dr. V.C. Agrawal, Emeritus Scientist, for going through the manuscript and suggesting necessary improvements. Thanks are also due to the Department of Forests, Govt. of Manipur, for providing help during the field surveys. The authors are indebted to Dr. S. Chakraborty, Scientist E (Retd.) and other officers and staff members of the Mammal & Osteology Section for their active co-operation for completing this work in time.
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## District-wise distribution of mammals in Manipur

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<td><em>Muntiacus muntjak vaginalis</em> (Boddaert)</td>
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<td>44.</td>
<td><em>Cervus eldi eldi</em> M’Clelland</td>
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<td><em>Belomys pearsoni trichotis</em> Thomas</td>
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<td><em>Petaurista alborufus candidulus</em> Wroughton</td>
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<td><em>Hylopetes alboniger alboniger</em> (Hodgson)</td>
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<td><em>Tamiops macclelandi macclelandi</em> (Horsfield)</td>
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<td>52.</td>
<td><em>Dromomys lokriah macmillani</em> Thomas</td>
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<td>53.</td>
<td><em>Ratufa bicolor gigantea</em> (M’clelland)</td>
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<td>54.</td>
<td><em>Hystrix brachyura</em> Linnaeus</td>
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**Family CERVIDAE**

**Order RODENTIA**

**Family SCIURIDAE**

**Family HYSTRICIDAE**
Table Contd.

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<td><em>Rhizomys pruinosus pruinosus</em> (Blyth)</td>
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<td><em>Cannomys badius badius</em> (Hodgson)</td>
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<td><em>Chiropodomys gliroides gliroides</em> (Blyth)</td>
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<td>58.</td>
<td><em>Vandeleuria oleracea dumentica</em> (Hodgson)</td>
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<td>59.</td>
<td><em>Hadromys humei</em> (Thomas)</td>
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<td><em>Rattus rattus bruneusculus</em> (Hodgson)</td>
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<td>61.</td>
<td><em>Rattus rattus bullocki</em> Roonwal</td>
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<td>62.</td>
<td><em>Rattus rattus tistae</em> Hinton</td>
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<td>63.</td>
<td><em>Rattus nitidus obsoletus</em> Hinton</td>
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<td>64.</td>
<td><em>Rattus mackenziei</em> Thomas</td>
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<td>65.</td>
<td><em>Rattus manipulus manipulus</em> (Thomas)</td>
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<td>66.</td>
<td><em>Niviventer niviventer niviventer</em> (Hodgson)</td>
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<td>67.</td>
<td><em>Niviventer niviventer mentosus</em> (Thomas)</td>
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<td>68.</td>
<td><em>Mus musculus castaneus</em> Waterhouse</td>
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<td>69.</td>
<td><em>Mus musculus homourus</em> Hodgson</td>
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No mention of exact locality
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<tr>
<td>70.</td>
<td><em>Mus musculus urbanus</em> Hodgson</td>
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<td>71.</td>
<td><em>Mus cervicolor imphalensis</em> Roonwal</td>
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<td>72.</td>
<td><em>Mus famulus cooki</em> Ryley</td>
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<td>73.</td>
<td><em>Diomys crumpi</em> Thomas</td>
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<td>74.</td>
<td><em>Bandicota bengalensis bengalensis</em> (Gray)</td>
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<td>75.</td>
<td><em>Bandicota indica nemorivaga</em> (Hodgson)</td>
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INTRODUCTION

Manipur is a small montane state in the extreme east of India on the Myanmer Frontier being one of the cluster of seven sister states of the north-eastern Hills. It shares an international border with Myanmer on the east, while the states of Assam, Nagaland and Mizoram border it in the West, north and south respectively. A roughly rectangular cartographic area of about 21,899.74 sq. kilometres spreading over 23°50’ and 25°41’ N latitudes and 93°2’ and 94°47’ E longitudes constitute the state.

The terrain lies between 700 and 2000 metres above the mean sea level. Several hill ranges running north-south abridging the Patkoi Hill range and the Lushai Hill range of the extended Arakan Yoma. But have a wide plain valley of Imphal roughly 48.27 km long and 31.18 km wide, having several lakes includes distinctive Loktak Lake.

Two principal rivers namely, Barak and Imphal (or Manipur) carry the drainage with their tributaries. The former following in the north-western section running north-south, then abruptly running west to flow into the Barak Valley of Assam thence to the mighty Brahmaputra river, while the later flowing north-south across the Imphal valley thence through Chin Hills to meet the Chindwin river.

Climate of the Imphal Valley is mild with cool summers and cold, but not severe, winters. Temperature varies between 33.3°C and -1.1°C. But, higher hilly sections are much colder. Average annual rainfall at Imphal is about 177.8 cm chiefly received during the monsoon months of June to September, but in the thrust areas of the hills receive much precipitation as much as 254 cm annually.

So far natural vegetation is concerned Tropical West Evergreen Forests extend in the monsoon thrust areas of the west and north-west. Tropical Dry Deciduous Forests extend along the eastern section of the rain shed areas. Tropical Moist Deciduous Forests extend over larger areas in between, when subtropical pine Forests extend on the southern section as well as northern section of the state. Montane West Temperate Forests are distributed along the higher section of the north-eastern hills. Arable Land are extending along the central part of the state. The forest area occupies 67.9% of the total area of the state—a comfortable and healthy sign. And categorized as Reserved Forests (9.6%), protected Forests (27.5%) and Unclassified (62.9%). The last category also conform 'private Forest' Flat Manipur Valley having several natural lakes have typical swampy vegetation. Loktak Lake has the peculiar floating vegetation known as 'phundi' Zoogeographically, Manipur lies in the juncture of Malayan and Indo-Chinese Subregion of the Oriental Region of the Megagean Realm and its geographical location bears significant importance. And its ecosystems constitute mainly that of north-eastern Hill States of India with the significant speciality of the ‘phundi’ of the wetland system.

Due to the nature of the terrain and also due to location the Manipur state was sporadically surveyed over the last two centuries. Godwin-

AVES

B. B. DUTTA and B. K. DATTA
Zoological Survey of India, ‘M’ Block, New Alipore, Kolkata-700 053
Austen (1874-82) appears to have provided the first systematic account of birds for the state in his treaties on north-eastern Hill region. Hume (1888) listed about 500 species, Oates (1883-90) referred Manipur in his account on birds of Burma. Allen (1905) provided brief accounts on game birds. Higgins (1913, 1914, 1933-34) made elaborate reference to birds of Manipur. Zoological survey undertook field surveys during 1936, and Roonwal made an extensive survey during 1945. In 1948 Roonwal in his contribution to Manipur Fauna accounted 91 bird species with the description of a new subspecies of bird namely, *Otus bakkamoena manipurensis*, the Manipur Scops Owl. In recent times, under the auspices of “State Fauna” assignments, several teams conducted field surveys in the state including those for ornithological surveys during nineties of this century.

**DETAILS OF COLLECTORS AND LOCALITIES**

**Collector**

Maj. M. l. Roonwal 1. 6 miles N. of Imphal (c. 2800 ft.)

2. Kanglatongbi, 16 miles N. of Imphal (c. 3500 ft.)

3. Imphal Valley

4. Regailons camp, Imphal (3,250 ft- 2,500 ft.)

Shir D. K. Ghosal 1. Imphal

2. Jiribam, Manipur

3. Chandal, Manipur

4. Churachandpur, Manipur

Shri A. K. Mondal 1. Uchathol, Jiribam, Manipur

2. Turibari (c. 1250 mt.), Kangpokpi, Senapati, Manipur

3. Tamenglong (c. 1280 mt.) Manipur.

From Higgins’ report it is apparent that during the late part of 19th century and early decade of 20th century British personnel collected hundreds of game birds in Manipur. Following tables as given by Higgins in his paper is reproduced here just to show abundance of Game birds in Manipur. It is needless to point out that such wanton killing of beautiful birds only to improve the delicacy of the dining table and charishma of individual gun power in the name of sports at the cost of countless Game birds which are, at present, living in very small numbers or not living at all in Manipur.

**SYSTEMATIC LIST OF BIRDS**

(As reported in this paper)

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<tr>
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<td>Podicipedidae</td>
<td>1. Podiceps cristatus cristatus (Linnaeus)</td>
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<td>2. Podiceps ruficollis capensis Salvadori</td>
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<tr>
<td>Pelicaniformes</td>
<td>Phalacrocoracidae</td>
<td>3. Phalacrocorax carbo sinensis (Shaw)</td>
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<td>4. Phalacrocorax niger (Vieillot)</td>
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<td>5. Anhinga rufa melanogaster Pennant</td>
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<tr>
<td>Ciconiformes</td>
<td>Ardeidae</td>
<td>6. Ardea cinerea rectirostris Gould</td>
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<td>7. Ardea purpurea manilensis Meyen</td>
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<td>8. Ardeola striatus chloriceps (Bonaparte)</td>
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<td>9. Burtorides striatus javanicus (Horsfield)</td>
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<td>10. Ardeola grayii grayii (Sykes)</td>
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<td>11. Ardeola bacchus (Bonaparte)</td>
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<td>12. Bubulcus ibis coromandus (Boddaert)</td>
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<td>13. Egretta intermedia intermedia (Wagler)</td>
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<td>14. Egretta garzetta garzetta (Linnaeus)</td>
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<td>15. Nycticorax nycticorax nycticorax (Linnaeus)</td>
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<td>16. Gorsachius melanolophus melanolophus (Raffles)</td>
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<td>17. Ixobrychus cinnamomeus (Gmelin)</td>
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<td>18. Ixobrychus sinensis (Gmelin)</td>
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<td>19. Ixobrychus flavicollis flavicollis (Latham)</td>
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Family CICONIIDAE
20. *Mycteria leucocephala* (Pennant)
21. *Anastomus oscitans* (Boddaert)
22. *Ciconia episcopus episcopus* (Boddaert)

Family THRESKIORNITHIDAE
23. *Threskiornis aethiopicus melanopechphala* (Latham)
24. *Platalea leucorodia major* Temminck & Schlegel

Order ANSERIFORMES
Family ANATIDAE
25. *Anser albifrons albifrons* (Scopoli)
26. *Anser anser rubrorostris* Swinhoe
27. *Dendrocygna javanica* (Horsfield)
28. *Dendrocygna bicolor* (Vieillot)
29. *Tadorna ferruginea* (Pallas)
30. *Tadorna tadorna* (Linnaeus)
31. *Anas acuta* Linnaeus
32. *Anas crecca crecca* Linnaeus
33. *Anas formosa* Georgi
34. *Anas poecilorhyncha zonorhyncha* Swinhoe
35. *Anas strepera strepera* Linnaeus
36. *Anas falcata* Georgi
37. *Anas penelope* Linnaeus
38. *Anas querquedula* Linnaeus
39. *Anas clypeata* Linnaeus
40. *Aythya ferina* (Linnaeus)
41. *Aythya nyroca* (Guldenstadt)
42. *Aythya baeri* (Radde)
43. *Aythya fuligula* (Linnaeus)
44. *Aix galericulata* (Linnaeus)
45. *Nettapus coromandelianus coromandelianus* (Gmelin)

Family FALCONIDAE
46. *Cairina scutulata* (S. Muller)
47. *Bucephala clangula clangula* (Linnaeus)

Order GALLIFORMES
Family PHASIANIDAE
48. *Elanus caeruleus vociferus* (Latham)
49. *Avida leucophotes syama* (Hodgson)
50. *Pernis pilorhynchus ruficollis* Lesson
51. *Milvus migrans govinda* Sykes
52. *Milvus migrans lineatus* (Gray)
53. *Haliastur indus indus* (Boddaert)
54. *Accipiter badius dussumieri* (Temminck)
55. *Accipiter nisus nisosimilis* (Tickell)
56. *Buteo buteo japonicus* (Temminck & Schlegel)
57. *Spizaetus nipalensis nipalensis* (Hodgson)
58. *Hieraaetus kienerii kienerii* (E. Geoffroy)
59. *Aquila clanga* Pallas
60. *Aquila pomarina hastata* (Lesson)
61. *Sarcogyps calvus* (Scopoli)
62. *Gyps bengalensis* (Gmelin)
63. *Circus macrourus* (S. G. Gmelin)
64. *Circus melanoleucos* (Pennant)
65. *Circus aeruginosus aeruginosus* (Linnaeus)
66. *Circus aeruginosus spilonotus* Kaup
67. *Spilornis cheela burmanicus* Swann
68. *Pandion haliaetus haliaetus* (Linnaeus)

Order FALCONIFORMES
Family ACCIPITRIDAE
48. *Elanus caeruleus vociferus* (Latham)
49. *Avida leucophotes syama* (Hodgson)
50. *Pernis pilorhynchus ruficollis* Lesson
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56. *Buteo buteo japonicus* (Temminck & Schlegel)
57. *Spizaetus nipalensis nipalensis* (Hodgson)
58. *Hieraaetus kienerii kienerii* (E. Geoffroy)
59. *Aquila clanga* Pallas
60. *Aquila pomarina hastata* (Lesson)
61. *Sarcogyps calvus* (Scopoli)
62. *Gyps bengalensis* (Gmelin)
63. *Circus macrourus* (S. G. Gmelin)
64. *Circus melanoleucos* (Pennant)
65. *Circus aeruginosus aeruginosus* (Linnaeus)
66. *Circus aeruginosus spilonotus* Kaup
67. *Spilornis cheela burmanicus* Swann
68. *Pandion haliaetus haliaetus* (Linnaeus)

Family FALCONIDAE
69. *Microhierax caerulescens caerulescens* (Linnaeus)
70. *Microhierax melanoleucos* (Blyth)
71. *Falco biarmicus jugger* J. E. Gray
72. *Falco peregrinus japonensis* Gmelin
73. *Falco subbuteo centralasiae* (Buturlin)
74. *Falco severus severus* Horsfield
75. *Falco chicquera chicquera* Daudin
76. *Falco vespertinus amurensis* Radde
77. *Falco naumannni Fleischer
78. *Falco tinnunculus interstinctus* McClelland

Order GALLIFORMES
Family PHASIANIDAE
79. *Francolinus francolinus melanotus* Hume
80. *Francolinus pintadeanus phayrei* (Blyth)
81. *Coturnix coturnix coturnix* (Linnaeus)
82. *Coturnix coturnix japonica* Temminck & Schlegel
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<th>Number</th>
<th>Species Name</th>
<th>Author</th>
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<td>83.</td>
<td>Coturnix coromandelica</td>
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<td>Lophura leucomelana lathami</td>
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<td>Lophura leucomelana williamsi</td>
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146. *Sternula aurantia* J. E. Gray
147. *Sternula hirundo tibetana* Saunders
148. *Sternula acuticauda* J. E. Gray

Order COLUMBIFORMES
Family COLUMBIIDAE

149. *Treron apicauda apicauda* Blyth
150. *Treron sphenura sphenura* (Vigors)
151. *Treron curvirostra nipalensis* (Hodgson)
152. *Treron pompadora phayrei* (Blyth)
153. *Treron bicincta bicincta* (Jerdon)
154. *Treron phoenicoptera phoenicoptera* (Latham)
155. *Ducula aenea sylvatica* (Tickell)
156. *Ducula badia insignis* Hodgson
157. *Ducula badia griseicapilla* Walden
158. *Columba livia intermediarilla* Strickland
159. *Columba hodgsonii* Vigors
160. *Columba pulchricollis* Hodgson
161. *Columba punicella Blyth*
162. *Macropygia unchall tusalia* (Blyth)
163. *Streptopelia orientalis agricola* (Tickell)
164. *Streptopelia decaocto decacoto* (Frivaldszky)
165. *Streptopelia tranquebarica humilis* (Temminck)
166. *Streptopelia chinensis tigrina* (Temminck)
167. *Chalcophaps indica indica* (Linnaeus)

Order PSITTACIFORMES
Family PSITTACIDAE

168. *Psittacula equadora avensis* (Kloss)
169. *Psittacula krameri borealis* (Neumann)
170. *Psittacula alexandri fasciata* (P. L. S. Muller)
171. *Psittacula cyanoccephala bengalensis* (Forster)
172. *Psittacula roseata juneeas Biswas*
173. *Psittacula finschii* (Hume)
174. *Loriculus vernalis* (Sparrman)

Order CUCULIFORMES
Family CUCULIDAE

175. *Clamator coromandus* (Linnaeus)
176. *Clamator jacobinus serratus* (Sparrman)
177. *Cuculus sparverioides sparverioides* Vigors
178. *Cuculus varius varius* Vahl
179. *Cuculus fugax nisicololor* Blyth
180. *Cuculus canorus bakeri* Hartert
181. *Cuculus poliocephalus poliocephalus* Latham
182. *Cacomantis merulinus querulus* Heine
183. *Chalcites maculatus* (Gmelin)
184. *Chalcites xanthorhynchus xanthorhynchus* (Horsfield)
185. *Surniculus lugubris dicruroides* (Hodgson)
186. *Eudynamys scolopacea malayana* Cabanis & Heine
187. *Rhododytes tristis tristis* (Lesson)
188. *Centropus sinensis intermedius* (Hume)
189. *Centropus toulou bengalensis* (Gmelin)

Order STRIGIFORMES
Family STRIGIDAE

190. *Tyto alba stertens* Hartert
191. *Tyto capensis longimembris* (Jerdon)
192. *Phodilus badius saturatus* Robinson
193. *Otus spilocephalus spilocephalus* (Blyth)
194. *Otus scops sunia* (Hodgson)
195. *Otus bakkamoena lettia* (Hodgson)
196. *Bubo bengalensis* (Franklin)
197. *Bubo nipalensis nipalensis* Hodgson
198. *Bubo coromandus coromandus* (Latham)
199. *Bubo zeylonensis leschenaulti* (Temminck)
200. *Bubo flavipes* (Hodgson)
201. *Glaucidium brodiei brodiei* (Burton)
202. *Glaucidium cuculoides rufescens* Baker
203. *Ninox scutulata burmanica* Hume
204. *Athene brama indica* (Franklin)
205. *Strix leptogrammica newarensis* (Hodgson)
206. *Strix aluco nivicola* (Blyth)
207. *Asio flammeus flammeus* (Pontoppidan)

Order CAPRIMULGIFORMES
Family PODARGIDAE

208. *Batrachostomus hodgsoni hodgsoni* (G. R. Gray)
Family CAPRIMULGIDAE
209. Eurostopodus macrotis cerviniceps (Gould)
210. Caprimulgus indicus hazarae Whistler & Kinnear
211. Caprimulgus macrurus bimaculatus Peale
212. Caprimulgus affinis monticola Franklin

Order APODIFORMES
Family APODIDAE
213. Collocalia brevirostris brevirostris (Horsfield)
214. Chaetura (Caudacuta) cochinchinensis Oustalet
215. Chaetura gigantea indica Hume
216. Chaetura sylvatica (Tickell)
217. Apus pacificus pacificus (Latham)
218. Apus pacificus leuconyx (Blyth)
219. Apus affinis subfurcatus (Blyth)
220. Cypsiurus parvus infumatus Sc1ater
221. Hemiprocn e longipennis coronata (Tickell)

Order TROGONIFORMES
Family TROGONIDAE
222. Harpactes erythrocephalus hodgsonii (Gould)
223. Harpactes erythrocephalus helenae Mayr
224. Harpactes erythrocephalus erythrocephalus (Gould)

Order CORACIIFORMES
Family ALCEDINIDAE
225. Ceryle lugubris guttulata Stejneger
226. Ceryle rudis leucomelanura Reichenbach
227. Alcedo hercules Laubmann
228. Alcedo atthis benghalensis Gmelin
229. Alcedo meninting collarti Baker
230. Ceyx erithacus erithacus (Linnaeus)
231. Pelargopsis capensis capensis (Linnaeus)
232. Halcyon coromanda coromanda (Latham)
233. Halcyon smyrnensis perpulchra Madarasz
234. Halcyon pileata (Boddart)

Family MEROPIDAE
235. Merops leschenaulti leschenaulti Vieillot

236. Nyctornis athertoni athertoni (Jardine & Selby)

Family CORACIIDAE
237. Coracias benghalensis affinis Horsfield
238. Eurystomus orientalis cyanicollis Vieillot

Family UPUPIDAE
239. Upupa epops longirostris Jerdon

Family BUCEROTIDAE
240. Ptibolaemus tickelli austeni (Jerdon)
241. Aceros nipalensis (Hodgson)
242. Rhyticeros undulatus ticehursti Deignan
243. Anthracoceros malabaricus malabaricus (Gmelin)

244. Buceros bicornis homrai Hodgson

Order PICIFORMES
Family CAPITONIDAE
245. Megalaima virens magnifica Baker
246. Megalaima lineata hodgsoni Bonaparte
247. Megalaima franklinii franklinii (Blyth)
248. Megalaima asiatica asiatica (Latham)
249. Megalaima australis cyanotis (Blyth)
250. Megalaima haemacephala indica (Latham)

Family INDICATORIDAE
251. Indicator xanthonotus fulvus Ripley

Family PICIDAE
252. Jynx torquilla chinensis Hesse
253. Picumnus innominatus malayorum Hartert
254. Sasia ochracea reichenowi Hesse
255. Micropternus brachyurus phaioceps Blyth
256. Picus canus hessei Gyldenstolpe
257. Picus flavinucha flavinucha Gould
258. Picus chlorolophus chlorolophus Vieillot
259. Dinopium benghalense benghalense (Linnaeus)

260. Dinopium shorii shorii (Vigors)
261. Dinopium javanense intermedium (Blyth)
262. Gecinulus grantia grantia (Horsfield)
263. Mulleripicus pulverulentus harterti Hesse
264. Hypopica hypythrurus hypythrurus (Vigors)
265. Picoides major stresemanni (Rensch)
266. Picoides darjellensis (Blyth)
267. Picoides cathpharius pyrrhothorax (Hume)
268. Picoides atratus (Blyth)
269. Picoides macei macei (Vieillot)
270. Picoides canicapillus canicapillus (Blyth)
271. Hernicircus canente canente (Lesson)
272. Blythipicus pyrrhotis pyrrhotis (Hodgson)
273. Chrysocolaptes lucidus guttacristatus (Tickell)

Order PASSERIFORMES
Family EURYLAIMIDAE
274. Serilophus lunatus rubropygius (Hodgson)
275. Psarisomus dalhousiae dalhousiae (Jameson)

Family PITIDAE
276. Pitta nipalensis nipalensis (Hodgson)
277. Pitta brachyura brachyura (Linnaeus)
278. Pitta sordida cucullata Hartlaub
279. Pitta cyanea cyanea Blyth

Family ALAUDIDAE
280. Mirafra assamica assamica Horsfield
281. Eremopterix grisea (Scopoli)

Family HIRUNDINIDAE
282. Riparia riparia ijimae (Lonnberg)
283. Hirundo rustica tyleri Jerdon
284. Hirundo striolata mayri Hall
285. Delichon nipalensis nipalensis Moore

Family LANIIDAE
286. Lanius collurioiides Lesson
287. Lanius techronotus techronotus (Vigors)
288. Lanius schach tricolor (Hodgson)
289. Lanius cristatus cristatus Linnaeus

Family ORIOLIDAE
290. Oriolus chinensis tenuirostris Blyth
291. Oriolus xanthornus xanthornus (Linnaeus)
292. Oriolus traillii traillii (Vigors)

Family DICRURIDAE
293. Dicrurus adsimilis albirictus (Hodgson)
294. Dicrurus leucophaeus hopwoodi Baker
295. Dicrurus caerulescens caerulescens (Linnaeus)
296. Dicrurus annectans (Hodgson)
297. Dicrurus aeneus aeneus Vieillot
298. Dicrurus remifer tectirostris (Hodgson)
299. Dicrurus hottentottus hottentottus (Linnaeus)
300. Dicrurus paradiseus grandis (Gould)

Family ARTAMIDAE
301. Artamus fuscus Vieillot

Family STURNIDAE
302. Saroglossa spiloptera (Vigors)
303. Aplonis panayensis affinis (Blyth)
304. Sturnus malabaricus nemoricola (Jerdon)
305. Strunus contra superciliaris (Blyth)
306. Sturnus sinensis (Gmelin)
307. Acridotheres tristis tristis (Linnaeus)
308. Acridotheres fuscus fuscus (Wagler)
309. Acridotheres javanicus infuscatus (Baker)
310. Acridotheres albocinctus Godwin-Austen & Walden

311. Mino coronatus (Blyth)
312. Gracula religiosa intermedia A. Hay

Family CORVIDAE
313. Garrulus glandarius interstinctus Hartert
314. Cissa chinensis chinensis (Boddart)
315. Cissa erythrorhyncha magnirostris (Blyth)
316. Dendrocitta vagabunda vagabunda (Latham)
317. Dendrocitta frontalis frontalis Horsfield
318. Dendrocitta formosa Jerdon
319. Corvus splendens splendens Vieillot
320. Corvus macrorhynchos levaillanti Lesson

Family CAMPEPHAGIDAE
321. Hemipus picatus capitalis (Horsfield)
322. Tephrodornis virgatus pelvica (Hodgson)
323. Coracina melanoptera sykesi (Strickland)
324. Pericrocotus brevirostris brevirostris (Vigors)
325. Pericrocotus ethologus mariae Ripley
326. *Pericrocotus solaris solaris* Blyth
327. *Pericrocotus roseus roseus* (Vieillot)
328. *Pericrocotus cinnamomeus vividus* Baker

**Family IRENIDAE**
329. *Aegithilla tiphia tiphia* (Linnaeus)
330. *Chloropsis hardwickii hardwickii* Jardine & Selby
331. *Chloropsis cochinchinensis cochinchinensis* (Gmelin)
332. *Irena puella puella* (Latham)

**Family PYCNONOTIDAE**
333. *Spizixos canifrons canifrons* (Blyth)
334. *Pycnonotus atriceps atriceps* (Temminck)
335. *Pycnonotus melanicterus flaviventris* (Tickell)
336. *Pycnonotus jocosus emeria* (Linnaeus)
337. *Pycnonotus cafer stanfordi* Deignan
338. *Pycnonotus striatus striatus* (Blyth)
339. *Pycnonotus flavescens flavescens* Blyth
340. *Criniger flaveolus flaveolus* (Gould)
341. *Hypsipetes viridescens cacharensis* (Deignan)
342. *Hypsipetes mcclelandi mcclelandi* Horsfield
343. *Hypsipetes flavalus flavalus* (Blyth)
344. *Hypsipetes madagascariensis nigrescens* Baker

**Family MUSCICAPIDAE**
345. *Pellorneum ruficeps vocale* Deignan
346. *Pellorneum albiventre albiventre* (Godwin-Austen)
347. *Trichastoma tickelli assamensis* (Sharpe)
348. *Trichastoma abbotti abbotti* (Blyth)
349. *Pomatorhinus schisticeps schisticeps* Hodgson
350. *Pomatorhinus ruficollii bakeri* Harington
351. *Pomatorhinus erythrogenys mcclelandi* Godwin-Austen
352. *Pomatorhinus ferruginosus formosus* Koelz
353. *Pomatorhinus ochraceiceps austeni* Hume
354. *Xiphirhynchus superciliaris intextus* Ripley
355. *Rimator malacoptilus* Blyth
356. *Napothera brevicaudata striata* (Blyth)
357. *Napothera epilepidota roberti* (Godwin-Austen & Walden)
358. *Spelaearnis longicaudatus* (Moore)
359. *Spelaearnis chocolatinus chocolatinus* (Godwin-Austen & Walden)
360. *Spelaearnis formosus* (Walden)
361. *Sphenocichla humei roberti* Godwin-Austen & Walden
362. *Stachyris ruficeps ambigua* (Harington)
363. *Stachyris ruficeps ruficeps* Blyth
364. *Stachyris chrysaea* Blyth
365. *Macronous gularis rubricapilla* (Tickell)
366. *Timalia pileata bengalenisis* Godwin-Austen
367. *Chrysomma sinense sinense* (Gmelin)
368. *Paradoxornis nipalensis poliotis* (Blyth)
369. *Paradoxornis ruficeps bakeri* (Hartert)
370. *Paradoxornis gularis transfluvialis* (Hartert)
371. *Turdoides longirostris* (Hodgson)
372. *Turdoides striatus striatus* (Dumont)
373. *Garrulax monileger monileger* (Hodgson)
374. *Garrulax pectoralis melanotis* Blyth
375. *Garrulax striatus cranbrooki* (Kinnea)
376. *Garrulax leucolophus patkaicus* Reichenow
377. *Garrulax chinensis nuchalis* Godwin-Austen
378. *Garrulax galbanus galbanus* Godwin-Austen
379. *Garrulax delesserti gularis* (McClelland)
380. *Garrulax cineraceus cineraceus* (Godwin-Austen)
381. *Garrulax caerulatus livingstoni* Ripley
382. *Garrulax ruficollis* (Jardine & Selby)
383. *Garrulax merulinus toxostomus* (Koelz)
384. *Garrulax sannio albosuperciliaris* Godwin-Austen
385. *Garrulax virgatus* (Godwin-Austen)
386. *Garrulax austeni austeni* (Godwin-Austen)
387. *Garrulax squamatus* (Gould)
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455. Prinia subflava fusca (Hodgson)
456. Prinia socialis inglisi Whistler & Kinnear
457. Prinia flaviventris flaviventris (Delessert)
458. Prinia criniger catharia Reichenow
459. Prinia atrogularis khasiana (Godwin-Austen)
460. Graminicola bengalensis bengalensis Jerdon
461. Orthotomus sutorius luteus Ripley
462. Orthotomus atrogularis nitidus Hume
463. Orthotomus cucullatus coronatus Blyth
464. Megalurus palustris toklao (Blyth)
465. Acrocephalus orientalis (Temminck & Schlegel)
466. Acrocephalus bistrigiceps Swinhoe
467. Acrocephalus dumetorum Blyth
468. Phylloscopus affinis affinis (Tickell)
469. Phylloscopus Juscatus mariae Ripley
470. Phylloscopus pulcher pulcher Blyth
471. Phylloscopus inornatus mandellii (Brooks)
472. Phylloscopus inornatus inornatus (Blyth)
473. Phylloscopus proregulus newtoni Gaetke
474. Phylloscopus magnirostris Blyth
475. Phylloscopus occipitalis coronatus (Temminck & Schlegel)
476. Phylloscopus reguloides assamensis Hartert
477. Phylloscopus reguloides claudiae (La Touche)
478. Seicercus affinis (Hodgson)
479. Seicercus burkii burkii (Burton)
480. Seicercus xanthochistos tephrodiras Sick
481. Seicercus poliogenys (Blyth)
482. Seicercus castaniceps castaniceps (Hodgson)
483. Abroscopus superciliaris flaviventris (Jerdon)
484. Abroscopus schisticeps flavimentalis (Baker)
485. Abroscopus albogularis albogularis (Horsfield & Moore)
486. Brachypteryx leucophrys nipaenesis Hodgson
487. Brachypteryx montana cruralis (Blyth)
488. Erithacus calliope (Pallas)
489. Erithacus pectoralis confusus (Hartert)
490. Erithacus brunneus brunneus (Hodgson)
491. Erithacus cyane cyane (Pallas)
492. Erithacus chrysaeus chrysaeus (Hodgson)
493. Copsychus saularis ermelas (Oberholser)
494. Copsychus malabaricus indicus (Baker)
495. Phoenicurus ochruros rufiventris (Vieillot)
496. Phoenicurus hodgsoni (Moore)
497. Phoenicurus frontalis (Vigors)
498. Phoenicurus aurorueus leucopterus (Blyth)
499. Rhyacornis fuliginosus fuliginosus (Vigors)
500. Cinclidium leucurum (Hodgson)
501. Enicurus immaculatus (Hodgson)
502. Enicurus schistaceus (Hodgson)
503. Enicurus leschenaulti indicus Hartert
504. Enicurus maculatus guttatus Gould
505. Cochoa purpurea Hodgson
506. Cochoa viridis Hodgson
507. Saxicola leucura (Blyth)
508. Saxicola caprata burmanica Baker
509. Saxicola jerdoni (Blyth)
510. Saxicola ferra Gray
511. Chaimarromis leucocephalus (Vigors)
512. Monticola rufiventris (Jardine & Selby)
513. Myiophonus caeruleus temminckii Vigors
514. Zoothera sibirica sibirica (Pallas)
515. Zoothera citrina citrina (Latham)
516. Zoothera mollissima mollissima (Blyth)
517. Zoothera dixoni (Seebohm)
518. Zoothera dauma dauma (Latham)
519. Zoothera monticola monticola Vigors
520. Zoothera marginata Blyth
521. Turdus dissimilis dissimilis Blyth
522. Turdus albocinctus Royle
523. Turdus boulboul (Latham)
524. Turdus feai (Salvadori)
525. Turdus obscurus Gmelin
526. Turdus ruficollis atrogularis Jarocki
527. *Turdus ruficollis ruficollis* Pallas

Family CINCILIDAE

528. *Cinctus pallasi dorjei* Kinnear

Family PARIDAE

529. *Melanochlora sultanea sultanea* (Hodgson)

530. *Parus major nipalensis* Hodgson

531. *Parus monticolus monticolus* Vigors

532. *Parus spilonotus subviridis* Blyth

533. *Sylviparus modestus modestus* Burton

534. *Aegithalos concinnus manipurensis* (Hume)

Family SIITIDAE

535. *Sitta europaea nagaensis* Godwin-Austen

536. *Sitta castanea cinnamoventris* Blyth

537. *Sitta himalayensis australis* Koelz

538. *Sitta formosa* Blyth

539. *Sitta frontalis frontalis* Swainson

Family CERTHIIDAE

540. *Certhia discolor manipurensis* Hume

Family MOTACILLIDAE

541. *Anthus hodgsoni hodgsoni* Richmond

542. *Anthus novaeseelandiae richardi* Vieillot

543. *Anthus novaeseelandiae rufulus* Vieillot

544. *Anthus cervinus* (Pallas)

545. *Anthus roseatus* Blyth

546. *Anthus spinoletta japonicus* Temminck & Schlegel

547. *Motacilla indica* Gmelin

548. *Motacilla cinerea cinerea* (Tunstall)

549. *Motacilla alba dakhunensis* Sykes

550. *Motacilla alba leucopsis* Gould

551. *Motacilla alba ocularis* Swinhoe

Family DICAEIDAE

552. *Dicaeum agile agile* (Tickell)

553. *Dicaeum chrysorrheum chrysochlore* Blyth

554. *Dicaeum melanozanthum* (Blyth)

555. *Dicaeum concolor olivaceum* Walden

556. *Dicaeum cruentatum cruentatum* (Linnaeus)

557. *Dicaeum ignipectus ignipectus* (Blyth)

Family NECTARINIIDAE

558. *Anthreptes singalensis rubinigentis* (Baker)

559. *Nectarinia sperata brasiliana* (Gmelin)

560. *Aethopyga gouldiae isolata* Baker

561. *Aethopyga gouldiae dabryi* (Verreaux)

562. *Aethopyga nipalensis koelzi* Ripley

563. *Aethopyga saturata assamensis* (McClalland)

564. *Aethopyga siparaja labecula* (Horsfield)

565. *Aethopyga ignicauda ignicauda* (Hodgson)

566. *Arachnothera longirostris longirostris* (Latham)

567. *Arachnothera magna magna* (Hodgson)

Family ZOSTEROPIDAE

568. *Zosterops palpebrosa palpebrosa* (Temminck)

Family PLOCEIDAE

569. *Passer domesticus indicus* Jardine & Selby

570. *Passer montanus hepaticus* Ripley

571. *Passer rutilans intensior* Rothschild

572. *Ploceus benghalensis* (Linne)

573. *Lonchura striata acuticauda* (Hodgson)

574. *Lonchura punctulata subundulata* (Godwin-Austen)

575. *Lonchura malacca atricapilla* (Vieillot)

Family FRINGILLIDAE

576. *Mycerobas melanozanthos* (Hodgson)

577. *Carduelis spinoides heinrichi* Stresemann

578. *Carpodacus erythrinus roseatus* (Blyth)

579. *Propyrrhula subhimachala* (Hodgson)

580. *Pyrrhula nipalensis ricketti* La Touche

Family EMBERIZIDAE

581. *Emberiza rutila Pallas*

582. *Emberiza aureola aureola* Pallas

583. *Emberiza spodocephala sordida* Blyth

584. *Emberiza fucata fucata* Pallas

585. *Emberiza pusilla* Pallas

586. *Melophus lathami* (Gray)
## Records of Game Birds Shot in Manipur State, 1910-1932

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| Wood Snipe                      | 6       | 1       | 1       | 5       | 3       | 20      | 3       |         |
| Solitary Snipe                  |         |         |         |         |         |         |         |         |
| Fantail Snipe                   | 23      | 671     | 582     | 715     | 910     | 890     | 1470    | 1076    |
| Pintail Snipe                   | 59      | 618     | 327     | 311     | 456     | 848     | 964     | 603     |
| Jack Snipe                      | 4       | 2       | 22      | 15      | 13      | 81      | 36      | 17      |
| Painted Snipe                   | 2       | 21      | 41      | 59      | 45      | 80      | 103     | 22      |
| **Snipe, unclassified**         | 23      | 671     | 582     | 715     | 910     | 890     | 1470    | 1076    |
| **Total**                       | 1137    | 1314    | 973     | 1101    | 1475    | 2228    | 2675    | 1956    |

Total 281 774 1619 1423 2060 2745 1819 1158
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ORNITHOLOGICAL ACCOUNTS

The numbers preceding the names of the birds used in Ali and Ripley’s Handbook of the birds of India and Pakistan, Vols. 1-10 (1968-1974).

Birds said to occur in Manipur from logical inference, such as from distributional point, and not based on recorded collection or reliable sight record, have their accounts given in square brackets.

Family PODICIPEDIDAE

3. Podiceps cristatus cristatus (Linnaeus) 
Great Crested Grebe

Winter visitor. May occur in winter in all types of water bodies.

5. Podiceps ruficollis capensis Salvadori 
Little grebe

A year-round resident bird in India. Fairly common in lakes and tanks.

26. Phalacrocorax carbo sinensis (Shaw) 
Large Cormorant

Resident. All India; on large bodies of water. May occur in large lakes in Manipur.

28. Phalacrocorax niger (Vieillot) 
Large Cormorant

Resident in India. Possibly breeds on suitable lakes (= Logtak).

29. Anhinga rufa melanogaster Pennant 
Darter

All India but sparse or not occur in NE India. Rarely occur in suitable water biotope.

Family ARDEIDAE

36. Ardea cinerea rectirostris Gould 
Eastern Grey Heron

Resident in India. A bird of marsh and wooded lakes. Slightly less common than purple Heron. Elsewhere breeds but returns early in Manipur (Higgins).

37. Ardea purpurea manilensis Meyen 
Eastern Purple Heron

A resident and also breeding in India. Fairly common, resides and breeds in Manipur (Higgins).

38. Ardeola striata chloriceps (Bonaparte) 
Little Green Heron

Distributed in the entire Indian Union. Not uncommon, especially in hill streams where they debouch into the Manipur Valley (Roonwal).

42. Ardeola grayii grayii (Sykes) 
Indian Pond Heron

Common paddy field bird. All India. This species is common in Manipur both resident and breeding.

1♂, 1♀, 6 miles N. of Imphal, Ca. 2800', 4. 12. 1945 (Roonwal).

Measurements : Wing Tail Bill
1♂ 228 87 69
1♀ 201 72 68

44. Bubulcus ibis coromandus (Boddaert) 
Cattle Egret

Common paddyfield bird. All India. Very common. 2 (Unsexed), Imphal Valley, Ca. 2,600/5.11.1945 (Roonwal).

Measurements : Wing Tail Bill
2 (unsexed) 224-247 83-92 56-60

46. Ardea alba modesta J. E. Gray 
Large Egret

Common paddyfield bird. All India. Very common in Manipur Valley

47. Egretta intermedia intermedia (Wagler) 
Median Egret

Birds of field and marsh, found in the entire Union. Found in Manipur in suitable biotope.

49. Egretta garzetta garzetta (Linnaeus) 
Little Egret

Its distributional range includes Manipur.
52. *Nycticorax nycticorax nycticorax* (Linnaeus)  
**Night Heron**  
Its distributional range includes Manipur.

53. *Gorsachius melanolophus melanolophus*  
(Raffles)  
**Malay or Tiger Bittern**  
A discontinuously distributed Indo-Malayan from having distributional in Manipur.

66. *Ixobrychus cinnamomeus* (Gmelin)  
**Chestnut Bittern**  
It is distributed throughout the Indian Union including Manipur.

67. *Ixobrychus sinensis* (Gmelin)  
**Yellow Bittern**  
Its distributional range includes Manipur.

58. *Ixobrychus flavicollis flavicollis* (Latham)  
**Black Bittern**  
Throughout Indian Union including Manipur.

60. *Mycteria leucocephala* (Pennant)  
**Painted Stork**  
Throughout the Indian Mainland including Manipur.

61. *Anastomus oscitans* (Boddaert)  
**Openbill Stork**  
Higgins reported it as very common, being seen in immense flocks and breeding.

62. *Ciconia episocopus episocopus* (Boddaert)  
**Whitenecked Stork**  
The range of distribution of this bird include Manipur.

69. *Threskiornis aethiopicus melancephala* (Latham)  
**White Ibis**  
Higgin reported it as not uncommon.

72. *Platalea leucorodia major* Temminck & Schlegel  
**Spoon bill**  
Throughout the Indian Mainland including Manipur.

79. *Anser albifrons albifrons* (Scopoli)  
**White fronted Goose**  
Higgins reported it as rare visitor and only been recorded four times, collected one on 25 Feb., 1916.

81. *Anser anser rubrirostris* Swinhoe  
**Eastern Grey Leg Goose**  
Higgins noted that first recorded shot in Manipur was on October 30th, 1911. Dumont noted large numbers in Loktak.

88. *Dendrocygna javanica* Horsfield  
**Lesser Whistling Teal**  
Higgins reported this bird was very rare in Manipur. Noted a pair in September, 1925 and a single in October, 1929.

90. *Tadorna ferruginea* (Pallas)  
**Ruddy Shelduck**  
Higgins reported it as regular winter visitor but in small numbers.

91. *Tadorna tadorna* (Linnaeus)  
**Common Shelduck**  
Higgins reported it as rare visitor, collected two specimens between 1910-1927 and saw a flock of six in October, 1930.

93. *Anas acuta* Linnaeus  
**Pintail**  
Distributed throughout the Indian Union including Manipur.
94. *Anas crecca crecca* Linnaeus  
Common Teal

Higgins reported it very common in all water bodies in Manipur.

95. *Anas formosa* Georgi  
Baikal Teal

Very rare and sporadic winter visitor. Recorded from Manipur (Ripley 1961 : 31)

99. *Anas poecilorhyncha xenorhyncha*  
Eastern Grey Duck  
Swinhoe

Recorded from Manipur. Higgins commented it as very rare in Manipur. Only two recorded between 1930 and 1931.

101. *Anas strepera strepera* Linnaeus  
Gadwal

An Wintering bird in India, gradually decreasing southwards. It has wintering range in Manipur.

102. *Anas falcata* Georgi  
Falacated Teal

Straggler to India, recorded from Manipur (Ripley 1961 : 33).

103. *Anas penelope* Linnaeus  
Wigeon

Winters throughout India including Manipur in suitable ponds and reedy swamps. Higgins reported it as common sporting bird in Manipur.

105. *Anas clypeata* Linnaeus  
Shoveller

A common wintering species in India including Manipur.

108. *Aythya ferina* (Linnaeus)  
Common Pochard

Common in India including Manipur. Higgins reported it as a good sporting bird.

109. *Aythya nyroca* (Guldenstadt)  
White-eyed Pochard

Wintering in India including Manipur.

110. *Aytha baeri* (Radde)  
Eastern White-eye

An uncommoin wintering species, occasionally in Manipur (Ripley 1961 : 36).

111. *Aytha fuligula* (Linnaeus)  
Tufted Duck

Winters in India including Manipur.

113. *Aix galericulata* (Linnaeus)  
Mandarin Duck

Exceptional vagrant in Manipur.

114. *Nettapus coromandelianus*  
*coromandelianus*  
(Gmelin)  
Cotton Teal

Very common. Higgins reported it as resident and breeding bird.

116. *Cairina scutulata* (S. Muller)  
White winged Wood Duck

Higgins reported it as very rare in Manipur. Occasionally in the S. E. of Manipur. Noted three in a small tributary of the Iril river on July 24, 1913 at about 3,000 ft.

117. *Bucephala clangula clangula* (Linnaeus)  
Goldeneye Duck  

A wintering vagrant in India, possibly in Manipur.

Family **ACCIPITRIDAE**

124. *Elanus caeruleus vociferus* (Latham)  
Blackwinged Kite

Hume (1888) found it very common in the Imphal Valley and Kopum Thull and absent in the hills of Manipur. Roonwal & Nath (1948) also found it fairly common in Manipur.

<table>
<thead>
<tr>
<th>Measurements</th>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
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<tbody>
<tr>
<td>1♂</td>
<td>273</td>
<td>123</td>
<td>23</td>
</tr>
<tr>
<td>1 (Unsexed)</td>
<td>279</td>
<td>131</td>
<td>21</td>
</tr>
</tbody>
</table>
128. *Aviceda leuphotes syama* (Hodgson)
   Burmese Blackfested Baza

Sporadically distributed in NE India including Manipur.

131. *Pernis pilorhynchos ruficollis* Lesson
   Eastern Honey Buzzard

It has distributional range in Manipur.

133. *Milvus migrans goivinda* Sykes
   Pariah Kite

Hume (1888) found it common in Manipur. Roonwal & Nath (1948) found it common in Imphal Valley and noted up to 3,500 ft. Thin population are more frequently found in city and suburb than in the jungle.

Measurements: Wing Tail Bill
\[
\begin{array}{ccc}
\sigma & 438 & 251 & 34 \\
1 \varphi & 431 & 265 & 34 \\
\end{array}
\]

134. *Milvus migrans lineatus* (Gray)
   Large Indian Kite

Hume (1888) recorded uncommon in Manipur. Roonwal & Nath (1948) reported its occurrence in Imphal Valley. This kite other than two preceding races, is a forest type.

Measurements: Wing Tail Bill
\[
\begin{array}{ccc}
\sigma & 497 & 333 & 36 \\
1 \varphi & 431 & 281 & 27 \\
\end{array}
\]

135. *Haliastur indus indus* (Boddaert)
   Brahminy Kite

Kanglatongbi, 16 miles N. of Imphal, Ca. 3,500 ft., 1 \varphi (2 Dec., 1945).

Measurements: Wing Tail Bill
\[
\begin{array}{ccc}
1 \varphi & 384 & 223 & 36 \\
\end{array}
\]

138. *Accipiter badius dussumieri* (Temminck)
   Indian Shikra

It has distributional range in Manipur.

147. *Accipiter nusus nisosimilis* (Tickell)
   Asiatic Sparrow-Hawk

Distributed in the Indian mainland including Manipur.

156. *Buteo buteo japonicus* (Temminck and Schlegel)
   Buzzard

Distributed in the Indian mainland including Manipur.

158. *Spizaetus nipalensis nipalensis* (Hodgson)
   Feathertoeed Hawk-Eagle


165. *Hieraaetus kienerii kienerii* (E. Geoffray)
   Rufousbellied Hawk-Eagle

It has distributional range in Manipur.

170. *Aquila clanga* Pallas
   Greater Spotted Eagle

Winters throughout India including Manipur.

171. *Aquila pomarina hastata* (Lesson)
   Lesser Spotted Eagle

It has distributional range in Manipur.

178. *Sarcogyps calvus* (Scopoli)
   Indian Black Vulture

It has distributional range in Manipur.

185. *Gyps bengalensis* (Gmelin)
   Indian Whitebacked Vulture

Distributed in India including Manipur.

190. *Circus macrourus* (S. G. Gmelin)
   Pale Harrier

A wintering bird in India including Manipur.

192. *Circus melanoleucos* (Pennart)
   Pied Harrier

A winter visitor throughout India including Manipur.
193. *Circus aeruginosus aeruginosus* (Linnaeus)  
Marsh Harrier

A wintering species of swamp in India including Manipur.

194. *Circus aeruginosus spilonotus* Kamp  
Eastern Marsh Harrier

An eastern Asian winter migrant having distributional range in Manipur.

199. *Spilornis cheela burmanicus* Swann  
Burmese Crested Serpent Eagle

It has distributional range in Manipur.

203. *Pandion haliaetus haliaetus* (Linnaeus)  
Osprey

Wintering in India including Manipur.

Family  
FALCONIDAE

204. *Microhierax caeruleseens caerulescens* (Linnaeus)  
Himalayan Redbreasted Falconet

Its distributional range includes Manipur.

205. *Microhierax melanoleucos* (Blyth)  
Pied Pigmy Falcon

It has distributional range in Manipur.

208. *Falco biarmicus juggar* J. E. Gray  
Laggar Falcon

Resident in India including Manipur.

209. *Falco peregrinus japonensis* Gmelin  
Eastern Peregrine Falcon

A winter migrant in India including Manipur.

213. *Falco subbuteo centratae* (Buturlin)

It has distributional range in Manipur.

215. *Falco severus severus* Horsfield  
Burmese Hobby

It has distributional range in Manipur.

220. *Falco vespertinus amurensis* Radde  
Eastern Redlegged Falcon

Passage migrant sporadic records, Possibly in Manipur.

221. *Falco naumanni Fleischer*  
Lesser Kestrel

Straggler in India, stray records, probably in Manipur.

223. *Falco tinnunculus interstinctus* McClelland  
East Himalayan Kestrel


Hume (1888) found it common in the Imphal Valley and rare in the hills. Ronwal & Nath (1948) found it common in Manipur.

Measurements:  
Wing  Tail  Bill
2♂  239-252  161-181  14-19
3♀  347-255  171-186  15-17

Family  
PHASIANIDAE

239. *Francolinus francolinus melanotus* Hume  
Assam Black Partridge

Higgins reported this bird is very common in suitable localities.

243. *Fancolinns pintadeanus phayrei* (Blyth)  
Burmese Francolin

Higgins remarked. It seems that this Francolin was never recorded as an inhabitant of Manipur in any scientific or semi scientific books or papers until 1914. Its distribution in the Manipur Valley appears to commence from the glen of the Khuga river (in the South West Corner of the valley), where it follows foothills in the southwest, south and east of the valley as far as pukhao in the glen of the Iril river in the extreme NE corner of the valley. It is nowhere so plentiful as the Black Partridge.

250. *Coturnix coturnix coturnix* (Linnaeus)  
Grey Quail

Higgins reported it as rare in Manipur. The
earliest record in Manipur was shot on 3rd September, 1919.

252. Coturnix coromandelica (Gmelin)  
Rain Quail

It has distributional range in Manipur.

253. Coturnix chinensis chinensis (Lennaeus)  
Bluebreasted Quail

Baker remarked that this species is very common in Manipur.

255. Perdicula manipurensis manipurensis Hume  
Manipur Painted Bush Quail

Higgins noted it in the bogs and swamps in the south of the valley and also in the glens which run into it.

256. Arborophila torqueola interstincta Ripley  
Assam Hill Partridge

It has distributional range in Manipur.

257. Arborophila rufogularis intermedia (Blyth)  
Arakan Hill Partridge

It has distributional range in Manipur.

258. Arborophila atrogularis (Blyth)  
Whitecheeked Hill Partridge

Imphal, Regailous camp (3,250 ft.) 1♂ 1♀ (9, 11, Feb., 1963) Hume (1888) found it very rare in Manipur and Higgins (1934) was on the same opinion.

Measurements: Wing Tail Bill
1♂ 145 65 20
1♀ 131 65 20

259. Bambusicola fytchii hopkinsoni Godwin-Austen  
Assam Bamboo Partridge

Kanglatongbi, 18 miles N. of Imphal (c. 3,500 ft.) 3♂, 1♀ (10 Dec., 1945)

Hume (1888) noted it rare and obtained it in the eastern hills of Manipur.

Higgins (1934) found it common throughout the Manipur hills, upto 6,000 ft.

Roonwal & Nath (1948) noted it as thinly found in the Manipur hills.

Measurements: Wing Tail Bill
3♂ 138-150 100-115 20-24
1♀ 141 103 23

288. Tragopan blythii blythii (Jerdon)  
Greybellied Tragopan

Hume (1888) found only in thick forest in the higher ranges of both sides of the valleys.

Higgins (1934) reported that one was recorded on February 14th, 1928. But Col. Cassels shot two in 1894 and one in 1896.

296. Lophura lencomelana lathami (J. E. Gray)  
Blackbreasted Kaleej


Bath Hume (1888) and Higgins (1934) found it common in Manipur, while Higgins also recorded Williamsi from Korong and Barak valley of Manipur.

Baker (1926) said this species as the common pheasant of Manipur.

Higgins (1934) further added that a quite number of birds on Thanga, a hilly island in Loktak.

Measurements: Wing Tail Bill
1♂ 256 295 33

297. Lophura leucomelana williamsi (Oates)  
Williams’ Kaleej Pheasant

Higgins (1934) saw the feathers of a male specimen shot in January, 1929 at Karong in the Barak Valley, 40 miles north of Imphal at about 3,500 ft.

Baker (1926) gave its habitat as east of the Manipur river, but all the localities he specified were in Burma, so presumably it was not recorded from so far north and west Manipur.
308. Syrmaticus humiae humiae (Hume)
Mrs Hume’s Barredback Pheasant

Higgins (1934) saw this bird at Ukhrul in the eastern hills just below 6000 ft, for the first time during rain. For the second time in January, 1918 at Heika (4,700 ft.) in the Southern hills.

309. Polypelectron bicalcaratum bakeri Lowe
Peacock Pheasant

Ragailus camp (3,250 ft.) 1♂ (11 Feb., 1936).
Hume (1888) recorded it as common in the western hills of Manipur, but absent in the valley and eastern hills. Higgins (1934) found it fairly common in the hills.

Measurements: Wing Tail Bill
1♂ 241 410 22

311. Pavo cristatus Linnaeus
Indian Peafowl

His Highness the Maharaja of Manipur had some pairs at the palace, the offspring of which ran wild over the country to some extent and reached the hills east and north of Imphal. Higgins (1934) was interested to see whether they were able to establish themselves and replace the extinct Burmese race by the Indians.

Family TURICIDAE

313. Turnix sylvatica dussumier (Temminck)
Little Bustard Quail

This birds is not common, but occurs in suitable biotope.

315. Turnix tanki blanfordii Blyth
Burmese Yellowlegged Button Quail

It has distributional range in Manipur.

322. Grus monacha Temminck
Hooded Crane

Regular visitor, though not in large numbers. Col. Cassels recorded six having been shot on 31st December, 1897 and 1st January, 1898.

324. Grus antiquone sharpii Blandford
Burmese Sarus

Not uncommon, residing and breeding in the swamps in the south of the valley, usually seen in pairs but Higgins once met with a large flock of 20 to 30 birds.

Family RALLIDAE

329. Rallus striatus albibenter Swainson
Indian Bluebreasted Banded Rail

It has distributional range in Manipur.

337. Porzana pusilla pusilla (Pallas)
Eastern Baillon’s Crake

It winters in India including Manipur.

339. Amaurornis fuscus bakeri (Hatert)
Northern Ruddy Crake

It has distributional range in Manipur.

341. Amaurornis bicolor (Walden)
Elwes’s Crake

It has distributional range in Manipur.

343. Amaurornis phoenicus chinensis (Boddaert)
Chinese Whitebreasted Waterhen

It has distributional range in Manipur.

346. Gallicrex cinerea cinerea (Gmelin)
Watercock

It is distributed in India including Manipur.

347. Gallinula chloropus indica Blyth
Indian Moorhen

It is distributed in India including Manipur.

349. Porphyrio porphyrio poliocephalus (Latham)
Indian Purple Moorhen

It has distributional range in Manipur.

350. Fulica atra atra Linnaeus
Coot

Higgins (1934) reported it very common winter
migrant. It comes with the Pochard but leaves before them.

Family JACANIDAE

358. *Hydrophasianus chirurgus* (Scopoli)  
Pheasant-tailed Jacana

It has distributional range in Manipur.

359. *Metopidius indicus* (Latham)  
Bronzewinged Jacana

It has distributional range in Manipur.

Family CHARADRIIDAE

364. *Vanellus vanellus* (Linnaeus)  
Lapwing

Higgins (1934) reported it as very rare visitor. Five were shot on November 29th, 1916. Higgins saw two on the edge of the Loktak Lake on 26th December, 1920. Col. Goodall saw a large flock on a bill north of the Loktak on 13th January, 1930.

356. *Vanellus cinereus* (Blyth)  
Greyheaded Lapwing

Higgins (1934) reported that this migratory species are almost invariably in flocks, sometimes as large as 50 birds on the wet ground round marshes and on the bills.

368. *Vanellus indicus atronuchalis* (Jerdon)  
Burmese Redwattled Lapwing

Imphal Valley (c. 2,600 ft.) 1♂, 1♀ (25 November, 1945).

Hume (1888) found it rare in the basin and absent in the hills. Higgins (1934) also had the same view.

Measurements:

<table>
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<tr>
<th></th>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
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<tbody>
<tr>
<td>1♂</td>
<td>220</td>
<td>118</td>
<td>33</td>
</tr>
<tr>
<td>1♀</td>
<td>222</td>
<td>117</td>
<td>36</td>
</tr>
</tbody>
</table>

369. *Vanellus spinosus duvancelei* (Lesson)  
Spurwinged Lapwing

This bird resides and breeds in Manipur.

373. *Pluvialis dominica fulva* (Gmelin)  
Eastern Golden Plover

Higgins (1934) noted that it is found in flocks as large as 200 or 300 on grazing grounds, the edges of bills and in fallow paddy fields in migration time.

378. *Charadrius dubius curonicus* Gmelin  
European Little Ringed Plover

It has distributional range in Manipur.

380. *Charadrius dubius jerdoni* (Legge)  
Indian Little Ringed Plover

It has distributional range in Manipur.

381. *Charadrius alexandrinus alexandrinus* Linnaeus  
Kentish Plover

It has wintering range in Manipur.

386. *Numenius phaeopus variegatus* (Scopoli)  
Eastern Whimbrel

Higgins (1934) reported a single bird was shot by Capt. Busfield on August 25th, 1932.

388. *Numenius arquata orientalis* C. L. Brehm  
Eastern Curlew


392. *Tringa erythropus* (Pallas)  
Spotted or Dusky Redshank

A regular visitor, seen in large flocks.

394. *Tringa totanus eurhinus* (Oberholser)  
Eastern Redshank

It has distributional range in Manipur.
395. *Tringa stagnatilis* (Bechstein)  
**Marsh Sandpiper**

It is wintering in India including Manipur.

396. *Tringa nebularia* (Gunnerus)  
**Greenshank**

It is wintering in India including Manipur.

397. *Tringa ochropus* Linnaeus  
**Green Sandpiper**

Imphal, 6 miles north (c. 2,800 ft.) 2♀ (4 December, 1945). Hume (1888) found it very common in Manipur.

Roonwal & Nath (1948) noted in distinctly uncommon and was occasionally seen near pools.

**Measurements:**  
Wing Tail Bill  
2♂ 142-147 61-66 37-40

398. *Tringa glareola* Linnaeus  
**Spotted Sandpiper**

It is wintering in Manipur.

401. *Tringa hypoleucus hypoleucus* Linnaeus  
**Common Sandpiper**

It has distributional range in Manipur.

404. *Gallinago solitaria solitaria* Hodgson  
**Eastern Solitary Snipe**

It is wintering in Manipur.

405. *Gallinago nemoricola* Hodgson  
**Woodsnipe**

It has distributional range in Manipur.

406. *Gallinago stenura* (Bonaparte)  
**Pintail Snipe**

It has distributional range in Manipur.

407. *Capela megala* (Swinhoe)  
**Swinhoe’s Snipe**

It has distributional range in Manipur.

409. *Gallinago gallinago gallinago* (Linnaeus)  
**F Fantail Snipe**

It has distributional range in Manipur.

410. *Gallinago minima* (Brunnich)  
**Jack Snipe**

It has distributional range in Manipur.

411. *Scolopax rusticola rusticola* (Linnaeus)  
**Woodcock**

It has distributional range in Manipur.

417. *Calidris temminckii* (Leisler)  
**Temminck’s Stint**

It has distributional range in Manipur.

426. *Philomachus pugnax* (Linnaeus)  
**Ruff**

Uncommon, though not infrequent visitor.

**Family**  
**ROSTRATULIDAE**

429. *Rostrula benghalensis benghalensis* (Linnaeus)  
**Painted Snipe**

It has distributional range in Manipur.

**Family**  
**RECURVIROSTRIDAE**

430. *Himantopus himantopus himantopus* (Linnaeus)  
**Indian Blackwinged Stilt**

It is distributed in India including Manipur.

432. *Recurvirostra avosetta* Linnaeus  
**Avocet**

Occasional visitor. Higgins (1934) once saw a pair (date not recorded).

**Family**  
**BURHINIDAE**

436. *Burhinus oedicnemus indicus* (Salvadori)  
**Indian Stone Curlew**

Higgins (1934) shot only one specimen on 6th September, 1932.

437. *Esacus magnirostris recurvirostris* (Cuvier)  
**Great Stone Plover**

Found in small parties.
Family LARIDAE

452. Larus fuscus fuscus Linnaeus
Lesser Blackbacked Gull
It has distributional range in Manipur.

454. Larus brunnicephalus Jerdon
Brownheaded Gull
Common in Lakes in the cold weather. Fond of associating with the Coots and Dabchicks.

463. Sterna aurantia J. E. Gray
India River Tern
It has distributional range in Manipur.

465. Sterna hirundo tibetana Saunders
Tibetan Common Tern
It has distributional range in Manipur.

470. Sterna acuticauda J. E. Gray
Blackbellied Tern
It has distributional range in Manipur.

Family COLUMBIDAE

493. Treron apicauda apicauda Blyth
Pintailed Green Pigeon
Higgins (1934) noted this species is not uncommon and has been shot in the hills.

494. Treron sphenura sphenura (Vigors)
Wedgetailed Green Pigeon
It has distributional range in Manipur but Higgins (1934) never saw or heard of this species in Manipur.

495. Treron curvirostra nipalensis (Hodgson)
Thickbilled Green Pigeon
This species is not uncommon in the hills.
Higgins (1934) saw a number of flocks in the jungle surrounding a village in the eastern hills at 4,200 ft. on 23rd March, 1918.

499. Treron pompadora phayrei (Blyth)
Ashyheaded Green Pigeon
Fairly common in the Hills.

Higgins (1934) shot a single bird on the west edge of the Manipur Valley on 5th February, 1915.

501. Treron bicincta bicincta (Jerdon)
Indian Orange breasted Green Pigeon
Mr. A. A. Barnard, J. S. E., saw a pair at Kanglatongbi, at the foot of the hills in the north of the valley in July, 1932 (Roonwal-1945).

503. Treron phoenicoptera phoenicoptera (Latham)
Bengal Green Pigeon
Higgins (1934) had no doubt their occurrence. Higgins shot them on several occasions in the Kabow valley, just across the Burma border where they are plentiful.

506. Ducula aenea sylvatica (Tickell)
Northern Green Imperial Pigeon
Higgins (1934) commented as, It does not occur in the Manipur valley and I have never seen it in the hills.

Roonwal & Nath (1945) noted it as common in the Kabow and Jiri valleys on the Burma and Cachar borders of the State, and also in the Nambar forest at the foot of the Naga Hills on the north.

516. Ducula badia insignis Hodgson
Nepal Maroonbacked Imperial Pigeon
It has distributional range in Manipur.

512. Ducula badia griscicapilla Walden
Greyheaded Imperial Pigeon
Hume (1888) found it common in Imphal Valley.
Higgins (1934) also found it common.

517. Columba livia intermedia Strickland
Indian Blue Rock Pigeon
Common and found elsewhere a domesticated species.

520. Columba hodgsonii Vigors
Speckled Wood Pigeon
It has distributional range in Manipur.
523. **Columba pulchrilocollis** Blyth

**Ashy Wood Pigeon**

Higgins (1934) saw three large grey pigeons on the upper slopes of the high range west of the Manipur Valley at 5,100 ft.

524. **Columba punicea** Blyth

**Purple Wood Pigeon**

It has distributional range in Manipur.

526. **Macropygia unchall tusalia** (Blyth)

**Bartailed Cuckoo-Dove**

Kanglatogbi, 16 miles N. of Imphal, (c. 3,500 ft.) 1♂ (20 December, 1945).

Hume (1888) found it in the Western hills but absent in the eastern hills of Manipur.

Higgins (1934) noted a single specimen in the Manipur Valley.

**Measurements:**

<table>
<thead>
<tr>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>1♂</td>
<td>178</td>
<td>178</td>
</tr>
</tbody>
</table>

532. **Streptopelia orientalis agricola** (Tickell)

**Eastern Turtle-Dove**

Kanglatongbi, 16-18 miles N. of Imphal (c. 3,500 ft.) 2♂ (11 Dec., 1945).

Hume (1888) noted it as rare in the western hills and basin of Manipur and absent in the eastern hills.

Higgins (1934) found it very common in the Imphal Valley. Roonwal & Nath (1945) noted it as very common in Manipur.

**Measurements:**

<table>
<thead>
<tr>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>2♂</td>
<td>175-185</td>
<td>123-137</td>
</tr>
</tbody>
</table>

534. **Streptopelia decaocto decaocto** (Frivaldszky)

**Indian Ring Dove**

Kanglatongbi, 16 miles N. of Imphal (c. 3,500 ft.) 2♂ (13 Nov., 1945)

Hume (1888) found it very common in Manipur.

Roonwal & Nath (1948) noted it as less common.

**Measurements:**

<table>
<thead>
<tr>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>1♀</td>
<td>173</td>
<td>—</td>
</tr>
</tbody>
</table>

536. **Streptopelia tranquebarica humilis**

(Temminck)

**Burmese Red Turtle-Dove**

These little doves are common in the Manipur Valley.

539. **Streptopelia chinensis tigrina** (Temminck)

**Burmese Spotted Dove**

Kanglatongbi, 15-16 miles N. of Imphal (c. 3,000 ft.) 2♂ (unsexed) (6, 14 Nov., 1945)

Hume (1888) found it common in Manipur but reported as s. c. suratensis.

Baker (1925) placed Manipur birds as intermediate between suratensis and tigrina.

Higgins (1934) found it common in Manipur.

Roonwal & Nath (1948) had the same observation.

**Measurements:**

<table>
<thead>
<tr>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>2♂</td>
<td>138-145</td>
<td>136-144</td>
</tr>
</tbody>
</table>

542. **Chalcophaps indica indica** (Linnaeus)

**Indian Emerald Dove**

Higgins (1934) reported it as fairly common in the western hills.

**Family** **PSITTACIDAE**

547. **Psittacula eupatria avensis** (Kloss)

**Large Burmese Parakeet**

It has distributional range in Manipur.

549. **Psittacula krameri borealis** (Neumann)

**Northern Roseringed Parakeet**


**Measurements:**

<table>
<thead>
<tr>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>1♀</td>
<td>173</td>
<td>—</td>
</tr>
</tbody>
</table>
551. *Psittacula alexandri fasciata* (P. L. S. Muller)  
Indian Redbreasted Parakeet

It is distributed in Manipur.

557. *Psittacula cyanopechala bengalensis*  
(Forster)  
Northern Blossomheaded Parakeet

It has distributional range in Manipur.

563. *Psittacula finschii* (Hume)  
Eastern Slatyheaded Parakeet

It has distributional range in Manipur.

Family CUCULIDAE

569. *Clamator coromandus* (Linnaeus)  
Redwinged Crested Cuckoo

It has winter migrant distributional range in Manipur.

570. *Clamator jacobinus serratus* (Sparrman)  
Pied Crested Cuckoo

Its wintering range includes Manipur.

572. *Cuculus sparverioides sparverioides* Vigors  
Large Hawk-Cuckoo

It is a winter migrant in Manipur.

573. *Cuculus varius varius* Vahl  
Common Hawk-Cuckoo

It is wintering in Manipur.

575. *Cuculus fugax visicolor* Blyth  
Hodgon’s Hawk-Cuckoo

It has winter distributional range in Manipur.

579. *Cuculus canorus bakti* Hartert  
Khasi Hills Cuckoo

It has distributional range in Manipur.

581. *Cuculus poliocephalus poliocephalus*  
Latham  
Small Cuckoo

It has wintering range in Manipur.

585. *Cacomantis merulinus querulus* Heine  
Rufousbellied Plaintive Cuckoo

It has wintering range in Manipur.

587. *Chalcites xanthorhynchus xanthorhynchus* (Horsfield)  
Violet Cuckoo

It has distributional range in Manipur.

588. *Surniculus lugubris dicruroides* (Hodgson)  
Indian Drongo Cuckoo

It has distributional range in Manipur.

591. *Eudynamys scolopacea malayana*  
Cabaniis & Heine  
Malay Koel

It has distributional range in Manipur.

593. *Rhopodytes tristis tristis* (Lesson)  
Large Greenbilled Malkoha

It has distributional range in Manipur.

601. *Centropus sinensis intermedius* (Hume)  
East Pakistan Crow-Pheasant

Karglatongbi, 16 miles N. of Imphal (c. 3,500 ft.) 1 (unsexed) (10 Nov., 1945).

Hume recorded it as common.

Measurements:  Wing  Tail  Bill  
1 (unsexed) 197 238 36

605. *Centropus toulou bengalensis* (Gmelin)  
Lesser Coucal

It has distributional range in Manipur.

Family STRIGIDAE

606. *Tyto alba stertens* Hartert  
Indian Barn Owl

Imphal Valley (c. 2,500 ft.) 1♂ (14 Nov., 1945).

Hume (1888) found it rare in Manipur.

Roonwal & Nath (1948) collected only one in the jungle.
DUTTA and DATTA: Aves

Measurements:

<table>
<thead>
<tr>
<th></th>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>1♂</td>
<td>289</td>
<td>116</td>
<td>27</td>
</tr>
</tbody>
</table>

608. *Tyto capensis longimembris* (Jerdon)
Grass Owl
It has distributional range in Manipur.

609. *Phodilus badius saturatus* Robinson
Sikkim Bay Owl
It has distributional range in Manipur.

612. *Otus spilocephalus spilocephalus* (Blyth)
Eastern Spotted Scops Owl.
It has distributional range in Manipur.

616. *Otus scops sunia* (Hodgson)
North Indian Scops Owl.
Kanglatongbi, 16 miles N. of Imphal (c. 3,500 ft.)
Turibari, 5 km. W. of kangpokpi, Sonapati
2♂, 1♀ (8, 12 Nov., 1992)
Measurements:

<table>
<thead>
<tr>
<th></th>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
</tr>
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<tbody>
<tr>
<td>2♂</td>
<td>150</td>
<td>64-62</td>
<td>19-18</td>
</tr>
<tr>
<td>2♀</td>
<td>154-152</td>
<td>69-71</td>
<td>19-20</td>
</tr>
</tbody>
</table>

624. *Otus bakkamoena lettia* (Hodgson)
Burmese Collared Scops Owl
It has distributional range in Manipur.

627. *Bubo bubo bengalensis* (Franklin)
Indian Great Horned Owl
It has distributional range in Manipur.

628. *Bubo nipalensis nipalensis* (Hodgson)
Forest Eagle Owl
It has distributional range in Manipur.

630. *Bubo coromandus coromandus* (Latham)
Dusky Horned Owl
It has distributional range in Manipur.

631. *Bubo zeylonensis leschenaulti* (Temminck)
Brown Fish Owl
It has distributional range in Manipur.

633. *Bubo flavipes* (Hodgson)
Twany Fish Owl
It has distributional range in Manipur.

635. *Glaucidium brodiei brodiei* (Buston)
Collared Pigmy Owlet
It has distributional range in Manipur.

641. *Glaucidium cuculoides rufescens* Baker
Burmese Barred Owlet
It has distributional range in Manipur.

643. *Ninox scutulata burmanica* Hume
Burmese Brown Hawk Owl
It has distributional range in Manipur.

650. *Athene brama indica* (Franklin)
Northern Spotted Owlet
It has distributional range in Manipur.

658. *Strix leptogrammica newarensis* (Hodgson)
Himalayan Brown Wood Owl
Modbung Kanglatongbi, 16 miles N. of Imphal
3♀ (23 Nov., 6, 13 Dec., 1945).
Hume (1888) found it in Manipur.
Measurements:

<table>
<thead>
<tr>
<th></th>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
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</thead>
<tbody>
<tr>
<td>3♂</td>
<td>372-385</td>
<td>223-238</td>
<td>39-42</td>
</tr>
</tbody>
</table>

662. *Strix aluco nivicola* (Blyth)
Himalayan Wood Owl
It has distributional range in Manipur.

664. *Asio flammeus flammeus* (Pontoppidan)
Shorteared Owl
It has distributional range in Manipur.
Family CAPRIMULGIDAE

667. Batrachostomus hodgsoni (G. E. Gray) Hodgson’s Frogmouth
It has distributional range in Manipur.

668. Eurostopodus macrotis cerviniceps (Gould) Burmese Great Eared Nightjar
It has distributional range in Manipur.

670. Caprimulgus indicus hazarae Whistler & Kinnear Himalayan Jungle Nightjar
It has distributional range in Manipur.

678. Caprimulgus indicus hazarae Whistler & Kinnear Himalayan Jungle Nightjar
It has distributional range in Manipur.

682. Caprimulgus affinis monticola Franklin Franklin’s Nightjar
It has distributional range in Manipur.

Family APODIDAE

683. Collocalia brevirostris brevirostris (Horsfield) Himalayan Swiftlet
It has distributional range in Manipur.

690. Chaetura (Caudacuta) cochinchinensis Oustalet Cochichina Spinetail Swift
It has distributional range in Manipur.

691. Chaetura gigantea indica Hume Brownthroated Spinetail Swift
It has distributional range in Manipur.

699. Apus pacificus pacificus (Latham) Large Whiterumped Swift
It has distributional range in Manipur.

700. Apus pacificus leuconyx (Blyth) Himalayan Whiterumped Swift
It has distributional range in Manipur.

706. Apus affinis subfurcatus (Blyth) Malay House Swift
It has distributional range in Manipur.

708. Cypsiurus parvus infumatus Solater Eastern Palm Swift
It is distributional in Manipur.

709. Hemiprocne longipenis coronata (Tickell) Crested Tree Swift
It has distributional range in Manipur.

Family TROGONIDAE

713. Harpactes erythrocephalus hodgsonii (Gould) Nepal Redheaded Trogon
It has distributional range in Manipur.

714. Harpactes erythrocephalus helenae Mayr Mishmi Redheaded Trogon
It has distributional range in Manipur.

715. Harpactes erythrocephalus erythrocephalus (Gould) East Pakistan Redheaded Trogon
Luanglong Khunow (c. 3,250 ft.) 1♂ (9 Feb., 1936)
Hume (1888) found it common in Manipur.
Measurements : Wing Tail Bill
1♂ 149 187 20

Family ALCEDINIDAE

718. Ceryle lugubris guttulata Stejneger East Himalayan Pied Kingfisher
It is distributed in Manipur.

719. Ceryle rudis leucomelanura Reichenbach Indian Pied Kingfisher
Imphal Valley (c. 2,600 ft.) 1♀ (29 Nov., 1945).
Hume (1888) found it very rare in the Imphal Valley and entirely absent in the hills.

Roonwal & Nath (1948) found it common.

This species is very rare. Usually with patchy distribution with thin population. One-two birds are observed flying through outskirt of the forest. Easily recognised by its loud call during flight.

Measurements: Wing Tail Bill
1 ♀ 137 80 63

721. Alcedo hercules Laubmann
Great Blue Kingfisher

It has distributional range in Manipur.

723. Alcedo atthis bengalensis Gmelin
Indian Small Blue Kingfisher

It has distributional range in Manipur.

725. Alcedo meninting coltarti Baker
Assam Blue-eared Kingfisher

It has distributional range in Manipur.

727. Ceyx erithacus erithacus (Linnaeus)
Indian Thrreetoed Forest Kingfisher

It has distributional range in Manipur.

730. Pelargopsis capensis capensis (Linnaeus)
Brownheaded Storkbilled Kingfisher

It has distributional range in Manipur.

733. Halcyon coromanda coromanda (Latham)
Indian Ruddy Kingfisher

It has distributional range in Manipur.

737. Halcyon smyrnensis perpulchra Madarasz
Eastern Whitebreasted Kingfisher

It is distributed in Manipur.

739. Halcyon pileata (Boddart)
Blackcapped Kingfisher

It has distributional range in Manipur.

Family MEROPIDAE

744. Merops leschenaulti leschenaulti Vieillot
Chestnut headed Bee-eater

It has distributional range in Manipur.

753. Nyctyornis athertoni athertoni
(Jardine & Selby)
Bluebearded Bee-eater

It has distributional range in Manipur.

Family CORACIDAE

757. Coracias benghalensis affinis Horsfield
Burmese Roller

It has distributional range in Manipur.

758. Eurystomus orientalis cyanicollis Vieillot
Himalayan Broadbilled Roller

It has distributional range in Manipur.

Family UPUPIDAE

766. Upupa epops longirostris Jerdon
Burmese Hoopoe

It has distributional range in Manipur.
Family BUCEROTIDAE

771. Aceros nipalensis (Hodgson) 
Rufousnecked Hornbill

It has distributional range in Manipur.

772. Rhyticeros undulatus ticehursti Deignan 
Assam Wreathed Hornbill.

It has distributional range in Manipur.

774. Anthracoceros malabaricus malabaricus 
(Gmelin)
Indian Pied Hornbill

Naglea Atrow, 63 miles from Imphal (c. 3,250 ft.) 1♀ (13 Feb., 1936).

Hume (1888) found it common in the western hills of Manipur but absent in the eastern hills.

Present population is absolutely thin. Survive only in some evergreen forest patch due to continuous killing by local people and hunter for its long quill feathers, enormous bill and flesh.

Measurements: Wing Tail Bill
1♀ 294 273 142

776. Buceros bicornis homrai Hodgson 
Great Pied Hornbill

It has distributional range in Manipur.

Family CAPITONIDAE

778. Megalaima virens magnifica Baker 
Assam Great Barbet

It has distributional range in Manipur.

784. Megalaima lineata hodgsoni Bonaparte 
Eastern Lineated Barbet

It has distributional range in Manipur.

787. Megalaima franklini franklini (Blyth) 
Golden Throated Barbet

It has distributional range in Manipur.

788. Megalaima asiatica asiatica (Latham) 
Bluethroated Barbet

Ragailous camp Imphal 1♂ (11 Nov., 1936)

Measurements: Wing Tail Bill
1♂ 105 69 25

789. Megalaima australis cyanotis (Blyth) 
Indian Blue-eared Barbet

It has distributional range in Manipur.

792. Megalaima haemacephala indica (Latham) 
Copper Smith.

It has distributional range in Manipur.

Family PICIDAE

795. Indicator xanthonotus fulvus Ripley 
Nagaland Orange rumped Honeyguide

It has distributional range in Manipur.

797. Jynx torquilla chinensis Hesse 
Chinese Wryneck


Measurements: Wing Tail Bill
1♀ 82 87 17

799. Picumnus innominatus malayorum Hartert 
Southern Speckled Piculet

It has distributional range in Manipur.

801. Sasia ochracea reichenowi Hesse 
Burmese Rufous Piculet

It has distributional range in Manipur.

803. Micropterus brachyurus phaioceps (Blyth) 
Eastern Rufous Woodpecker

It has distributional range in Manipur.

810. Picus canus gyldenstolpei Baker 
Assam Blacknaped Green Woodpecker

It has distributed in Manipur.

813. Picus flavinucha flavinucha Gould 
Eastern Large Yellownaped Woodpecker

It has distributional range in Manipur.
815. *Picus chlorolophus chlorolophus* Vieillot
East Himalayan Yellownaped Woodpecker
It has distributional range in Manipur.

819. *Dinopium benghalense benghalense* (Linnaeus)
Northern Goldenbacked Woodpecker
It has distributional range in Manipur.

824. *Dinopium shorii shorii* (Vigors)
Himalayan Goldenbacked Threetoed Woodpecker
It has distributional range in Manipur.

826. *Dinopium javanense intermedium* (Blyth)
Burmese Goldenbacked Threetoed Woodpecker
It has distributional range in Manipur.

827. *Gecinulus grantia grantia* (Horsfield)
Paleheaded Woodpecker
It has distributional range in Manipur.

829. *Mulleripicus pulverulentus harterti* Hesse
Assam Great Slaty Woodpecker
It is distributed in Manipur.

833. *Hypopicus hyperythrus hyperythrus* (Vigors.)
Eastern Rufousbellied Woodpecker
It is distributed in Manipur.

834. *Picoides major stresemanni* (Rensch)
Blackcrowned Pied Woodpecker
It is distributed in Manipur.

838. *Picoides darjellensis* (Blyth)
Darjeeling Pied Woodpecker
It has distributional range in Manipur.

841. *Picoides cathpharius pyrrhothorax* (Hume)
Manipur Crimsonbreasted Pied Woodpecker
This is described from Aimoles, eastern Manipur Hills and also reported from Meghalaya (Ripley, 1982).

844. *Picoides atratus* (Blyth)
Stripebreasted Pied Woodpecker
Manipur (c. 2,600 ft.) 1♀ (4 Feb., 1936).
Hume (1888) reported it as rare and found only in the eastern hills.

Measurement:  
Wing  Tail  Bill
1♀  110  71  21

845. *Picoides macei macei* (Vieillot)
Fulvousbreasted Pied Woodpecker
It has distributional range in Manipur.

850. *Picoides canicapillus canicapillus* (Blyth)
Burmese Greycrowned Pygmy Woodpecker
It has distributional range in Manipur.

856. *Hemicircus canente canente* (Lesson)
Heartspotted Woodpecker
It is distributed in Manipur.

857. *Blythipicus pyrrhotis pyrrhotis* (Hodgson)
Redeared Baywoodpecker
It has distributional range in Manipur.

861. *Chrysocolaptes lucidus guttacristatus* (Tickell)
Eastern Larger Goldenbacked Woodpecker
It has distributional range in Manipur.

Order PASSERIFORMES
Family EURYLAIMIDAE

864. *Serilophus lunatus rubropygius* (Hodgson)
Nepal Collared Broadbill
It has distributional range in Manipur.

865. *Psarisomus dalhousiae dalhousiae* (Jameson)
Longtailed Broadbill
Nanglea Atrow, 63 miles from Imphal 1♂, 1♀ (13 Feb., 1936).
Hume (1888) found it common in the hills but not in Valley.

Measurements:  

<table>
<thead>
<tr>
<th></th>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1\sigma$</td>
<td>102</td>
<td>124</td>
<td>18</td>
</tr>
<tr>
<td>$1\varphi$</td>
<td>100</td>
<td>112</td>
<td>19</td>
</tr>
</tbody>
</table>

Family PITTIDAE

866. *Pitta nipalensis nipalensis* (Hodgson)  
Bluenaped Pitta

It is distributed in Manipur.

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

It is distributed in all India including Manipur.

869. *Pitta sordida cucullata* Hartlaub  
Greenbreasted Pitta

It has distributional range in Manipur.

871. *Pitta cyanea cyanea* Blyth  
Blue Pitta

Its distributional range includes Manipur.

Family ALAUDIDAE

873. *Mirafra assamica assamica* Horsfield  
Bengal Bush Lark

It is distributed in Manipur.

878. *Eremopterix grisea* (Scopoli)  
Ashycrowned Finch-Lark

It is distributed in Manipur.

Family HIRUNDINIDAE

911. *Riparia riparia ijimae* (Lonnberg)  
Eastern Collared Sand Martin

It has distributional range in Manipur.

918. *Hirundo rustica tytleri* Jerdon  
Chestnuthellied Swallow

It has winter distributional range in Manipur.

929. *Hirundo striolata mayri* Hall  
Chinese Striated or Redrumped Swallow

It is wintering in Manipur.

932. *Delichon nipalensis nipalensis* Moore  
Nepal House Martin

It has distributional range in Manipur.

Family LANIIDAE

938. *Lanius collurioides* Lesson  
Chestnutrumped Shrike

It is distributed in Manipur.

945. *Lanius tephronotus tephronotus* (Vigors)  
Eastern Tibet Greybacked Shrike

It has distributional range in Manipur.

948. *Lanius schach tricolor* (Hodgson)  
Imphal (c. 3,500 ft.) $1\sigma$ $1\varphi$ (24 Nov., 1945).  
Hume (1888) found it common in Manipur.  
Roonwal & Nath (1948) had the same view.

Measurements:  

<table>
<thead>
<tr>
<th></th>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1\sigma$</td>
<td>96</td>
<td>12</td>
<td>—</td>
</tr>
<tr>
<td>$1\varphi$</td>
<td>98</td>
<td>121</td>
<td>15</td>
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</tbody>
</table>

949. *Lanius cristatus cristatus* Linnaeus  
Brown Shrike

Imphal Valley (c. 2,500 ft.) $1\sigma$ (3 Dec., 1945).  
Hume (1888) found it fairly common in Manipur.  
Roonwal & Nath (1948) noted it less common than earlier race.

Measurements:  

<table>
<thead>
<tr>
<th></th>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1\sigma$</td>
<td>90</td>
<td>86</td>
<td>16</td>
</tr>
</tbody>
</table>

Family ORIOLIDAE

955. *Oriolus chinensis tenuirostris* Blyth  
Slenderbilled Blacknaped Oriole

It has distributional range in Manipur.
958. *Oriolus xanthornus xanthornus* (Linnaeus)
North Indian Blackheaded Oriole

It is fairly common and noted elsewhere in Manipur.

961. *Oriolus traillii traillii* (Vigors)
Indian Maroon Oriole

Luanglong Khulem 1, Jun., 1 (9 Feb., 1936)
Oates (1889) extended its range upto Manipur.

Measurements:
1 Jun. ♀ Wing 171 Tail 109 Bill 28

Family DICRURIDAE

962. *Dicrurus adsimilis albiricuts* (Hodgson)
North Indian Black Drongo

It has distributional range in Manipur.

966. *Dicrurus leucophaeus hopwoodi* Baker
Assam Grey Drongo

Kanglatongbi 16 miles N. of Imphal (c. 3,500 ft.) 1♂ (29 Dec., 1945).
Hume (1888) found it in the hills but absent in the Imphal basin.

Measurements:
1♂ Wing 140 Tail 147 Bill 25

967. *Dicrurus caerulescens caerulescens* (Linnaeus)
Indian White bellied Drongo

It is distributed in Indian mainland including Manipur.

970. *Dicrurus annectans* (Hodgson)
Crowbilled Drongo

It has distributional range in Manipur.

971. *Dicrurus aeneus aeneus* Vieillot
Bronzed Drongo

Chandal, Manipur 1♂ 1♀ (9 Mar., 1992).

Measurements:
1♂, 1♀ Wing 124, 117 Tail 113 Bill 22, 5

972. *Dicrurus remifer tectirostris* (Hodgson)
Lesser Racket-tailed Drongo

It has distributional range in Manipur.

973. *Dicrurus hottentottus hottentottus* (Linnaeus)
Haircrested Drongo

It has distributional range in Manipur.

976. *Dicrurus paradiseus grandis* (Gould)
Greater Racket-tailed Drongo

It has distributional range in Manipur.

Family ARTAMIDAE

982. *Artamus /uscus* Vieillot
Ashy Swallow-Shrike

It is distributed in Indian mainland including Manipur.

Family STURNIDAE

984. *Saroglossa spiloptera* (Vigors)
Spottedwinged Stare

It has distributional range in Manipur.

985. *Aplonis panayensis affinis* (Blyth)
Tipperah Glossy Stare

It has distributional range in Manipur.

989. *Sturnus malabaricus nemoricola* (Jerdon)
Whitewinged Myna

It has distributional range in Manipur.

1004. *Sturnus contra superciliaris* (Blyth)
Burmese Pied Myna

Imphal (c. 2,800 – 3,000 ft.) 2♂, 1♀.

Hume (1888) found it fairly common in the Manipur Valley and absent in the hills.

Roonwal & Nath (1948) also found it common in the valley and found upto 3,500 ft.
Measurements: Wing Tail Bill

3♂ 118-120 65-72 31-33
5♀ 113-115 67-72 29-33

1005. Sturnus sinensis (Gmelin)
Chinese or Grey backed Myna
It has distributional range in Manipur.

1006. Acridotheres tristis tristis (Linnaeus)
Indian Myna
10 miles N. of Imphal (c. 3,000 ft.) 3♂, 1♀ (9 Dec., 1945).
Roonwal & Nath (1948) found it upto 3,500 ft.
Measurements: Wing Tail Bill
3♂ 140-144 91-95 22-25
1♀ 136 87 24

1009. Acridotheres fuscus fuscus (Wagler)
Northern Jungle Myna
It has distributional range in Manipur.

1012. Acridotheres javanicus infuscatus (Baker)
Orangebilled Jungle Myna
Kanglatongbi 15 miles N. of Imphal (c. 3,500 ft.) 3♂ (14 Dec., 1945).
Hume (1888) noted only in South and Southeast Manipur and found rare everywhere.
Roonwal & Nath (1948) found it common.
Measurements: Wing Tail Bill
3♂ 133-137 83-100 22-25

1013. Acridotheres albocinctus Godwin-Austen & Walden
Collared Myna
Kanglatongbi, 18 miles N. of Imphal (c. 3,500 ft.) 1♀ (22 Dec., 1945).
Godwin-Austen & Walden (1875) found it common in Manipur Valley. Hume (1888) had the same view.
Measurements: Wing Tail Bill
1♀ 125 76 25

1014. Mino coronatus (Blyth)
Goldcrested Myna
It has distributional range in Manipur.

1015. Gracula religiosa intermedia A. Hay
Northern Hill Myna
It has distributional range in Manipur.

Family CORVIDAE

1021. Garrulus glandarius interstinctus Hartert
East Himalayan Redcrowned Jay
It has distributional range in Manipur.

1023. Cissa chinensis chinensis Boddaert
Green Magpie
It has distributional range in Manipur.

1028. Cissa erythrorhyncha magnirosthis (Blyth)
Burmese Redbilled Blue Magpie
Kanglatongbi, 18 miles N. of Imphal (c. 3,500 ft.) 1♂ (22 Dec., 1945).
Hume (1888) noted it in Manipur.
Roonwal & Nath (1948) found it common in the jungle of Dimapur Road, Imphal. Relatively less in population than North eastern Treepie in dense forest.
Measurements: Wing Tail Bill
1♂ 194 446 36

1032. Dendrocitta vagabunda vagabunda (Latham)
Northeastern Tree Pie
It is distributed in Manipur.

1035. Dendrocitta frontalis frontalis Horsfield
Blackbrowed Tree Tie
It has distributional range in Manipur.

1038. Dendrocitta formosae himalayana Jerdon
East Himalayan Tree Tie
Tairenpokpi (c. 3,000 ft.) 1♀ (7 Feb., 1936).
Hume (1888) found it in both western and eastern hills of Manipur.

Measurements:

- **1♀**: Wing 144, Tail 208, Bill 30

1049. *Corvus splendens splendens* Vieillot

Indian House Crow

It has distributional range in Manipur.

1055. *Corvus macrorhynchos levillarotii* Lesson

Eastern Jungle Crow

It is distributed in Manipur.

1057. *Hemipus picatus picatus* (Sykes)

Blackbacked Pied Flycatcher Shrike

It has distributional range in Manipur.

1064. *Tephrodornis virgatus pelvica* (Hodgson)

Nepal Wood Shrike

It has distributional range in Manipur.

1079. *Coracina melanoptera sykesi* (Strickland)

Peninsular Blackheaded Cuckoo-Shrike

It is distributed in Manipur.

1084. *Pericrocotus brevirostris brevirostris* (Vigors)

Shortbilled Minivet

It has distributional range in Manipur.

1087. *Pericrocotus ethologus mariae* Ripely

Nagaland Longtailed Minivet.

It has distributional range in Manipur.

1088. *Pericrocotus solaris solaris* Blyth

Yellowthroated Minivet

It has distributional range in Manipur.

1089. *Pericrocotus roseus roseus* (Vieillot)

Rosy Minivet

It has distributional range in Manipur.

1095. *Pericrocetus cinnamomeus viridus* Baker

Eastern Small Minivet

It is distributed in Manipur.

Family IRENIDAE

1098. *Aegithina tiphia tiphia* (Linnaeus)

Common Iora

It has distributional range in Manipur.

1106. *Chloropsis hardwickii hardwickii* Jardine & Selby

Orangebellied Chloropsis

Regaiious camp, Manipur (c. 3,250 ft.) 1♀.

Hume (1888) noted it common in many parts of Manipur.

Measurements:

- **1♀**: Wing 87, Tail 72, Bill 20

1108. *Chloropsis cochinchinensis cochinchinensis* (Gmelin)

Goldmantled Chloropsis

It has distributional range in Manipur.

1110. *Irena puella puella* (Latham)

Fairy Bluebird

Nanglea Atrow, 63 miles from Imphal, 1♀ (9 Feb., 1936).

Hume (1888) found it very common in some forested parts of Manipur.

It is a disjunct distributed species.

Measurements:

- **1♀**: Wing 136, Tail 119, Bill 23

Family PYCNONOTIDAE

1111. *Spizixos canifrons canifrons* Blyth

Finchbilled Bulbul

Kalanaga (c. 3,250 ft.) 1♂ (16 Feb., 1936).

Hume (1888) reported it from western hills and rare in elsewhere of Manipur.
Measurements: Wing Tail Bill
1♂ 95 98 15

1112. Pycnonotus atriceps atriceps (Temminck)
Blackheaded Bulbul

Manglea Atrow (c. 3,250 ft.) 1♂ (14 Feb., 1936).

Baker (1922) extended its range up to Manipur.

Measurements: Wing Tail Bill
1♂ 85 81 16

1115. Pycnonotous melanicterus flaviventris
Blackcrested Yellow Bulbul

(Tickell)

Luanglong Khulen (c. 3,250 ft.) 1♂ (9 Feb., 1936).

Kalanaga (c. 3,250 ft.) 1♂, 1♀ (16 Feb., 1936).

Hume (1888) found it common in the western hills but absent in Manipur Valley and the eastern hills.

Measurements: Wing Tail Bill
2♂ 92 91-97 13-14
1♀ 83 82 15

1121. Pycnonotus jocosus emeria (Linnaeus)
Bengal Redwhiskered Bulbul


Measurements: Wing Tail Bill
2♂ 90-91 93, 97 19, 19
2♀ 88, 89 82, 87 18, 18

1132. Pycnonotus cafer stanfordi Deignan
Burmese Redvented Bulbul

Luanglong Khulen (3,250 ft.) 1♂ (29 Feb., 1936).

Imphal (c. 3000-3500 ft.) 5♂, 3♀ (14, 28, 29 Nov., 1945).

Uchathol, Jiribum 2♂ (27 Nov., 1992)

Churachandpur 2♀ (12, 14 Mar., 1992)

Hume (1888) found it common in the Western hills and less in the eastern hills of Manipur.

Measurements: Wing Tail Bill
5♂ 98-106 93-106 19-23
5♀ 93-99 89-100 20-21

1133. Pycnonotus striatus striatus (Blyth)
Striped Green Bulbul

It has distributional range in Manipur.

1137. Pycnonotus flavescens flavescens
Blyth's Bulbul

Blyth

It has distributional range in Manipur.

1140. Criniger flavolus flavolus (Gould)
Whitethroated Bulbul

Kanglatongbi, 16 miles N. of Imphal (c. 3,500 ft.) 1♂ (8 Dec., 1945).

Hume (1888) noted it common in dense scrub and creepes in the western hills of Manipur.

Measurements: Wing Tail Bill
1♂ 106 92 20

1141. Hypsipetes viridescens cacharensis
Olive Bulbul

(Deignan)

Kalanaga (c. 3,250 ft.) 2♂, 2♀ (17 Feb., 1936).

Hume (1888) found it fairly common in the eastern hills of Manipur and absent elsewhere.

Measurements: Wing Tail Bill
2♂ 105, 107 103, 113 23, 26

1147. Hypsipetes flavalus flavalus
Browneared Bulbul

(Blyth)

It has distributional range in Manipur.
1151. Hypsipetes madagascariensis nigrescens Baker  
**Assam Black Bulbul**  
It has distributional range in Manipur.

Family MUSCICAPIDAE

1159. Pellorneum ruficeps vocale Deignan  
**Manipur Spotted Babbler.**  
It is restricted in the valley of central Manipur.  
This species was described from Kanglatongbi, Manipur.  
Measurements : Wing Tail Bill  
1♂ 72 72 20

1164. Pellornium albiventre albiventre (Godwin-Austen)  
**Assam Brown Babbler**  
It has distributional range in Manipur.

1166. Trichastoma tickelli assamensis (Sharpe)  
**Tickell’s Babbler**  
Measurements : Wing Tail Bill  
1♀ 61 53 18

1169. Pomatorhinus schisticeps schisticeps Hodgson  
**East Himalayan Slatyheaded Scimitar Babbler**  
It is distributed in Manipur.

1184. Pomatorhinus erythrogenys mcclellandii Godwin-Austen  
**Assam Rustycheeked scimitar Babbler**  
Karong 1♀ (5 Nov., 1936).  
Hume (1888) found it common in Manipur.  
Measurements : Wing Tail Bill  
1♀ 84 98 29

1187. Pomatorhinus ferruginosus formosus Koelz  
**Assam Coralbilled Scimitar Babbler**  
It has distributional range in Manipur.

1190. Pomatorhinus ochraceiceps austeni Hume  
**Manipur Longbilled Scimitar Babbler**  
This race was described from Manipur.  
Ripley (1982, p. 327) reported it from Meghalaya.

1192. Xiphirynchus supercilialis intextus Ripley  
**Assam Slenderbilled Scimitar Babbler**  
It is distributed in Manipur.

1193. Rimator malacoptilus Blyth  
**Longbilled Wren-Babber**  
It has distributional range in Manipur.

1195. Napothera epilepidota roberti (Godwin-Austen & Walden)  
**Austen’s Small Wren-Babber**  
It has distributional range in Manipur.

1202. Spelaeornis longicaudatus (Moore)  
**Longtailed Wren-Babber**  
It has distributional range in Manipur.

1203. Spelaeornis chocolatinus chocolatinus (Godwin-Austen & Walden)  
**Streaked Longtailed Wren-Babber**  
It has distributional range in Manipur.

1208. Spelaeornis humei roberti Godwin-Austen & Walden  
**Cachar Wedgebilled Wren**  
It has distributional range in Manipur.

1209. Stachyris rufifrons ambigua (Harington)  
**Assam Redfronted Babber**  
It is distributed in Manipur.

1210. Stachyris ruficeps ruficeps Blyth  
**Redheaded Babber**  
It is distributed in Manipur.
1212. *Stachyris chrysaea chrysaea* Blyth
   Nepal Goldenheaded Babbler
   It has distributional range in Manipur.

1228. *Macronous gularis rubricapilla* (Tickell)
   Yellowbreasted Babbler
   It has distributional range in Manipur.

1229. *Timalia pileata bengalensis* Godwin Austen
   Redcapped Babbler
   It is distributed in NE India including Manipur.

1229. *Timalia pileata bengalensis* Godwin Austen
   Redcapped Babbler
   It is distributed in NE India including Manipur.

1231. *Chrysoma sinense sinense* (Gmelin)
   Yellow-eyed Babbler
   It has distributional range in Manipur.

1242. *Paradoxornis nipalensis poliotis* (Blyth)
   Blyth’s or Assam Orange Parrotbill
   It is distributed in NE India including Manipur.

1242. *Paradoxornis nipalensis poliotis* (Blyth)
   Blyth’s or Assam Orange Parrotbill
   It is distributed in NE India including Manipur.

1250. *Paradoxornis gularis transfluvialis* (Hatert)
   Assam Greyheaded Parrotbill
   It has distributional range in Manipur.

1242. *Paradoxornis nipalensis poliotis* (Blyth)
   Blyth’s or Assam Orange Parrotbill
   It is distributed in NE India including Manipur.

1250. *Paradoxornis gularis transfluvialis* (Hatert)
   Assam Greyheaded Parrotbill
   It has distributional range in Manipur.

1275. *Garrulax monileger monileger* (Hodgson)
   Necklaced Laughing Thrush
   It is distributed in NE India including Manipur.

1275. *Garrulax monileger monileger* (Hodgson)
   Necklaced Laughing Thrush
   It is distributed in NE India including Manipur.

1278. *Garrulax pectoralis melanotis* Blyth
   Assam Blackgorgeted Laughing Thrush
   It has distributional range in Manipur.

1282. *Garrulax striatus cranbrooki* (Kinnear)
   Assam Striated Laughing Thrush
   It has distributional range in Manipur.

1284. *Garrulax leucomelas patkai* Reichenow
   Assam Whitecrested Laughing Thrush
   It has distributional range in Manipur.

1285. *Garrulax chinensis nuchalis* Godwin Austen
   Chestnutbacked Laughing Thrush
   It is distributed in NE India including Manipur.

1286. *Garrulax galbanus galbanus* (Godwin-Austen)
   Yellowthroated Laughing Thrush
   It is distributed in Manipur.

1288. *Garrulax delesserti gularis* (McCleland)
   Yellow breasted Laughing Thrush
   It is distributed in NE India including Manipur.

1289. *Garrulax cineracea cineracea* (Godwin-Austen)
   Ashy Laughing Thrush
   Turibari, Kanpokpi, Senapati 1♂, 1♀ (9 Nov., 1992).

   Measurements:
   Wing Tail Bill
   1♂ 86 98 28
   1♀ 85 96 28

1302. *Garrulax caeruleus livingstoni* Ripley
   Nagaland Greysided Laughing Thrush
   It’s distributional range includes Manipur.

1303. *Garrulax ruficollis* (Jardine & Selby)
   Rufousnecked Laughing Thrush
   Karon 2 o (5 Feb., 1936).
   Launglong Khulen 1♂ (8 Feb., 1936).
   Hume (1888) found it very common in Manipur.

   Measurements:
   Wing Tail Bill
   1♂ 100 113 21

1305. *Garrulax merulinus toxostominus* (Koelz)
   Manipur Spotted breasted Laughing Thrush
   This race was described from Korong, Manipur.
1306. *Garrulax sannio albosuperciliaris*  
Godwin-Austen  
**Whitebrowed Laughing Thrush**  
Measurements: Wing Tail Bill  
♀ 104 23

1317. *Garrulax virgatus* (Godwin-Austen)  
**Manipur Streaked Laughing Thrush**  
It's distributional range includes Manipur.

1318. *Garrulax austeni austeni* (Godwin-Austen)  
**Browncapped Laughing Thrush**  
It is distributed in Manipur.

1319. *Garrulax squamatus* (Gould)  
**Bluewinged Laughing Thrush**  
It is distributed in NE India including Manipur.

1329. *Garrulax erythrocephalus godwini*  
(Harrington)  
**Nagaland Redheaded Laughing Thrush**  
It’s distributional range includes Manipur.

1330. *Garrulax erythrocephalus erythrolaema*  
(Hume)  
**Manipur Redheaded Laughing Thrush**  
It’s distributional range includes Manipur.

1332. *Garrulax phoeniceus bakeri* (Hartert)  
**Assam Crimsonwinged Laughing Thrush**  
It is distributed in NE India including Manipur.

1334. *Leiothrix argentauris vernayi* (Mayr & Greenway)  
**Burmese Silvereared Mesia**  
It has distributional range in Manipur.

1336. *Leiothrix lutea calipyga* (Hodgson)  
**Eastern Redbilled Mesia**  
It is distributed in NE India including Manipur.

1339. *Cutia nipalensis nipalensis* Hodgson  
**Nepal Cutia**  
It has distributional range in Manipur.

1340. *Pteruthius rufiventer* Blyth  
**Rufousbellied Shrike-Babbler**  
It is distributed in NE India including Manipur.

1341. *Pteruthius flaviscapis validirostris* Koelz  
**Redwinged Shrike-Babbler**  
It has distributional range in Manipur.

1345. *Pteruthius melanotis melanotis* Hodgson  
**Chestnut-throated Shrike-Babbler**  
It is distributed in NE India including Manipur.

1347. *Gampsorhynchus rufulus rufulus* Blyth  
**Whiteheaded Shrike-Babbler**  
It is distributed in NE India including Manipur.

1350. *Actinodura egertoni khasiana* (Godwin-Austen)  
**Assam Barwing**  
It is distributed in NE India including Manipur.

1355. *Actinodura waldeni waldeni* (Godwin-Austen)  
**Manipur Barwing**  
It’s distributional range includes Manipur.

1357. *Minla ignotincta ignotincta* Ali & Ripley  
**Redtailed Minla**  
It has distributional range in Manipur.

1361. *Minla strigula cinereigence* (Ripley)  
**Assam Barthroated Siva**  
It’s distributional range includes Manipur.

1362. *Minla cyanouroptera cyanouroptera* (Hodgson)  
**Bluewinged Siva**  
Nanglea Atrow (c. 3,250 ft.) 2♂ 1♀ (13, 14 Feb., 1936).
Hume (1888) found it common above 4,500 ft. in the western and eastern hills of Manipur. Measurements: 

<table>
<thead>
<tr>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>61-62</td>
<td>71</td>
<td>12-13</td>
</tr>
<tr>
<td>60</td>
<td>60</td>
<td>13</td>
</tr>
</tbody>
</table>

1365. *Yuhina castaniceps castaniceps* (Moore)  
Chesnut-headed Yuhina

It has distributional range in Manipur.

1366. *Yuhina bakeri Rothschild*  
Whitenaped Yuhina

It is distributed in NE India including Manipur.

1370. *Yuhina flavicollis rouxi* (Oustalet)  
Assam Yellowanped Yuhina

It is distributed in NE India including Manipur.

1372. *Yuhina gularis gularis* Hodgson  
Eastern Stripethroated Yuhina

It is distributed in NE India including Manipur.

1374. *Yuhina nigrimenta nigrimenta* Hodgson  
Blackchinned Yuhina

It is distributed in NE India including Manipur.

1375. *Yuhina xantholeuca xantholeuca* (Hodgson)  
Whitebellied Yuhina

It is distributed in NE India including Manipur.

1377. *Alcippe chrysitis albilineala* (Koelz)  
Assam Goldenbreasted Tit-Babbler

It’s distributional range includes Manipur.

1378. *Alcippe cinerea* (Blyth)  
Dusky Green Tit-Babbler

It is distributed in NE India including Manipur.

1379. *Alcippe castaneiceps castaneiceps* (Hodgson)  
Chestnut-headed Tit-Babbler

It is distributed in NE India including Manipur.

1383. *Alcippe vinpectus austeni*  
(=Ogilvie-Grant)  
Assam Whitebrowed Tit-Babbler

This race was described from Manipur and Naga Hills.

1385. *Alcippe cinereiceps manipurensis*  
(=Ogilvie-Grant)  
Manipur Brownheaded Tit-Babbler

This race was described from Owen Kulno Peak, Manipur Hills.

1387. *Alcippe rufogularis collaris* Walden  
Assam Redthroated Tit-Babbler

It’s distributional range includes Manipur.

1388. *Alcippe brunnea mandelli* (Godwin-Austen)  
Rufousheaded Tit-Babbler

It’s distributional range includes Manipur.

1391. *Alcippe poioicephala fusca* Godwin Austen  
Assam Quaker Babbler


Measurements: 

<table>
<thead>
<tr>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>67-68</td>
<td>63-67</td>
<td>16-17</td>
</tr>
<tr>
<td>66-67</td>
<td>62</td>
<td>15-15</td>
</tr>
</tbody>
</table>

1392. *Alcippe nipalensis nipalensis* (Hodgson)  
Nepal Quaker Babbler

Luagnlong Khunow (c. 3,250 ft.) 1♀ (9 Nov., 1936).

Hume (1888) reported it very common in many parts of Manipur.

Measurements: 

<table>
<thead>
<tr>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>59</td>
<td>55</td>
<td>12</td>
</tr>
</tbody>
</table>

1393. *Alcippe nipalensis commoda* Ripley  
Mishmi quaker Babbler

<table>
<thead>
<tr>
<th>Measurements</th>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>1♂</td>
<td>57, 59</td>
<td>~, 56</td>
<td>13, 13</td>
</tr>
<tr>
<td>2♀</td>
<td>57, 60</td>
<td>57, 59</td>
<td>13, 13</td>
</tr>
</tbody>
</table>

1395. *Heterophasia annectens annectens* (Blyth)  
Chestnutbacked Sibia  
It's distributional range includes Manipur.

1399. *Heterophasia gracilis* (McCordell)  
Grey Sibia  
Tairenpokpi (c. 3,000 ft.) 1♂ (7 Nov., 1936).  
Baker (1922) extended its range upto Manipur.

1400. *Heterophasia pulchella* (Godwin-Austen)  
Beautiful Sibia  
It has distributional range in Manipur.

1408. *Muscicapa muttui muttui* (Layard)  
Brownbreasted Flycatcher  
It has distributional range in Manipur.

1410. *Muscicapa ferruginea* (Hodgson)  
Ferruginous Flycatcher  
It is distributed in Manipur.

1412. *Muscicapa parva albicilla* Pallas  
Eastern Redbreasted Flycatcher  
Churachandpur 1♀ (12 Mar., 1992)  
Measurements : Wing | Tail | Bill |
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>1♀</td>
<td>66, 69</td>
<td>50, 50</td>
</tr>
</tbody>
</table>

1414. *Muscicapa strophiata strophiata*  
(Hodgson)  
Orange gorgeted Flycatcher  
It's distributional range includes Manipur.

1416. *Muscicapa monileger leucops* (Sharpe)  
Assam Whitegorgeted Flycatcher  
It is distributed in NE India including Manipur.

1417. *Muscicapa hyperythra hyperythra* Blyth  
Rufousbreasted Blue Flycatcher  
It has distributional range in Manipur.

1418. *Muscicapa hodgsonii* (Verreaux)  
Rustybreasted Blue Flycatcher  
It is distributed in NE India including Manipur.

1420. *Muscicapa westermanni australorientis*  
Ripley  
Eastern Little Pied Flycatcher  
It is distributed in NE India including Manipur.

1422. *Muscicapa superciliaris aestigma* G. R. Gray  
Little Blue and White Flycatcher  
It has distributional range in Manipur.

1425. *Muscicapa leucomelanura cerviniventris*  
(Sharpe)  
Manipur Slaty Blue Flycatcher  
This race was described from Manipur.

1426. *Muscicapa sapphira* Blyth  
Sapphireheaded Flycatcher  
It is distributed in NE India including Manipur.

1428. *Muscicapa grandis grandis* (Blyth)  
Large Niltava  
It is distributed in NE India including Manipur.

1430. *Muscicapa macgrigoriae signata* (Horsfield)  
Eastern Small Niltava  
It is distributed in NE India including Manipur.

1432. *Muscicapa sundara sundara* (Hodgson)  
Eastern Rufousbellied Niltava  
Nanglea Atrow, Imphal 1♂ (12 Dec., 1936).  
Turibari, Senapati 1♂, 1♀ (9, 19 Nov., 1992).  
Baker (1924) extended its range upto Manipur.  
Measurements : Wing | Tail | Bill |
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>2♂</td>
<td>79, 85</td>
<td>66, 71</td>
</tr>
</tbody>
</table>
1♀ 76 64 16

1433. *Muscicapa viridis oatesi* (Salvadori)  
Rufousbilled Blue Flycatcher  
It has distributional range in Manipur.

1437. *Muscicapa poliogenys cachariensis* (Madarasz)  
Eastern Brooks’ Flycatcher  
It’s distributional range includes Manipur.

1439. *Muscicapa unicolor unicolor* (Blyth)  
Pale Blue Flycatcher  
It has distributional range in Manipur.

1440. *Muscicapa rubeculoides rubeculoides* (Vigors)  
Bluethroated Flycatcher  
It has distributional range (breeding) in Manipur.

1441. *Muscicapa banyumas magnirostris* (Blyth)  
Largebilled Blue Flycatcher  
It is distributed in NE India including Manipur.

1445. *Muscicapa thalassina thalassina*  
Swainson  
Verditer Flycatcher  
It is distributed in India including Manipur.

1448. *Culicicapa ceylonensis calochrysea*  
Oberholser  
Northern Greyheaded Flycatcher  
It is distributed in the Indian mainland including Manipur.

1450. *Rhipidura hypoxantha* Blyth  
Yellowbellied Fantail Flycatcher  
It has distributional range in Manipur.

1456. *Rhipidura abbicollis stanleyi* Baker  
NEFA Whitethroated Fantail Flycatcher  
It’s distributional range includes Manipur.

1463. *Terpsiphone paradisi saturatior*  
(Salomonsen)  
East Himalayan Paradise Flycatcher  
It has distributional range in Manipur.

1465. *Hypothymis azurea styani* (Hartlaub)  
Indian Blacknapped Flycatcher  

Measurements: Wing Tail Bill
1♂ 73 76 16

1471. *Tesia cyaniventer* Hodgson  
Yellow browed Ground Warbler  
It has distributional range in Manipur.

1472. *Tesia olivae* (McClelland)  
Slatybellied Ground Warbler  
It has distributional range in Manipur.

1478. *Cettia fortipes fortipes* (Hodgson)  
Strongfooted Bush Warbler  
It is distributed in NE India including Manipur.

1483. *Cettia flavolivacea alexanderi* Ripley  
Manipur Aberrant Bush Warbler  
It’s distributional range includes Manipur.

1497. *Cisticola exilis tytleri* Jerdon  
Yellowheaded Fantail Warbler  
It’s distributional range includes Manipur.

1501. *Prinia rufescens rufescens* Blyth  
Rufous Wren-Warbler  
It is distributed in NE India including Manipur.

1502. *Prinia hodgsonii rufula* Godwin-Austen  
Northern Ashy Grey Wren-Warbler  
It has distributional range in Manipur.

1512. *Prinia subflora fusca* (Hodgson)  
Eastern Plain Wren-Warbler  
It’s distributed in NE India including Manipur.
1516. *Prinia socialis inglesi* Whistler & Kinnear
Assam Ashy Wren-Warbler
It has distributional range in Manipur.

1525. *Prinia flavigentris flavigentris* (Delessert)
Assam Yellowbilled Wren-Warbler
It's distributional range includes Manipur.

1528. *Prinia criniger catharia* Reichenow
Assam Brown Hill-Warbler
It's distributional range includes Manipur.

1530. *Prinia atrogularis khasiana* (Godwin-Austen)
Assam Blackthroated Hill Warbler
It has distributional range in Manipur.

1534. *Graminicola bengalensis bengalensis* Jerdon
Large Grass Warbler
It is distributed in Manipur.

1537. *Orthotomus sutorius luteus* Ripley
Mishmi Tailor Bird
It has distributional range in Manipur.

1540. *Orthotomus atrogularis nitidus* Hume
Blacknecked Tailor Bird
It has distributional range in Manipur.

1548. *Megalurus palustris toklao* (Blyth)
Strioted Marsh Warbler
Jiribam, Manipur 1σ (20 Mar., 1992).

Measurements: Wing Tail Bill
1σ 106 122 22

1554. *Acrocephalus orientalis* (Temminck & Schlegel)
Eastern Great Reed Warbler
It has distributional range in Manipur.

1555. *Acrocephalus bistrigiceps bistrigiceps* Swinhoe
Blackbrowed Reed Warbler
It has distributional range in Manipur.

1556. *Acrocephalus dumeretorum* Blyth
Blyth’s Reed Warbler
It has distributional range in Manipur.

1579. *Phylloscopus affinis affinis* (Tickell)
Tickell’s Leaf Warbler
It is distributed in the Indian mainland including Manipur.

1585. *Phylloscopus fuscatus mariae* Ripley
Manipur Dusky Leaf Warbler
This race was described from Moirang, Manipur.

1588. *Phylloscopus pulcher pulcher* Blyth
Eastern Orangebarred Leaf Warbler
It is distributed in NE India including Manipur.

1591. *Phylloscopus inornatus mandelli* (Brooks)
Mandelli’s Yellow-browed Leaf Warbler
It is distributed in NE India including Manipur.

1592. *Phylloscopus inornatus inornatus* (Blyth)
Siberian Yellow Browed Leaf Warbler
It has distributional range in Manipur.

1596. *Phylloscopus proregulus newtoni* Gaetke
Eastern Pallas’ Leaf Warbler
It is distributed in NE India including Manipur.

1601. *Phylloscopus magnirostris* Blyth
Largebilled Leaf Warbler
It has distributional range in Manipur.

1607. *Phylloscopus occipitalis coronatus* (Temminck & Schlegel)
Eastern Crowned Leaf Warbler
It is distributed in Manipur.

1610. *Phylloscopus reguloides assamensis* Hartert
Assam Crowned Leaf Warbler
It is distributed in NE India including Manipur.
11. \textit{Phylloscopus reguloides claudiae} (La Touche)
Yunan Crowned Leaf Warbler
It has distributional range in Manipur.

113. \textit{Seicercus affinis} (Hodgson)
Allied Flycatcher Warbler
It has distributional range in Manipur.

115. \textit{Seicercus burkii burkii} (Burton)
Eastern Blackbrowed Flycatcher Warbler
Uchathol, Jiribam, Imphal 1\(\sigma\) (26 Nov., 1992).
Chandal, Manipur 1\(\varphi\) (6 Mar., 1992).
Measurements: Wing Tail Bill
\(1\sigma\) 59 50 14
\(1\varphi\) 58 50 14

119. \textit{Seicercus xanthoschistos tephrodiras}
Sick Assam Greyheaded Flycatcher Warbler
It has distributional range in Manipur.

120. \textit{Seicercus poliogenys} (Blyth)
Greycheeked Flycatcher Warbler
It has distributional range in Manipur.

122. \textit{Abroscopus superciliaris flaviventris}
(Jerdon)
Sikkim Yellowbellied Flycatcher Warbler
It is distributed in NE India including Manipur.

125. \textit{Abroscopus schisticeps flavimentalis}
(Baker)
Assam Blackfaced Flycatcher Warbler
It has distributional range in Manipur.

126. \textit{Abroscopus albogularis albogularis}
(Horsfield & Moore)
White-throated Flycatcher Warbler
It is distributed in NE India including Manipur.

139. \textit{Brachypteryx leucophrys nipalensis}
Hodgson
Lesser Shortwing
It is distributed to NE India including Manipur.

140. \textit{Brachypteryx montana cruralis} (Blyth)
Whitebrowed Shortwing
Nanglea Atrow (c. 3,250 ft.) 1\(\sigma\), 2\(\varphi\) (13, 14 Feb., 1936).
Roonwal & Nath (1948) first recorded it from Manipur.
Measurements: Wing Tail Bill
\(1\sigma\) 71 48 —
\(2\varphi\) 65-68 46-47 15 —

143. \textit{Erithacus calliope} (Pallas)
Rubythroat
Uchathol, Jiribam, Imphal 1\(\sigma\) (28 Nov., 1992).
Turibari, Senapati 1\(\varphi\) (9 Nov., 1992).
Measurements: Wing Tail Bill
\(1\sigma\) 73 61 16
\(1\varphi\) 74 61 17

148. \textit{Erithacus pectoralis confusus} (Hartert)
Eastern Rubythroat
It has distributional range in Manipur.

150. \textit{Erithacus brunneus brunneus} (Hodgson)
Indian Blue Chat
It has distributional range in Manipur.

153. \textit{Erithacus cyane cyane} (Pallas)
Siberian Blue Chat
Straggler. One record from Manipur (Hume 1888).

158. \textit{Erithacus chrysaeus chryseus} (Hodgson)
Eastern Golden Bush Robin
It has distributional range in Manipur.

163. \textit{Copsychus saularis erimelas} (Oberholser)
Assam Magpie Robin
Kanlatongbi, Imphal (c. 3,500 ft.) 1 unsexed (10 Dec., 1945).


Roonwal & Nath (1948) found it common in the open country and listed this bird as copsychus saularis saularis (Linnaeus).

Measurements: Wing Tail Bill
1♂ 97, 99 87, 91 20, 23
1♀ 91 79 20

1667. *Copsychus malabaricus indicus* (Baker)
Indian Shama

It has distributional range in Manipur.

1672. *Phoenicurus ochruros rufiventris* (Vieillot)
Eastern Black Redstart

It has distributional range in Manipur.

1674. *Phoenicurus hodgsoni* (Moore)
Hodgson’s Redstart

It has wintening distributional range in Manipur.

1675. *Phoenicurus frontalis* (Vigors)
Bluefronted Redstart


Measurements: Wing Tail Bill
1♀ 85 70 17

1677. *Phoenicurus auroreus leucopterus* (Blyth)
Dauran Redstart

It has distributional range in Manipur.

1679. *Rhyacornis fuliginosus fuliginosus* (Vigors)
Plumbeons Redstart

Hume (1888) found it common in the western hills of Manipur.

Roonwal & Nath (1948) noted it occasionally on the banks of Imphal River and smaller streams running through evergreen forest.

1681. *Cinclidium leucurum* (Hodgson)
Whitetailed Blue Robin

It has distributional range in Manipur.

1685. *Enicurus immaculatus* (Hodgson)
Blackbacked Forktail

Nanglea Atrow, Imphal (c., 3,250 ft.) 2♀ (12 Feb., 1936).


Hume (1888) found it common in the western hills but absent in the eastern hills.

Measurements: Wing Tail Bill
1♂ 87 126 21
1♀ 87, 90 110, 115 15, –

1686. *Enicurus schistaceus* (Hodgson)
Slatyheaded Forktail

It has distributional range in Manipur.

1687. *Enicurus leschenaulti indicus* Hartert
Lescheneault’s Forktail

It has distributional range in Manipur.

1689. *Enicurus maculatus guttatus* Gould
Eastern Spotted Forktail

It has distributional range in Manipur.

1690. *Cochoa purpurea* Hodgson
Purple Cochoa

It has distributional range in Manipur.

1691. *Cochoa viridis* Hodgson
Green Cochoa

It has distributional range in Manipur.

1699. *Saxicola leucura* (Blyth)
Whitetailed Bush Chat

It has distributional range in Manipur.

1701. *Saxicola caprata burmanica* Baker
Burmese Pied Bush Chat

Imphal Valley (c., 2,500 ft.) 1♂ (3 Dec., 1945). 9 miles N. of Imphal (c., 3,500 ft.) 1♂ (29 Dec., 1945).

Hume (1888) found it common in the Manipur basin but absent in the hills.
Roonwal & Nath (1948) found it in the Imphal valley in small numbers and not found beyond 3,500 ft.

Measurements: Wing Tail Bill

Roonwal & Nath (1948) found it in the Imphal valley in small numbers and not found beyond 3,500 ft.

**Measurements:** Wing Tail Bill

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2♂</strong></td>
<td>63</td>
<td>69</td>
<td>52, 53</td>
</tr>
</tbody>
</table>

**1704. Saxicola jerdoni** (Blyth)

**Jerdon's Bush Chat**

It has distributional range in Manipur.

**1705. Saxicola ferrea** Gray

**Dark-grey Bush Chat**

Chandal, Manipur 1♀ (9 Mar., 1992)

**Measurements:** Wing Tail Bill

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>1♀</td>
<td>66</td>
<td>57</td>
<td>15</td>
</tr>
</tbody>
</table>

**1716. Chaimarrornis leucocephalus** (Vigors)

**Whitecapped Redstart**

Kanglatongbi, 16 miles N. of Imphal (c. 3,500 ft.) 2♂ (26 Nov., 1946).

Hume (1888) reported it common in the western hills but absent both in the eastern hills and Imphal valley.

**Measurements:** Wing Tail Bill

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>2♂</td>
<td>100</td>
<td>77, 80</td>
<td>15, 16</td>
</tr>
</tbody>
</table>

**1724. Monticola rufiventris** (Jardine & Selby)

**Chestnut bellied Rock Thrush**

It has distributional range in Manipur.

**1729. Myiophonus caeruleus temminckii** Vigors

**Himalayan Whistling Thrush**

Luanlong Khulen, Manipur 1♂, 1♀ (8, 9 Feb., 1936).

Taisenpokpi, Manipur 1♂ (7 Feb., 1936).

Nanglea Atrow, Manipur 1♀ (14 Feb., 1936).

Kanglatongbi, 16-18 miles N. of Imphal 1♂, 4♀ (23, 26 Nov., & 18, 22, 23 Dec., 1945).

Hume (1888) found it in the western hills of Manipur but absent in the eastern hills.

Roonwal & Nath (1948) found it common on the bank of the Imphal river and other hills streams.

**Measurements:** Wing Tail Bill

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Wing</th>
<th>Tail</th>
<th>Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>3♂</td>
<td>168-179</td>
<td>120-134</td>
<td>28-34</td>
</tr>
<tr>
<td></td>
<td>(173)</td>
<td>(129)</td>
<td>(23)</td>
</tr>
<tr>
<td>6♀</td>
<td>167-177</td>
<td>121-139</td>
<td>26-34</td>
</tr>
<tr>
<td></td>
<td>(170)</td>
<td>(128)</td>
<td>(31)</td>
</tr>
</tbody>
</table>

**State Fauna Series 10: Fauna of Manipur**

**1732. Zoothera sibirica sibirica** (Pallas)

**Whitebrowed Ground Thrush**

It has distributional range in Manipur.

**1733. Zoothera citrina citrina** (Latham)

**Orangeheaded Ground Thrush**

It has distributional range in Manipur.

**1739. Zoothera millisima mollisina** (Blyth)

**Eastern Plainbacked Mountain Thrush**

It has distributional range in Manipur.

**1740. Zoothera dixoni** (Scebohm)

**Longtailed Mountain Thrush**

It has distributional range in Manipur.

**1741. Zoothera dauma dauma** (Latham)

**Smallbilled Mountain Thrush**

It has wintering distribution in Indian mainland including Manipur.

**1745. Zoothera monticola** Vigors

**Large Brown Thrush**

It has winter distributional range in Manipur.

**1746. Zoothera marginata** Blyth

**Lesser Brown Thrush**

It has distributional range in Manipur.

**1747. Turdus dissimilis dissimilis** Blyth

**Blackbreasted Thrush**

Regailous Camp, 63 miles W. of Imphal (c. 3,250 ft.) 1♀ (11 Feb., 1936).

Oates (1890) recorded specimens from that area.
Measurements: Wing Tail Bill

1 ♂ 123 80 18

1749. *Turdus albocintillus* Royle
Whitecollared Blackbird

It has distributional range in Manipur.

1750. *Turdus boulboul* (Latham)
Greywinged Blackbird

Launglong Khulen, Imphal (c. 3,250 ft.) 1 ♂, 1 ♀ (9 Feb., 1936).

Hume (1888) collected a pair of this bird from Barak valley, but did not meet with elsewhere.

Measurements: Wing Tail Bill

1 ♂ 147 112 25
1 ♀ 139 112 25

1761. *Turdus feai* (Salvadori)
Fea's Thrush

It has wintering distributional in Manipur.

1762. *Turdus obscurus* Gmelin
Dark Thrush

It has distributional range in Manipur.

1763. *Turdus ruficollis atrocularis* Jarocki
Blackthroated Thrush

It has wintering distribution in Manipur.

1764. *Turdus ruficollis ruficollis* Pallas
Redthroated Thrush

It has distributional range in Manipur.

1776. *Cinclulus pallasi dorjei* Kinnear
East Himalayan Brown Dipper

It has distributional range in Manipur.

1789. *Melanochlora sultanea sultanea* (Hodgson)
Sultan Tit

It has distributional range in Manipur.

1793. *Parus major nipalensis* Hodgson
Nepal Grey Tit


Measurements: Wing Tail Bill

2 ♀ 64, 64 61, 66 12, 12

1799. *Parus monticolous monticolous* Vigors
Greenbacked Tit

It has distributional range in Manipur.

1812. *Parus spilonotus subviridis* Blyth
Assam Blackspotted Yellow Tit

It has distributional range in Manipur.

1814. *Sylviparus modestus modestus* Burton
Eastern Yellowbrowed Tit

It has distributional range in Manipur.

1820. *Aegithalo concinnus manipurensis* (Hume)
Manipur Redheaded Tit

This race was described from Eastern Hills, Manipur.

1826. *Sitta europaea nagaensis* Godwin-Austen
Naga Nuthatch

It has distributional range in Manipur.

1828. *Sitta castanea cinnaomoventeris* Blyth
Eastern Chestnutbellied Nuthatch

It is distributed in NE India including Manipur.

1835. *Sitta himalayana australis* Koelz
Whitetailed Nuthatch

It has distributional range in Manipur.

1837. *Sitta formosa* Blyth
Beautiful Nuthatch

It is distributed in NE India including Manipur.

1838. *Sitta frontalis frontalis* Swainson
Velvetfronted Nuthatch

It has distributional range in Manipur.

1850. *Certha discolor manipurensis* Hume
Manipur Tree Creeper

This race was described from Eastern Hills, Manipur.
1852. *Anthus hodgsoni hodgsoni* Richmond
Indian Tree Pipit

Measurements: Wing Tail Bill
2♂  81, 82  60, 69  16, 16
2♀  77, 80  59, 60  16, 16

1859. *Anthus novaeseelandiae rufulus* Vieillot

Measurements: Wing Tail Bill
1♀  77  57  16

1864. *Anthus cervinus* (Pallas)
Redthroated Pipit

It has distributional range in Manipur.

1865. *Anthus roseatus* Blyth
Vinaceousbreasted Pipit

It has distributional range in Manipur.

1872. *Anthus spinolaletta japonicus* Temminck & Schlegel

Alpina Pipit

An erratic winter visitor to Manipur (Hime ?-1888).

1874. *Motacilla indica* Gmelin
Forest Wagtail

A wintering race in India including Manipur.

1884. *Motacilla caspica caspica* (Gmelin)
Grey Wagtail

Kanglatongbi, 16 miles N. Imphal (c. 3,500 ft.) 2♂, 1♀, 1 (unsexed) (22, 23 Dec., 1945).
Hume (1888) found it common in the western hills of Manipur and in the Imphal Valley.
Roonwal & Nath (1948) had the same view.
Measurements: Wing Tail Bill
2♂  82, 87  95, 96  15
2♀  83  89  15
1 (unsexed)  85  93  15

1884. *Motacilla alba dukhunensis* Skyes
Indian White Wagtail

Kanglatorgbi, 16 miles N. Imphal (c. 3,500 ft.) 1♂ (12 Dec., 1845).
Imphal Valley (2,600 ft.) 1♂ (23 Dec., 1945)
Hume (1888) noted it scarce in Manipur while Roonwal & Nath (1948) found it common in Manipur.
Measurements: Wing Tail Bill
2♂  91, 93  92, 95  15

1888. *Motacilla alba leucopsis* Gould
Whitefaced Pied Wagtail

Imphal Valley (c. 3,000 ft.) 1 unsexed (20 Dec., 1945).
Measurements: Wing Tail Bill
1 (unsexed)  88  90  13

1889. *Motacilla alba ocularis* Swinhoe
Streaked Pied Wagtail

It has distributional range in Manipur.

1892. *Dicaeum agile agile* (Tickell)
Indian Thickbilled Flowerpecker

It is distributed in India including Manipur.

1895. *Dicaeum chrysorrheum chrysochloer* Blyth
Yellowvented Flowerpecker

It is distributed in NE India including Manipur.

1896. *Dicaeum melanoxanthum* (Blyth)
Yellowbellied Flowerpecker

It has distributional range in Manipur.

1901. *Dicaeum concolor olivaceum* Walden
Plaincoloured Flowerpecker

It is distributed in NE India including Manipur.

1904. *Dicaeum cruentatum cruentatum* (Linnaeus)
Scarletbacked Flowerpecker

It is distributed in NE India including Manipur.
1905. *Dicaeum ignipectus ignipectus* (Blyth)  
Firebreasted Flowerpecker  
It is distributed in NE India including Manipur.

1906. *Anthreptes singalensis rubinigentis* (Baker)  
Rubycheek  
It has distributional range in NE India including Manipur.

1910. *Nectarinia sperata brasiliana* (Gmelin)  
Van Hasselt’s Sunbird  
It has distributional range in Manipur.

1920. *Aethopyga gouldiae isolata* Baker  
Manipur Yellowbacked Sunbird  
This race was described from Manipur.

1921. *Aethopyga gouldiae dabryii* (Verreaux)  
Dabry’s Sunbird  
It has distributional range in Manipur.

1924. *Aethopyga nipalensis* Koelzi Ripley  
Eastern Yellowbacked Sunbird  
It has distributional range in Manipur.

1926. *Aethopyga saturata assamensis* (McClelland)  
Assam Blackbreasted Sunbird  
It has distributional range in Manipur.

1928. *Aethopyga siparaja labecula* (Horsfield)  
Assam Yellowbacked Sunbird  
It has distributional range in Manipur.

1930. *Aethopyga ignicauda ignicauda* (Hodgson)  
Firetailed Yellowbacked Sunbird  
It has distributional range in Manipur.

1932. *Arachnothera magna magna* (Hodgson)  
Streaked Spiderhunter  
It is distributed in NE India including Manipur.

1933. *Zosterops palpebrosa palpebrosa* (Temminck)  
White-eye  
Ragailows Camp, 63 miles Imphal (c. 3,250 ft.) 1 ♂ (11 Feb., 1936).

Hume (1888) found it common in the Imphal valley but absent in the hills.

1934. *Passer domesticus indicus* Jardine & Selby  
Indian House Sparrow  

1938. *Passer montanus malaccensis* Dubois  
Tree Sparrow  
Imphal (c. 2,600 ft.) 1 ♂, 1 ♀ (6 Feb., 1934).

Kanglatongbi, 16 miles N. Imphal (c. 3,500 ft.) 2 ♂, 2 ♀ (17, 18 Dec., 1945).

Hume (1888) found it very common in the Imphal Valley.

Roonwal & Nath (1948) had the same view as Hume. Both also mentioned that House Sparrow was entirely absent.

1942. *Passer montanus hepaticus* Ripley  
Mishmi Tree Sparrow  
Tamenglong, Manipur 1 ♂ (23 Nov., 1992).

1947. *Passer rutilans intensior* Rothschild
Yunan Cinnamon Tree Sparrow
It has distributional range in Manipur.

1961. *Ploceus benghalensis* (Linnaeus)
Blackthroated Weaver Bird
It has distributional range in Manipur.

1967. *Lonchura striata acuticauda*
(Hodgson)
Whitebacked Munia
Kanglatongbi, 16 miles N. Imphal (c. 3,500 ft.) 2♂, 2♀ (17, 18 Dec., 1945).

1977. *Lonchura malacca atricapilla* (Vieillot)
Eastern Blackheaded Munia
It has distributional range in Manipur.

1986. *Coccothraustes melanozanthos*
(Hodgson)
Spottedwinged Grosbeak
It has distributional range in Manipur.

1992. *Carduclis spinoides heinrichi*
Stresemann
Mt. Victoria Greenfinch
It has distributional range in Manipur.

2011. *Carpodacus erythrinus roseatus* (Blyth)
Indian Rosefinch
It is distributed in the Indian mainland including Manipur.

2033. *Propyrrhula subhimachala* (Hodgson)
Redheaded Rosefinch
It has distributional range in Manipur.

2037. *Pyrrhula nipalensis ricketti* La Touche
Chinese Brown Bullfinch
It has distributional range in Manipur.

2045. *Emberiza rutila* Pallas
Chestnut Bunting
It has distributional range in Manipur.

2046. *Emberiza aureola aureola* Pallas
Yellowbreasted Bunting
It has distributional range in Manipur.

2047. *Emberiza spodocephala sordida* Blyth
Blackfaced Bunting
It has distributional range in Manipur.

2055a. *Emberiza fucata fucata* Pallas
Amur Greyheaded Bunting
It has wintering distributional range in Manipur.

2056. *Emberiza pusilla* Pallas
Little Bunting
It has distributional range in Manipur.

2060. *Melophus lathami* (Gray)
Crested Bunting
It has distributional range in Manipur.

**SUMMARY**

This paper is dealt with the collections now preserved in the National Zoological Collection. Altogether total number of families, genera, species and subspecies known from India are 78, 405 and 2,110 respectively, of which the share of the State of Manipur is 59 families, 256 genera and 586 species and subspecies. Altogether eight races as cited below were described from the State of Manipur.

1159. *Pellornium ruficeps vocale* Dugnan
Manipur Spotted Babbler

1350. *Garrulax merulinus taxostaminus* (Koelz)
Spottedbreasted Laughing Thrush.

1385. *Alcippe cinereiceps manipurensis* (Ogilvie-Grant)
Manipur Brownheaded Tit Babbler

1425. *Muscicapa leucomelanura cerviniventris* (Sharpe)
Manipur Slaty Blue Babbler
ACKNOWLEDGEMENTS

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Members of the staff of the Zoological Survey who conducted field surveys and deserve thanks are Messers A. K. Mondal, D. K. Ghosal and S. Ghose, in the field.

REFERENCES


INTRODUCTION

Manipur, a small state, in the North-Eastern border of India, lies between 23°47' and 25°41' north latitude and 93°6' and 94°48' east longitude. Comprising mostly of hills, valleys, rivers, streams and lakes, it is bordered by Nagaland on the north, Myanmar in the east and south-east, Mizoram on the south-east and Assam on west. Manipur covers an area of 22,327 Sq. Km. The largest fresh water lake in the North-East, the Loktak lake and the only floating National Park in the world-keibul Lamjao—with its unique ‘Sangai’ or the “Dancing deer” add to the natural wealth of Manipur. Manipur also has the highest percentage of forest cover, i.e., 15,154 Sq. Km to state geographical area compared to any other state in India.

The state has a very rich wildlife wealth, but the representative collections of reptiles deposited at Eastern Regional Station, Zoological Survey of India, Shillong does not support this fact. Only nine species are available with the National Zoological Collection at Eastern Regional Station.

SYSTEMATIC ACCOUNT

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1. *Cyrtodactylus khasiensis* (Jerdon)
2. *Hemidactylus bowringi* (Gray)
3. *Hemidactylus frenatus* Schlegel

**REPTILIA : SQUAMATA**

R. MATHEW

Zoological Survey of India, Eastern Regional Station, Shillong

**Class REPTILIA**

**Order SQUAMATA**

**Sub-order SAURIA**

**Family GEKKONIDAE**

1. *Cyrtodactylus khasiensis* (Jerdon)
2. *Hemidactylus bowringi* (Gray)
3. *Hemidactylus frenatus* Schlegel

**Family AGAMIDAE**

4. *Calotes emma* Gray
5. *Calotes mystaceus* Dumeril & Bibron
6. *Calotes versicolor* (Daudin)

**Family SCINCIDAE**

7. *Mabuya multifasciata multifasciata* (Kuhl)

**Family COLUBRIDAE**

8. *Elaeophryne radiata* (Schlegel)
9. *Xenochrophis piscator* (Schneider)

**Genus Cyrtodactylus**


**Diagnostic characters:** Digits clawed, beneath with a row of distinct transverse plates, eye with vertical pupil; 2 or 3 pair of post mentals.

1. *Cyrtodactylus khasiensis* (Jerdon)


**Material examined:** 1 ex, India, Manipur, Litan, Ukhral Road, 20.i.77, Coll. H. Khajuria.

**Diagnostic characters:** Upper labials 10 to 12 and as many lower labials; body and limbs dorsally with small granular scales intermixed with much
larger rounded keeled tubercles; a lateral fold of enlarged scales; belly with round imbricate scales, 30 to 40 across the middle; tail covered with small flat scales, those on the median line below larger than the others; a dorsal series of enlarged tubercles on the basal part; male with an angular series of 8 to 14 preanal pores. Light brown or greyish brown above with dark spots or markings more or less regularly arranged; head with brown spots; tail with brown bands; belly whitish.

Length Snout to vent 58 mm; tail 60 mm.

Distribution: Manipur; Assam; Meghalaya; West Bengal.

Elsewhere: Myanmar.

Genus Hemidactylus oken


Diagnostic characters: Digits strongly dilated with transversely divided lamellae beneath; terminal phalanges compressed, free or united with the expanded portion; inner digit well developed with free, clawed, terminal phalanges; pupil vertical, males with preanal and or femoral pores.

2. Hemidactylus bowringi (Gray)


Material examined: 1 ex, India, Manipur, Moirang, 18.iii.74, Coll. K.R. Rao.

Diagnostic characters: Upper labials 9-11, lower labials 7-9; post mentals 2 pairs; back with small more or less uniform granules, belly with smooth rounded imbricate scales; 4th toe with 9 to 11 lamellae beneath; males with 12 to 15 femoral pores on each side. Light brown above with darker spots, tail with dark chevron shaped spots; whitish below.

Length Snout to vent 58 mm; tail 55 mm.

Distribution: Manipur; Godavari valley; Sikkim; West Bengal.

Elsewhere: China; Hongkong; Myanmar.

3. Hemidactylus frenatus Schlegel


Material examined: 11 ex : 4 ex, India Manipur, Chandel, Moreh, 14.vi.92, Coll. R. Mathew; 2 ex, Churachandpur, 5.vi.92, Coll. R. Mathew; 2 ex, Bishenpur, Alt. 2700', 29.v.92, Coll. R. Mathew; 3 ex, Bishenpur, Loukoipat, 1.vi.92, Coll. R. Mathew.

Diagnostic characters: Upper labials 10-12, lower labials 8-10; post-mentals 2 pairs; gular region with small granular scales, snout with large granules; hinder part of head with small granules, back with small granules intermixed with round or conical tubercles, these enlarged tubercles vary considerably in number and may be absent altogether; belly with smooth, round, imbricate scales, 4th toe with 9 to 10 lamellae beneath; tail covered above with small scales and a series of six enlarged, pointed, tubercles arranged in regular rows; below with a median series of transversely enlarged scales; males with a continuous series of about 26-36 preano-femoral pores. Greyish or pinkish brown above, may be darker, with indistinct darker markings, sometimes arranged as longitudinal stripes, a dark line along the side of the head and a light one above it usually present; whitish below; tail sometimes coral red.

Length Snout to vent 58 mm; tail 50 mm.

Distribution: Manipur; Assam; Meghalaya; Southern India; Tripura; West Bengal.

Elsewhere: Hainan; Hongkong; Indo-China; Malay Peninsula; Sri Lanka; Australia; Africa; Yunnan.

Family AGAMIDAE

Genus Calotes Rafinesque


MATHEW: Reptilia: Squamata

Diagnostic characters: Dorsal scales uniform; a dorsal crest more or less developed; tympanum exposed; tail long and slender.

4. Calotes emma Gray


Material examined: 2 ex: 1 ex, India, Manipur, Bishenpur, Loukoipat, Alt. 2700', 1.vi.92, Coll. R. Mathew; 1 ex, Imphal, 3 km. from Imphal on way to Chandel, 8.vi.92, Coll. R. Mathew.

Diagnostic characters: Canthus rostralis and supraciliary edge sharp; a spine at the end of the supraciliary edge, and two more on the occiput between the tympanum and the nuchal crest, the posterior one situated just above the ear; dorsal scales larger than ventrals; and oblique fold in front of the shoulder covered with small granular scales. Olive brown above, a white dorso-lateral broad line starting from the upper labials to above the forelimb; throat brilliant deep peacock blue; light brown below; limbs and tail with brown or black transverse bands or stripes.

Length Snout to vent 108 mm; tail 180 mm.

Distribution: Manipur; Assam; Meghalaya.

Elsewhere: French Indo-China; Malay Peninsula; Myanmar; Siam; Yunnan.

5. Calotes mystaceus Dumeril & Bibron


Diagnostic characters: Canthus rostralis and supraciliary edge sharp; no postorbital spine, two short separated spines or groups of 2 or 3 spines on each side of the back of the head; an oblique fold in front of the shoulder. Brownish gray or olivaceus above; dark lines radiating from eye; flanks with 3 or 5 large rusty red spots; upper lip white or yellow, the stripe extending to the shoulder.

Length Snout to vent 130 mm; tail 220 mm.

Distribution: The whole of India.

Elsewhere: Afghanistan; Indo-Chinese Sub Region; China; Hainan; Hongkong; Malay Peninsula; Sri Lanka; Sumatra.

Family SCINCIDAE

Genus Mabuya Fitzinger

1926. Mabuya Fitzinger, Class Rept. pp. 23 & 52.

Diagnostic characters: Eyelids movable, the lower with or without a more or less transparent disc; tympanum more or less deeply sunk.
7. **Mabuya multifasciata multifasciata** (Kuhl)


**Material examined:** 2 ex : 1 ex, India, Manipur, Chandel, Moreh Reserve Forest, 19.i.76, Coll. A. K. Ghosh; 1 ex, Litan, Alt. 1050 meters, 20.i.77, Coll. S. G. Patil.

**Diagnostic characters:** Supranasals separated or just touching one another; prefrontals usually in contact with one another; a pair of nuchal; a post nasal; ear opening subcircular with small pointed lobules anteriorly; 30-34 scales round the middle of the body; dorsals with 3 or 5 keels. Brown or olive brown above, uniform or with dark brown or black longitudinal spots or streaks along the lateral margins of the scales; flanks dark brown or black, with or without white black edged spots; a pale dorso lateral line often present; upper head scales often margined with black; whitish below.

Length Snout to vent 120 mm; tail 140 mm.

**Distribution:** Manipur; Assam; Meghalaya; Nagaland; Nicobar Islands; West Bengal.

**Elsewhere:** East Indies; Hainan; Malay Peninsula; New Guinea: Pulo Condore; Tongking; Yunnan.

8. **Elaphe radiata** (Schlegel)


**Material examined:** 1 ex., India, Manipur, Churachandpur, 3 km. North of Singnat, Alt. 3200', 4.vi.92, Coll. R. Mathew.

**Diagnostic characters:** Scales in 21 rows; ventrals 222-250; caudals 82-108 paired; Anal 1, preocular 1, post oculars 2; temporals 2 + 3. Reddish brown above with four black stripes in the anterior half or two thirds of the body, commencing a short distance behind the neck; the upper pair on either side of the vertebral line broader; the outer pair narrower, usually broken into a series of elongated spots on the anterior part of the body; a black bar across the acciput and three black streaks radiating from below the eye; the young are brightly patterned.

Total length 1610 mm; tail 340 mm.

**Distribution:** Manipur; Meghalaya.

**Elsewhere:** Eastern Himalayas; Indo-Chinese Sub Region; Malay Archipelago.

**SUMMARY**

A total of nine species under six genera and four families are recorded herein.

**ACKNOWLEDGEMENTS**

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**REFERENCES**


INTRODUCTION

Amphibian fauna of Manipur has been left more or less untouched till the publication of Anuran Fauna of north-east India by Chanda in 1994. Singh (1977) reports *Tylototriton verrucosus* (The Himalayan newt) from the state.

The present report will be the first consolidated faunal account of amphibians of Manipur which includes 14 species belonging to 7 genera, 5 families and 2 orders. The order Apoda is not represented in this account.

Authors are presuming that the number of species in the state will surely increase, if thorough surveys could be undertaken in the State in future, as 55 species of amphibians have so far been reported from north-east India.

MATERIAL AND METHODS

Amphibians are either aquatic, terrestrial or arboreal. Aquatic form could be collected by the help of water-net, a net fitted with a metal ring fixed at the end of a long bamboo pole, cast-net and fishing hook. Both terrestrial and arboreal forms could be collected by hand or long forceps. In the field, notes should be taken regarding the habits and habitats of the amphibians. For collection, aquatic vegetations, bush grown on moist soil, heap of rotten leaves, burrows made on elevated banks of ponds, canals, rivers, dark corner of village huts, undersurface of barks and holes on the trees, soil under stones etc. should be explored. Nocturnal fauna should be explored by the help of lamps. The collected material are first chloroformed and then put into 5% formalin solution at least for 24 hours for fixation. Before putting in the formalin, an incision on the abdomen for the smaller specimens, and injection of 10% formalin solution inside the abdomen for larger specimens should be given for proper fixation of the viscera. The fixed material along with labels containing the data of locality, altitude, habitat, date of collection and name of collector would be packed properly and kept in 5% formalin solution again. Then the material would be studied and identified with the help of literature in the laboratory.

Text-fig. 1. Illustrations of measurements and essential morphological characters used in the paper.


Current names of species are given by Dr. M. S. Ravichandran, Zoological Survey of India, Kolkata
Fig. 1: Illustration of measurements and essential morphological characters.
SYSTEMATIC ACCOUNT

Class AMPHIBIA
Order ANURA

Key to the Families

1. Jaws toothless ............................................... 2
   Upper jaw toothed ........................................ 3

2. Skin rough with well-developed warts, parotoids present ............. BUFONIDAE
   Skin more or less smooth, parotoids absent ................................ MICROHYLIDAE

3. No intercalary ossification (extra cartilaginous bone) between the distal and penultimate phalanges ....................... RANIDAE
   An intercalary ossification between the distal and penultimate phalanges ........................................ RHACOPHORIDAE

Family I. BUFONIDAE

Genus 1. Bufo Laurenti


1. Bufo melanostictus Schneider
   Common Indian Toad


Material examined: Several tadpoles, Near Wang-Jing village, Eile 18, on Burma Road, Manipur, alt. 2600 ft., 7-iii-1920, Manipur Survey; Several tadpoles, Hanjhahidel Kharangpat, Manipur, alt. 2600 ft, 14-iii-1920, Manipur Survey.

Diagnostic character: Head broader than long, with cornified bony ridges; snout rounded, nearly equal the diameter of the eye; nostril a little nearer to the tip of snout than to eye; interorbital width broader than that of upper eyelid; tympanum very distinct, two third diameter of the eye. Fingers free, first little longer than second, tips of fingers and toes swollen. Toes nearly half webbed, more than three phalanges of fourth toe free; two oval (inner and outer) metatarsal tubercles present. Tarsometatarsal articulation reaches in between tympanum and eye. Dorsum dark brownish, rough with several spiny warts, parotoid large, kidney-shaped. Venter dull whitish with numerous small spiny warts.


Remarks: Boulenger (1890) records its distributional range upto 10,000 feet in Sikkim Himalayas. Terrestrial and nocturnal in habit, found in and near water during breeding season.

Status: Very common.

Family II. MICROHYLIDAE

Genus 2. Microhyla Tschudi


2. Microhyla ornata (Dumeril and Bibron)
   Ornate Microhylid


Material examined: Nil, record from published literature.

Diagnostic character: Head broader than long; snout obtusely pointed, a little longer than the diameter of the eye; nostril nearer to the tip of snout than the eye; interorbital width a little broader than that of upper eyelid; tympanum not so distinct. Fingers free, first shorter than second, tips flattened. Toes with a rudiment of web, tips blunt; two small but distinct oval (inner and outer) metatarsal tubercles present. Tibiotarsal
articulation reaches near to eye. Dorsum smooth, brownish with broad darker markings. Venter smooth, dull whitish, little darker on throat.

Distribution: India: Manipur; Assam; Meghalaya; Mizoram; Nagaland; Tripura; Andhra Pradesh; Madhya Pradesh; Kerala; West Bengal; Gujarat and Andaman.

Elsewhere: Pakistan, Nepal, Bangladesh, Sri Lanka, Myanmar, South China, South east Asia and Taiwan.

Remarks: Commonest form of microhylid frogs found in India. It frequents inside bushes grown on moist soil.

Status: Common.

Family III. RANIDAE

Family Ranidae is represented by two genera in Manipur, of which genus Amolops Cope, 1865 is distinguished by its tadpoles possessing “large adhesive belly disc” just below the mouth (Inger, 1966).

Genus 3. Amolops Cope


3. Amolops afghanus (Günther)


Measurements: Snout to vent length 66 mm.

Diagnostic character: Head as long as broad or a little broader than long; snout rounded, equals the diameter of the eye; nostril equidistant from the tip of the snout and the eye; interorbital width nearly equal to that of the upper eyelid; tympanum almost indistinct, covered by granules, less than half diameter of the eye. Fingers free, first generally a little shorter than second, tips with well developed large discs; subarticular tubercles of fingers and toes distinct. Toes fully webbed, web feebly notched, web reaches middle of the disc of the fourth toe, tips with distinct and large discs; inner metatarsal tubercle elliptical, outer metatarsal tubercle absent. Tibiotarsal articulation reaching beyong the tip of the snout. Dorsum olive green and granular, a distinct glandular fold above the tympanum, glandular dorsolateral fold absent. Venter light yellowish, granular on belly and posterior part of thighs.

Distribution: India: Manipur; Sikkim; Punjab; Meghalaya; West Bengal.

Elsewhere: Nepal, Myanmar, Thailand, Yunnan and Tibet.

Remarks: Chanda (1992) reported it from Manipur.

Status: Not common.

Genus 4. Rana Linnaeus


Key to the species of the Genus Rana

1. Tips of toes with discs ................................. 2
   Tips of toes without discs ............................ 3

2. Dorsal skin entirely smooth ....................... livida
   Dorsal skin on sacral region tuberculated ....
   .................................................... mawphlongensis

3. Toes webbed upto the tips ........................... 4
   Toes webbed not upto the tips ..................... 5

4. Inner metatarsal tubercle digitiform (toe-like)
   .................................................... cyanophylyctis
   Inner metatarsal tubercle oval .................... goshisi

5. Outer metatarsal tubercle present limnocharis
   Outer metatarsal tubercle absent .......... tigerina

4. Rana livida (Blyth)


Material examined: Nil; record from published literature.

Diagnostic character: Head mostly as long as broad; snout rounded, generally longer than the eye; nostril nearer to the tip of the snout than the eye; interorbital width longer than of upper eyelid; tympanum district, more than half diameter of the eye. Fingers with rudiment of that web, first equals second, tips with large discs containing groove separating the upper from the lower surface; subarticular tubercles of fingers and toes large, distinct. Toes entirely webbed, tips with discs similar to those of fingers, but smaller; inner metatarsal tubercle long, compressed, outer metatarsal tubercle absent. Tibiotarsal articulation reaching beyond the tip of snout. Dorsum dark brown (in spirit), smooth. Venter dull whitish, smooth, granules on under surface of thighs.

Distribution: India; Manipur; West Bengal; Meghalaya and Assam.

Remarks: Chanda (1992) reported it from Manipur.

Status: Rare.

6. Rana mawphlongensis Pillai & Chanda

Current Name: Limnonectes mawphlangensis (Pillai & Chanda)

Material examined: Nil; record from published literature.

Diagnostic character: Head as long as broad; snout pointed, a little longer than eye; nostril equidistant from the tip of the snout and the eye; tympanum distinct, more than half diameter of the eye. Fingers free, first slightly longer than second, tips pointed; subarticular tubercles of fingers and toes feebly prominent. Toes fully webbed, tips swollen; a pointed digit-like inner metatarsal tubercle present, outer metatarsal tubercle absent. Tibiotarsal articulation reaches in between posterior end of tympanum and nostril. Dorsum darker with small warts. Venter whitish and smooth.

Distribution: India; Manipur. Throughout the plains of India, and up to 1856 m. in the Himalayas. Also Pakistan, Afghanistan, Iran, South Arabia, Nepal, Thailand and Sri Lanka.

Remarks: It is a very common species throughout the plains of India, and recorded from adjoining state of Manipur, Viz. Tripura, Meghalaya Assam and Arunachal Pradesh.

Status: Very common.
7. **Rana ghoshi** Chanda

   Current Name: *Euphlyctis ghoshi* (Chanda)


   **Material examined**: Nil; record from published literature.

   **Diagnostic character**: Head broader than long; snout rounded, slightly projecting beyond lower jaw; nostril much closer to eye than to tip of snout; interorbital space about one and half times of interorbital width; tympanum half the diameter of eye. Fingers free, first slightly longer than second; tips rounded; subarticular tubercles of fingers and toes small but very prominent. Toes fully webbed; tips rounded; inner metatarsal tubercle oval, prominent; outer metatarsal tubercle absent. Tibiotarsal articulation reaching tympanum. Dorsum light brown with dark irregular blotches. Venter pale. Skin on dorsum rough with small tubercles. Venter smooth. A glandular dorsolateral fold extends from eyes to posterior region of the body, ending near the groin.

   **Distribution**: India: Manipur.

   **Remarks**: It is found to occur in the overhanging vegetation near the small stream, and is a diurnal species (Chanda, 1994).

   **Status**: Rare.

8. **Rana limnocharis** Boie

   **Cricket Frog**

   Current Name: *Fejervarya limnocharis* (Graver horn)


   **Measurements**: Snout to vent length 32-38 mm.

   **Diagnostic character**: Head generally as long as broad; snout generally pointed, projecting beyond the mouth, as long as or a little longer than the diameter of the eye; nostril nearer to the tip of snout than the eye; interorbital width much smaller than that of the upper eyelid: tympanum distinct, nearly two-third the diameter of the eye. Fingers free, first longer than second, tips swollen; subarticular tubercles of fingers and toes distinct. Toes half-webbed, normally three phalanges of fourth toe free; a distinct oval inner metatarsal tubercle and a feebly distinct outer metatarsal tubercle present. Tibiotarsal articulation reaches in between tympanum and nostril. Dorsum greyish and warty. Venter whitish and smooth.

   **Distribution**: India: Manipur. Chanda (1992) reports it from Manipur. It is broadly distributed species in India and found in almost all the biotopes of the Country.

   **Elsewhere**: Eastern Asia from Pakistan, Nepal, Sri Lanka and China to Japan.

   **Remarks**: This is a common terrestrial frog generally found in moist cultivated land, and inside bushes near water.

   **Status**: Very common.

9. **Rana tigerina** Daudin

   **Indian Bull Frog**

   Current Name: *Hoplobatrachus tigerinus* (Daudin)


   **Material examined**: 1 ex., Morek, Manipur, 8-ii-1993, H. T. Sing.

   **Measurements**: Snout to vent length 90 mm.

   **Diagnostic character**: Head as long as broad or a little broader than long; snout rounded or pointed, projecting beyond the mouth, longer than the diameter of the eye; nostril generally equidistant from the tip of snout and the eye; interorbital width much smaller than that of the upper eyelid; tympanum, distinct, nearly equal to the diameter of the eye; Fingers free, first longer than second, tips not sharply pointed; subarticular...
tubercles of fingers and toes not very distinct. Toes entirely webbed, tips not pointed; a blunt, not shovel-shaped, inner metatarsal tubercle present, outer metatarsal tubercle absent. Tibiotarsal articulation reaches in between posterior end of eye to nostril. Dorsum olive green with darker spots, distinct warts and long glandular folds. Venter whitish and smooth.

**Distribution**: India: Manipur. Chanda (1992) reports it from Manipur. The species is common throughout India from the base of the Himalaya to Southern part of the country

**Elsewhere**: Nepal, Sri Lanka, Myanmar, Thailand, South China and Taiwan.

**Remarks**: Commonest species of edible frogs found all over India.

**Status**: Common.

**Family IV RHACOPHORIDAE**

**Key to the Genera of Family RHACOPHORIDAE**

Toes not completely webbed, interspace between vomerine processes narrow ............

Toes completely webbed, interspace between vomerine processes wide ........... **Rhacophorus**

**Genus 5 Polypedates** Tschudi 1838. *Polypedates* Tschudi, Classif Batr.: 34.

10. **Polypedates leucomystax** (Gravenhorst) *Tree Frog*


**Material examined**: 4 ex., a stream near Potsengha, Manipur, 19.iii.1920, Manipur Survey.

**Measurements**: Snout to vent length 27-46 mm.

**Diagnostic character**: Head broader than long, skin on head rugose; snout not pointed, projecting a little beyond the mouth, greater than the diameter of the eye; nostril nearer to the tip of the snout than to the eye; interorbital width much broader than that of the upper eyelid; tympanum distinct, about three-fourth diameter of the eye. Fingers free, first equals the second, tips of fingers and toes bears horse-shoe shaped distinct discs; subarticular tubercles of fingers and toes distinct. Toes three-fourth webbed, one phalange of fourth toe free; a distinct oval inner metatarsal tubercle present, outer metatarsal tubercle absent. Tibiotarsal articulation reaches in between eye and tip of snout. Dorsum light chocolate and smooth. Venter dull whitish and granular.

**Distribution**: India: Manipur; Mizoram; Tripura; Meghalaya; Nagaland; Assam; Arunachal Pradesh and West Bengal.

**Elsewhere**: South China to Malaysia.

**Remarks**: Chanda (1992) reports it from Manipur.

**Status**: Rare.


**Key to the species of the Genus Rhacophorus**

1. Tibiotarsal articulation reaching posterior corner of eye ......................... **bipunctatus**

   Tibiotarsal articulation reaching beyond the posterior corner of eye ...................... 2

2. Nostril nearer the tip of the snout than the eye; tibiotarsal articulation reaching nostril to beyond the tip of the snout ...... **nigropalmatus**

   Nostril equidistant from the tip of the snout and the eye, tibiotarsal articulation reaching in between the eye and nostril........ **maximus**
11. *Rhacophorus bipunctatus* Ahl


*Material examined:* Nil; record from published literature.

*Diagnostic character:* Head broader than long; snout obtusely pointed; nostril equidistant from the tip of snout and the eye; interorbital width greater than that of eye; tympanum distinct, two-third of eye. All fingers webbed to discs except the first; first finger shorter than second; subarticular tubercles moderately large and prominent. Toes fully webbed to the discs; outer metatarsal completely separated by web; subarticular tubercles small and prominent; a small inner metatarsal tubercle present; outer metatarsal tubercle absent. Tibiotarsal articulation reaching posterior corner of eye; heels strongly overlapping when hindlimbs folded at right angles to body. Dorsum green to olive, leaf green in life. Ventrally whitish. Black spots are very prominent on flanks. The number of spots are variable, sometimes two large spots occur on the right side, three smaller spots on the left. Generally the anterior spot is larger than others. Dorsal skin smooth. Bally, lateral sides of body and thighs fully granulated.

*Distribution:* India: Manipur; Arunachal Pradesh; Assam; Nagaland; Tripura.

*Elsewhere:* Indonesia.

*Remarks:* Chanda (1992 and 1994) reported it from Manipur.

*Status:* Rare.

12. *Rhacophorus nigropalmatus* Boulenger


*Material examined:* Nil; record from published literature.

*Diagnostic character:* Head a little broader than long; snout rounded, as long as the diameter of the eye; nostril nearer the tip of the snout than the eye; interorbital width broader than that of upper eyelid; tympanum distinct, half to two-third the diameter of the eye. Fingers fully webbed to the discs, first finger shorter than second, tips with distinct discs; subarticular tubercles of fingers and toes distinct. Toes fully webbed to the discs; a small pointed inner metatarsal tubercle present, outer metatarsal tubercle absent. Tibiotarsal articulation reaching nostril to beyond the tip of the snout. Dorsum darty white, smooth or finely granular. Venter cream colour, coarsely granulated.

*Distribution:* India: Manipur; Arunachal Pradesh; Meghalaya; Nagaland; Mizoram; Assam.

*Elsewhere:* Sumatra, Borneo, Thailand and Malayasia.

*Remarks:* Chanda (1992) reported it from Manipur.

*Status:* Rare.

13. *Rhacophorus maximus* Günther


*Material examined:* Nil; record from published literature.

*Diagnostic character:* Head a little broader than long; snout rounded, as long as the diameter of the eye; nostril nearer the tip of the snout than the eye; interorbital width much broader than that of upper eyelid; tympanum distinct, more than half diameter of the eye. Fingers entirely webbed, web reaches the base of discs at the tips of fingers, first shorter than second; subarticular tubercles of fingers and toes well-developed. Toes fully webbed to the discs; an oval distinct inner
metatarsal tubercle present, outer metatarsal tubercle absent. Tibiotarsal articulation reaching in between the eye and the nostril. Dorsum greenish and smooth, heel without triangular dermal appendage; black spots behind the arm absent. Venter white, granular.

**Distribution**: India: Manipur; Meghalaya; Assam; Arunachal Pradesh; Nagaland; Mizoram.

**Elsewhere**: Nepal, Southern China and Thailand.

**Remarks**: Chanda (1992 and 1994) reported it from Manipur.

**Status**: Rare.

**Order** CAUDATA

**Family** V SALAMANDRIDAE

**Genus** 7 Tylototriton Anderson


14. *Tylototriton verrucosus* Anderson

**The Himalayan Newt**


**Material examined**: 4 ex., Manipur, .-xi.1976, N. Ekendra Singh.

**Measurement**: Largest: Snout to vent length 98 mm. and vent to tip of tail length 67 mm. Smallest: Snout to vent length 38 mm. and vent to tip of tail length 32 mm.

**Diagnostic character**: Head broader than long; surrounded by hard porous ridge; snout short, blunt tipped, larger than that diameter of the eye; nostril nearer the tip of the snout than the eye; tympanum indistinct. Finger and toes moderate and free, tips blunt. Body 3 to 3\(\frac{1}{2}\) times the length of the head. Tail flat, as long as or a little longer than the head and body. A broad and distinct porous vertebral ridge; a series of 15 to 16 knob-like porous glad along each side of dorsum, the last three behind the leg. Anal opening a longitudinal slit. Dorsum tubercular, dark brown, partotoids large and distinct, wrinkled on belly, granular on throat and under surface of limbs, a distinct gular fold.

**Distribution**: India: Manipur; West Bengal; Sikkim; Arunachal Pradesh.

**Elsewhere**: Nepal, Thailand and Western China.

**Remarks**: Singh (1977) reported the species first time from Manipur. It frequents inside stagnant water found in the hill-pockets.

**Status**: Rare.

**SUMMARY**

This is the first consolidated faunal account of amphibians of Manipur which includes 14 species, 7 genera, 5 families and 2 orders. Keys, illustrations of essential morphological characters to follow the key, and short diagnostic characters of the species have been added in the paper for determination of the species.

**ACKNOWLEDGEMENT**

Authors are highly indebted to the Director, Zoological Survey of India for providing with all sorts of facilities to carry out this work.
REFERENCES

BOULENGER, G. A. 1890. The fauna of British India, including Ceylong and Burma, Reptilia and Batrachia. London (Taylor & Francis), : xviii + 541.


INTRODUCTION

Manipur is one of the fascinating and interesting state in India owing to its diverse ichthyofauna which occurs in varied habitat. In the middle of the parallel rows of hills with an elevation from 700 to 2000 metres above the sea level, there is a evergreen oval shaped valley. The fertile valley is watered by a number of winding rivers originated from the high hills and dotted with sparkling lakes.

The fish fauna of Manipur consists of Assamese, endemic and Burmese elements. The Assamese elements are observed in the southern part of the Brahmaputra Drainage system while endemic and Burmese elements are observed in the eastern part including the valley which is drained by the Chindwin Drainage system.

Chaudhuri (1912) described a new loach, Noemacheilus manipurensis sp. nov. from Manipur. Hora (1921) listed 12 species from Loktak Lake, 29 species from sluggish stream in Manipur valley, 18 species from streams with rocky bed in the southern watershed of the Naga hills and 17 species from stream with rocky bed in the northern watershed of the Naga hills. Altogether Hora (1921) recorded 56 species from this region. Hora and Mukherjee (1935) mentioned that in the fish fauna of Naga hills, representative of both Assamese and Burmese element in almost equal proportion exists. In their observation they have listed 44 species mainly from Brahmaputra and Chindwin drainage. Hora (1936) on his further observation of the fishes of Naga hills, Manipur state (mainly Tamenglong district) enlisted fishes from the following localities, namely, Zekwara—2 sp., Karong—1 sp., Laimatak River—5 sp., Irang River—6 sp., Khathalo stream near Nangha—3 sp., Barak River—3 sp., Makru River—3 sp., Menon (1952) worked on the fishes collected about 30 miles radius of imphal from Kanglatongbi, Imphal and Water Pools and streams on Imphal-Pallel Road and listed 19 species under 9 families. Menon (1954) on his further observation on the fish fauna of Manipur, listed 63 species from Loktak Lake, Imphal river and Barak River respectively. Datta, Karmakar and Laishram (1984) described Acrossocheilus manipurensis sp. nov. from Taret hill stream, Saibol, 20 kms east of Tengnoupal, Manipur. Viswanath and Tombhi Singh (1985) described 36 species of fishes from Tengnoupal district with 9 new records from Manipur viz., Anguilla bengalensis bengalensis (Gray), Esomus danricus (Hamilton), Barilius gatensis (Valenciennes), B. barna (Hamilton), Acrossocheilus hexagonolepis (McClelland), Aorichthys aor (Hamilton), Eutropuchthys vacha (Hamilton), Bagarius bagarius (Hamilton) and Glossogobius giuris (Hamilton). Viswanath and Tombi Singh (1986) described a new species of the Genus Puntius (Puntius jayarami sp. nov.) from Manipur. The specimens were collected from Chakpi stream (a tributary of Imphal River). Viswanath and Tombi Singh (1986) further recorded Mystus microphthalmus (Day) first time from India. The authors collected six specimens of the species at the confluence of Manipur River and Chakpi River. Barman (1987) described a new cyprinid fish of the genus Danio (Danio manipurensis sp.)

The present work includes a large number of fish collections recently made from three extensive field surveys (Dr. P. Krishnamurthy and party-1991, Dr. T. Roy and party-1992 and Dr. A. K. Karmakar and party-1993) by Z.S.I. survey parties; fish specimens received from Dr. W. Viswanath Singh, Manipur University; earlier identified collection available in National Zoological Collection (Collection mainly made by Drs. S. L. Hora, B. Prashad and B. N. Chopra, M. L. Roonwal, A. G. K. Menon). During the preparation of this faunal work, we have also made use of all the earlier informations available in the literature in addition to the study of fish material.

The present systematic list of the fishes of Manipur includes 9 orders 24 families 64 genera and 141 species of which 10 species under 9 genera are recorded first time from Manipur. In addition 4 species under 4 genera are recorded for the first time from India.

An attempt has been made in this present study to provide an upto date classification, nomenclature—both scientific and local names, details of material studied, size-ranges, distributional pattern, fishery information along with a species identification key under each genera. A detailed map of Manipur showing drainage system and collecting stations has also been included.

**PHYSIOGRAPHY**

The state of Manipur lies on the eastern frontier of India with an area of 22,356 sq.km. consisting of a vast plain valley covering about 1920 sq.km. It has a Kaleidoscopic landscape, undulating blue green hills with lush undergrowth interspersed with cascading rapids and dotted with exotic flowers. Manipur has an unrivalled scenic beauty, beautiful landscape with rich flora and fauna.

The state of Manipur has common boundaries with Nagaland in the north, Assam in the west, Myanmar in the east and both Mizoram and Myanmar in the south. It has eight districts namely, Imphal, Thoubal, Bishenpur, Ukhrul, Senapati, Churachandpur, Chandel and Tamenglong, and Jiribam Sub Division.

Imphal, a mini-metropolis, the capital of Manipur and head quarters of Imphal district, lies in the centre of oval shaped valley. According to legends, it is one of the ancient towns of Indian Sub-continent and was in existence circa 300 B.C.

Thoubal district lies also in the oval valley bordering Imphal, Bishenpur and Chandel districts respectively. Bishenpur is a picturesque valley district at the foothills that roll down to the valley. The Loktak lake, the largest freshwater lake in the North East India with small islands in the centre of the vast sheet of sparkling water and
Keibul Lamjao National Park, the only natural habitat of the Browantlered deers, the most threatened species in the entire Indian subcontinent, situated in this district.

Ukhrul, the head quarters of Ukhrul district, situated 2020 metres above the M.S.L. and is the highest station in Manipur. The Siroi Kasam Range stretches from north to south in Ukhrul district is one of the most strikingly beautiful ranges. This district has a common border with Nagaland in the north and Myanmar in the east. The Siroi Lily grows only in the Siroi hills. The Kangkhui cave is a remarkable limestone cave in Ukhrul district.

The Senapati district has a common border with Nagaland, Senapati being the head quarters of it. Mao is an attractive hill station, the border town and is halfway between Imphal and Dimapur. Imphal river flows from north to south of this district almost equally dividing it into two halves.

Churachandpur district is situated at the south-west corner of Manipur, having a common border with Assam, Mizoram and Myanmar. Khuga valley along with Khuga river is the main attraction of this district. The Tonglon cave, 32 kms from Churachandpur is a natural precipice cave.

Chandel district has a vast area measuring 3375 sq.km. This district is bordering with Myanmar in the east and south, Ukhrul district in the north and Churachandpur district in the west. In the Chandel district there are many rivers, namely, Chakpi, Kana, Lokchao, Taretlok, Maha etc.

Tamenglong, the home of Kabui Nagas known as Rongmeis, is known for its deep gorges, mysterious caves, splendid waterfalls, exotic orchids and oranges. The Tharon cave, 45 kms from Tamenglong is long, deep and large.

Jiribam Sub-Division is on the western end of Manipur bordering Assam by Barak and Jiri River. It is 225 kms from Imphal on New Cachhar Road, which is interesting for its changing scenario as one moves from the cool of Manipur towards the heat of Cachhar plains.

DRAINAGE SYSTEM

The fertile, evergreen, oval shaped valley is watered by a number of rivers and rivulets originating from the high hills and dotted with sparkling lakes. The lowest portion of Manipur state is in the southern half of the valley. Almost all the lakes are found in this region. The Loktak lake, the largest freshwater lake in North Eastern India having an inundated area of about 28,000 hectares, is one of the greatest fisheries wealth of Manipur. Besides, there are some other important lakes like pumlen, Ikop, Waithou etc.

The major river systems can be divided as (i) The Barak and tributaries—Irang, Leimatak, Maklong, Maku and Jiri (ii) The Imphal and tributaries—Iril, Thoubal, Heirok, Nampul, Khuga and Chakpi and (iii) the cold water streams—Rangazek, Nungsang khong etc.

In addition to these, there are a number of domestic, community tanks, water logged bodies and more than 30,000 hectares of low lying paddy fields where fishes are available.

The Imphal river is the main drainage outlet from the valley. The tributaries originating from the hill ranges on the north, north east and north west join the Imphal river in the course through the valley. The confluent is then named as the Manipur river which joins the Chindwin river in Myanmar. The Chakpi river originates from Vumku canal and Laiong near Tengnoupal and then flows in between Anal Khulen and Jang kelchang hill. Two important rivulets, viz. Ningtungjang and Challonglapal, collect water from different sides of the hills and join Chakpi river near Ducho. Another small stream called Tujang, originates from southern part of the Chandel district join Chakpi river near Salluk village. The Chakpi river falls in the Imphal river near Serou. Many rare species of fish are migrated from Chindwin and Irabati river systems of Myanmar in to Imphal river at Manipur.

Abbreviations used

(i) A. K. K.—A. K. Karmakar
(ii) T. R.—T. Roy
(iii) P.K.—P. Krishnamurthy
Map of Manipur showing drainage pattern and collecting stations
**LIST OF COLLECTING STATIONS**

1. Imphal (Imphal river and fish markets).
2. Sekmai river at Sekmai, Dist. Imphal.
3. Waithou village, 15 kms south of Imphal.
4. Iril river, 8 kms west of Imphal.
5. Nung Sung Kong stream, 20 kms south of Ukhrul.
6. Hung dung village, 6 kms north of Ukhrul.
7. Rangazak stream, 15 kms north of Ukhrul.
8. Thoubal, Dist.—Thoubal.
10. Chakpi river at Chakpikarang, 13 kms south of Sugnu.
11. Serou village, 11 kms south of Sugnu.
12. Chakpi river at Nungpan, 9 kms south of Sugnu.
13. Churachandpur, Dist.—Churachandpur.
15. Ithai barage, Dist.—Bishenpur.
16. Keibul Lamjao Game Sanctuary.
17. Lomtak lake at Takmu.
18. Lomtak lake at Thanga.
19. Lomtak lake at Ningthoukhong.
22. Fish farms at Jiribam.
23. Jiri river at Gopalthal village, 4 kms north of Jiribam.

**SYSTEMATIC LIST OF FISHES**

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<th>Local Name</th>
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<th>Subclass</th>
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**ORDER CYPRINIFORMES**

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Subfamily CYPRININAЕ

30. *Acrossocheilus hexagonolepis* (McClelland)

31. *A. manipurensis* Datta, Karmakar & Laishram

32. *Catla* catla (Hamilton) Catla

33. *Cirrhinus* mrigala (Hamilton) Mrigal

34. *Ctenopharyngodon idella* (Valenciennes) Grass Carp

35. *Cyprinus carpio* var. *communis* Linnaeus Scale carp

36. *Labeo angra* (Hamilton) Ngaton

37. *L. bata* (Hamilton) -do-

38. *L. calbasu* (Hamilton) Ngathi

39. *L. dero* (Hamilton) -do-

40. *L. dyocheilus* (McClelland)

41. *L. panguisia* (Hamilton) Ngaton

42. *L. rohita* (Hamilton) Rou

43. *Osteobrama belangeri* (Valenciennes) 

44. *Puntius burmanicus* (Day) Ngaseksha Tharak

45. *O. cotio cotio* (Hamilton)

46. *O. cotio cunna* (Day) -do-

47. *Neolissochilus hexastichus* (McClelland)

48. *P. chola* Phabounaga

49. *P. clavatus* (McClelland) —

50. *P. conchonius* (Hamilton) —

51. *P. jayarami* Vishwanath & Tombi Heikaknga

52. *P. gelius* (Hamilton) —

53. *P. phutunio* (Hamilton) Ngakha Meingangbi

54. *P. sarana sarana* (Hamilton) Nganoi, Nghahou

55. *P. sarana orphoides* (Valenciennes) Ngakha

56. *P. shalynius* Yazdani & Talukdar —

57. *P. shanensis* (Hora and Mukherjee) —

58. *P. sophore* (Hamilton) Phaounga

59. *P. ticto* (Hamilton) -do-

60. *Tor progeneius* (McClelland)

61. *T. putitora* (Hamilton) Ngara

62. *T. tor* (Gray) Ngara

Subfamily SCHIZOTHORACINAE

63. *Schizothorax richardsonii* (Gray) Sananga

Subfamily GARRINAE

65. *Crossocheilus burmanicus* Hora Ngari

66. *C. latius* (Hamilton) Ngari

67. *Garra gotyla* (Gray) Ngamu sengum

68. *G. gravelyi* (Annandale) Ngamu sengum

69. *G. kempi* Hora Ngamu sengum

70. *G. lissorhynchus* (McClelland) Nungnga

71. *G. manipurensis* Vishwanath & Sarojnalini Ngu Sengum

72. *G. naganensis* Hora Nungnga

73. *G. nasuta* (McClelland) Ngamu Sengum

74. *G. rupecula* (McClelland) Nungnga

Family PSILORHYNCHIDAE

75. *Psilorhynchus homaloptera* Hora & Mukherjee

Family HOMALOPTERIDAE

Subfamily NOEMACHEILINAE

76. *Noemacheilus botia* (Hamilton) Ngatup

77. *N. chindwinicus* Tilak and Hussain

78. *N. Kangjupkhulensis* Hora Leingoiphon

79. *N. manipurensis* Chaudhuri -do-

80. *N. prashadi* Hora Leingoiphon

81. *N. scaturigina* (McClelland)

82. *N. sikmaiensis* Hora Ngatup

83. *N. zonalternans* (Blyth) -do-

Family COBITIDAE

Subfamily BOTIINAE

84. *Botia berdmorei* (Blyth) —

85. *B. dario* (Hamilton) Ngarang

86. *B. histrionica* (Blyth) Sarengkhoibi
KARMKAR & DAS: Fishes

Subfamily COBITINAE
87. Acanthophthalmus pangia (Hamilton) Nganap
88. Lepidocephalus berdmorei (Blyth) Ngakrichou
+89. L. caudofurcatus Tilak & Hussain —
90. L. guntea (Hamilton) Ngakijou
**91. L. irrorata Hora Pat-Ngamu

Order SILURIFORMES
Family BAGRIDAE
**92. Acrichthys aor (Hamilton) Ngachou
93. Batasio tengara (Hamilton) —
**94. Mystus armatus (Day) —
95. M. bleekeri (Day) Ngashep
**96. M. microphthalmus (Day) Ngara
**97. M. tengara (Hamilton) —

Family SILURIDAE
*98. Ompok bimaculatus (Bloch) Ngaton
**99. Silurus berdmorei (Blyth) —
**100. Wallago attu (Bloch) Sareng

Family SCHILBEIDAE
+101. Ailia punctata (Day) —
+102. Clupisoma prateri Hora —
**103. Eutropiichthys vacha (Hamilton) Ngahei

Family AMBLYCIPITIDAE
*104. Amblyceps mangois (Hamilton) —

Family SISORIDAE
**105. Bagarius bagarius (Hamilton) Ngaren
**106. Cona conta (Hamilton)
**107. Erethistes pussilus Muller & Troschel
**108. Exostoma labiatum (McClelland)
109. Gagata cenia (Hamilton) Ngarang
110. G. gagata (Hamilton) —
**111. Glyptocephalus pectinoperus (McClelland) Ngapang
*112. G. platypogonoides (Bleeker) Ngapang
*113. G. sinanse manipurensis Menon Ngapang
114. G. talchitta (Hamilton) Ngapang
115. G. trilineatus Blyth Ngapang
+116. Nangra viridescens (Hamilton)
117. Pseudecheneis sulcatus (McClelland)
Family CLARIIDAE
118. Clarias batrachus (Linneaus) Ngakra
Family HETEROPNEUSTIDAE
119. Heteropneustes fossilis (Bloch) Ngachik

Order Atheriniformes
Family CYPRINODONTIDAE
120. Aplocheilus panchax (Hamilton)

Family CHANNIDAE
**121. Channa marulius (Hamilton) Ngamuporom
122. C. orientalis (Bloch & Schneider) Mitei Ngamu
123. C. punctatus (Bloch) Ngamu bogra
+124. C. stewartii (Playfair)
*125. C. striatus (Bloch) Ngamuporam

Order SYNBRANCHIFORMES
Family SYNBRANCHIDAE
**126. Monopterus albus (Zuiew) Ngaprum

Order Perciformes
Family CHANDIDAE
127. Chanda baculis (Hamilton) Ngamhai
128. C. nama Hamilton Ngamhai
129. C. ranga Hamilton Ngamhai

Family NANDIDAE
130. Badis badis (Hamilton) Ngamhai

Family CICHLIDAE
**131. Oreochromis mossambica (Peters) Tunghanbi

Family MUGILIDAE
132. Sicamugil cascasia (Hamilton)

Family GOBIIDAE
133. Glossogobius giuris (Hamilton) Nailonnga

Family ANABANTIDAE
134. Anabas testudineus (Bloch) Uikabi
Family BELONTIDAE

135. Colisa fasciatus (Bloch)     Ngapemma
++136. C. labiosus (Day)  —
137. C. sota (Hamilton)    Phetin

Order MASTACEMBELIFORMES
Family MASTACEMBELIDAE
**138. Macrognathus aral (Bloch & Schneider)

139. Mastacembelus armatus (Lacepede)

++140. M. caudicellatus Boulenger  —
141. M. pancalus (Hamilton)   Ngaril

* Recorded from the Zoological Survey of India (H.Q) registered collection.
** Recorded from literature.
+ Recorded for the first time from Manipur
++ Recorded for the first time from India.

SYSTEMATIC ACCOUNT

Class PISCES
Subclass TELEOSTOMI
Order ANGUILLIFORMES
Family ANGUILLIDAE

Genus Anguilla Shaw, 1803

1803. Anguilla Shaw, General Zoology, 4 : 15 (type-species: Anguilla vulgaris Shaw)

Eel like fishes, anteriorly cylindrical with minute embedded scales. Vertical gill opening; gill slits near base of pectoral fin. Dorsal fin commences far behind gill openings. Pectoral fins well developed. Dorsal, anal and caudal fins confluent. Lateral line present.

1. Anguilla bengalensis bengalensis (Gray)


Material examined: (i) 2 exs., 145-200 mm, Jiri river at Jiribam, Coll. W. Vishwanath, December '89.

Geographical Distribution: India: throughout.
Elsewhere: Pakistan; Sri Lanka; Myanmar and the East Indies.

Fishery Information: It attains a length of 1200 mm; common to about 800 mm. This is the most common eel in Indian inland waters and of considerable commercial value; and is supposed to have special nutritional importance.

Family MORINGUIDAE

Genus Moringua Gray, 1831


Body very long and slender; trunk considerably longer than tail. Gill openings narrow and long. Cleft of the mouth narrow; teeth in single row on jaws. Dorsal and anal fins membranous, inserted a short distance behind vertical line through anus; both confluent with caudal fin. Vent far behind mid-length of the body.

2. Moringua raitabarua (Hamilton)

1991. Moringua raitabarua : Talwar and Jhingran, Inland Fishes of India and Adjacent Countries : 77-78.

Material examined: (i) 1 ex., 445 mm, Pond at Nampal, Coll. T. R. & party, 26.ii.92 (ii) 1 ex., 350 mm, Moirang Fish Market, Coll. P. K. & party, 1.xii.91.

Geographical Distribution: India: Gangetic estuary, West Bengal (First record from Manipur).
Elsewhere: Bangla Desh.

Fishery Information: This eel attains a length of about 450 mm and is consumed by certain group of people in West Bengal and Manipur.

Order OSTEOGLOSSIFORMES
Family NOTOPTERIDAE

Genus Notopterus Lacepede, 1800

Body broad, strongly compressed, caudal portion long and tapering. Abdominal edge serrated, with about 28 scutes. Head compressed with large membranous opercular flap. Mouth opening wide; teeth small on jaws, also on palate and tongue. Dorsal fin short, inserted near middle of back with seven to ten rays. Anal fin very long with 100 to 135 rays, confluent with small caudal fin. Pelvic fins rudimentary.

3. *Notopterus notopterus* (Pallas)


*Material examined*: (i) 3 exs., 8-103 mm, Moirang Market, Coll. P. K. & party, 24.xi.91 (ii) 1 ex., 200 mm, Thangal Market, Imphal, Coll. P. K. & party, 22.xi.91 (iii) 2 exs., 95-97 mm, Bishenpur, Coll. P. K. & party, 27.xi.91 (iv) 2 exs., 75-130 mm, Takmu Lake, Coll. T. R. & party, 29.ii.92 (v) 5 exs., 90-99 mm, Keibul Lamjao sanctuary, Coll. T. R. & party, 1.iii.92 (vi) 1 ex., 126 mm, Thoubal Fishing Centre, Coll. P. K. & party, 29.xi.91 (vii) 2 exs., 45-70 mm, Thanga village, 50 kms from Imphal, Coll. P. K. & party, 28.xi.91 (viii) 1 ex., 175 mm, Khatikhong Fish Farm at Jiribam, A. K. K. & party, 18.iii.93 (ix) 1 ex., 210 mm, Takmu Fish Farm, Loktak Lake, Coll. A.K.K. & party, 13.iii.93 (x) 2 exs., 122-130 mm, Thangal Fish Market, Imphal, Coll. A.K.K. & party 5.iii.93.

*Geographical Distribution*: India: throughout.

*Elsewhere*: Pakistan; Nepal; Bangla Desh; Myanmar; Thailand; Malaya and Indonesia.

*Fishery Information*: Generally it attains a length of about 450 mm. Due to its carnivorous nature, this fish can only be cultured in wild waters or in fattening ponds where large fishes are only present. Commercially important species, consumed both in fresh and dried state.

<table>
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<tr>
<th>Order</th>
<th>CYPRINIFORMES</th>
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<td>Family</td>
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**Genus Chela** Hamilton-Buchanan, 1822


Body elongate, strongly compressed, with cutting abdominal edge. Mouth directed obliquely upward, cleft extending to below anterior margin of the eye. Symphysial knob absent on the lower jaw. Dorsal fin with, 9 to 11, anal fin with 17 to 25 rays. Outer ray of pelvic fin elongated. Lateral line curved downwards, with 34 to 68 scales.

**Key to the species of Genus Chela**

Pectoral fin not reaching anal fin. Pelvic fin with an elongated ray extending to middle or end of anal fin base. Lateral line scales 51 to 68 ................................. *C. cachius*

Pectoral fin reaching anal fin. Pelvic fin with elongated ray ends before anal fin base. Lateral line scales 34 to 37 ............................. *C. laubuca*

4. *Chela cachius* (Hamilton)


*Geographical Distribution*: India.

*Elsewhere*: Pakistan; Bangla Desh and Myanmar.

*Fishery Information*: It attains to a size of about 70 mm and due to its beautiful colouration, it is used as an ornamental fish in the aquaria.

**Genus Salmostoma** Swainson, 1839

Body elongate and laterally compressed. Abdomen keeled below pectoral fin to vent, keel not hardened. Mouth oblique, its cleft extending to anterior margin of eye or slightly beyond. Lower jaw often with a symphysial knob. Dorsal fin short, with 9 to 10 and anal fin with 14 to 20 rays. Outer ray of pelvic fin usually not elongated. Lateral line gently curved downwards above pectoral fin, with 38 to 112 scales.

Key to the species of Genus Salmostoma

1. Lateral line scales above 70
   - 2
   - Lateral line scales below 70
     - 3
2. Anal fin with 11 to 13 branched rays
   - S. bacaila
   - Anal fin with 16 to 18 branched rays
     - S. phulo phulo
3. Lateral line scales 38-40. Dorsal fin inserted in advance of anal fin. Anal fin rays 14 to 15
   - S. boopis

6. Salmostoma bacaila (Hamilton)

1822. Cyprinus bacaila Hamilton-Buchanan, Fishes of Ganges, : 265, 384, pl. 8, fig. 76 (type-locality: freshwater rivers of Gangetic provinces).


Material examined: (i) 1 ex., 80 mm, Jiri river at Gopalthal village, 4 kms north of Jiribam, Coll. A.K.K. & party, 19.iii.93 (ii) 1 ex., 88 mm, Pachau Fish Breeding Farm, 3 kms south of P.W.D.I.B., Jiribam, Coll. A.K.K. & party, 18.iii.93.

Geographical Distribution: India: Western Ghats-South Canara and Poona (new record from Manipur).

Fishery Information: This species attains a length of about 120 mm and is of no interest to fisheries.

8. Salmostoma phulo phulo (Hamilton)


Material examined: (1) 4 exs., 65-90 mm, Jiri River at Gopalthal village, 4 kms north of Jiribam, Coll. A.K.K. & party, 19.iii.93.

Geographical Distribution: India: Gangetic and Brahmaputra drainages.

Elsewhere: Bangla Desh.

Fishery Information: It attains a length of about 120 mm and is of no interest to fisheries.

Subfamily BASBORINAE

Genus Amblypharyngodon Bleeker, 1860


10. Amblypharyngodon mola (Hamilton)


Geographical Distribution: India: throughout the country.

Elsewhere: Bangla Desh; Myanmar; Pakistan.

Fishery Information: It attains a length of about 100 mm and used as a food fish in some areas specially Eastern India.

Genus Aspidoparia Heckel, 1843


Body elongate and subcylindrical; abdomen rounded. Mouth small and inferior. Lower jaw without a lip but with a sharp crescentic bony edge. No barbels. Dorsal fin inserted posterior to pelvic fin, with 9 to 10 rays; anal fin with 9 to 12 rays. Lateral line greatly curved, running in the lower half of caudal peduncle with 38 to 60 scales.

11. Aspidoparia morar (Hamilton)

1822. Cyprinus morar Hamilton-Buchanan, Fishes of Ganges, : 264, 384, pl. 31, fig. 75 (type-locality: Yamuna river and Tista river).


Material examined: (i) 1 ex., 116 mm, Jiri river at Jiribam, Coll. W. Vishwanath, 1989.

Geographical Distribution: India: throughout northern part.

Elsewhere: Iran; Pakistan; Nepal; Bangla Desh; Myanmar and Thailand.

Fishery Information: It attains a length of about 175 mm and of no interest to fisheries.

Genus Barilius Hamilton-Buchanon, 1822


Body more or less elongated, laterally compressed, with rounded abdomen. Mouth moderate and terminal; maxilla extends to below or slightly beyond anterior margin of eye. Barbels 1 or 2 pairs or absent. Dorsal fin inserted opposite interspace between pelvic and anal fin, often extending over anal fin. Dorsal fin with 9 to 13 and anal fin with 9 to 17 rays. Lateral line concave and complete with 38 to 75 scales. Body usually with dark spots or bands.

Key to the species of Genus Barilius

1. Barbels absent .............................................. 5
   Barbels present ........................................... 2

2. Barbels 4 ...................................................... 3
   Barbels 2 ...................................................... 4

3. Anal fin short with 9-11 rays, each scale with a black spot ........................................... B. bendelisis
- Anal fin long with 13-15 rays, 10 vertical bars ....................... \textit{B. vagra}

4. Lateral line scales 38-39 ........................................ \textit{B. dogarsinghi}

- Lateral line scales 43-46 ........ \textit{B. barila}

5. Body with 7-9 vertical bars .... \textit{B. barna}

- Body with more than 12 vertical bars ...... 6

6. Lateral line scales 39-41 ........ \textit{B. gatensis}

- Lateral line scales 45 ........ \textit{B. ornatus}

12. \textit{Barilius barila} (Hamilton)

1822. \textit{Cyprinus (Barilius) barila} Hamilton-Buchanan, \textit{Fishes of Ganges}, 267, 384 (type-locality, rivers of northern Bengal).


\textbf{Geographical Distribution} : India : Jammu and Kashmir, Delhi, Uttar Pradesh, Madhya Pradesh, Bihar, West Bengal, Assam, Manipur and Orissa.

\textit{Elsewhere} : Nepal; Bangla Desh and Myanmar.

\textbf{Fishery Information} : It attains a length of 110 mm. Like other small species of \textit{Barilius}, it is used by the fishermen as a bait on hooks for bigger fishes.

13. \textit{Barilius barna} (Hamilton)

1822. \textit{Cyprinus (Barilius) barna} Hamilton-Buchanan, \textit{Fishes of Ganges}, 268, 384 (type-locality : Jamuna river and Brahmaputra river).


\textbf{Material examined} : (i) 1 ex., 68 mm, Jiri river at Gopalthal village, 4 kms north of Jiribam, Coll. A.K.K. & party, 19.iii.93.

\textbf{Geographical Distribution} : India : Ganga and Brahmaputra river system, Mahanadi.

\textit{Elsewhere} : Nepal; Bangla Desh and Myanmar.

\textbf{Fishery Information} : It attains a length of 80 mm and is of no interest to fisheries.

14. \textit{Barilius bendelisis} (Hamilton)


\textbf{Material examined} : (i) 3 exs., 55-118 mm, Jiri river at Gopalthal village, 4 kms north of Jiribam, Coll. A.K.K. & party, 19.iii.93 (ii) 1 ex., 80 mm, Chakpi river at Chakpikarang, 13 kms from I.B., Sugnu, Coll. A.K.K. & party, 16.iii.93.

\textbf{Geographical Distribution} : India.

\textit{Elsewhere} : Pakistan; Nepal; Bangla Desh and Sri Lanka.

\textbf{Fishery Information} : It attains a length of 160 mm, is one of the principal commercial hill stream fishes.

15. \textit{Barilius dogarsinghi} Hora

1921. \textit{Barilius dogarsinghi} Hora, \textit{Rec. Indian Mus.}, 22(3) : 191, fig. 3 (type-locality : near Chanderkhong, Manipur).


\textbf{Material examined} : (i) 1 ex., 50 mm, Chakpi river at Nungpan, 9 kms from I.B., Sugnu, Coll. A.K.K. & party, 16.iii.93.

\textbf{Geographical Distribution} : India : Manipur.

\textbf{Fishery Information} : It attains a length of 85 mm, is of no interest to fisheries.

17. \textit{Barilius ornatus} Sauvage


Geographical Distribution: Myanmar; Thailand (new record from India: Manipur).

Fishery Information: It attains a length of 130 mm, is of no interest to fisheries.

18. Barilius vagra (Hamilton)


Material examined: (i) 14 exs., 75-122 mm, Chakpi River at Nungpan, 9 kms from I.B., Sugnu, Coll. A.K.K. & party, 16.iii.93.

Geographical Distribution: India: Himalayan and Sub-Himalayan rivers.

Elsewhere: Afghanistan; Pakistan; Nepal; Bangladesh and Sri Lanka.

Fishery Information: It attains a length of 130 mm and is of no interest to fisheries. However, the colour of the fish in living condition with beautiful combination of different shades, is very attractive.

Genus Danio Hamilton-Buchanan, 1822


Body more or less elongate and compressed. Mouth anterior, small and directed obliquely upwards. Lower jaw with a symphysial knob. Maxilla extends up to anterior margin of the eye. Barbels 2 pairs, one pair or absent. Dorsal fin with 6 to 17 and anal fin with 11-20 rays. Caudal fin emarginate, lunate or forked. Lateral line complete, incomplete or absent; with 32 to 65 scales.

Key to the species of Genus Danio

1. Barbels absent. Lateral line scales 35-38 .... ................................................. D. devario
   - Barbels present .............................................. 2

2. Lateral colour bands not breaking up anteriorly to form a mottled pattern ........................................ 3
   - Several well marked and uniform lateral bands, - Lateral line scales 34-36 .. D. aequipinnatus
   4. A single lateral band well marked posteriorly. - Lateral line scales 38-40 ...... D. naganensis

20. Danio aequipinnatus (McClelland)

1839. Perilampus aequipinnatus McClelland, Asiatic Res., 19(2): 393, pl. 60, fig. 1 (type-locality: Assam).


Material examined: (i) 1 ex., 55 mm, Nung Sung Kong (stream), 20 kms south of Ukhrul, Coll. A.K.K. & party, 8.iii.93.

Geographical Distribution: India: throughout.

Elsewhere: Nepal; Sri Lanka; Bangladesh; Myanmar and Thailand.

Fishery Information: It attains a length of about 150 mm and is a widely distributed beautiful fish of our area. This also proves to be peaceful and hardy aquarium fish.

22. Danio devario (Hamilton)

1822. Cyprinus devario Hamilton-Buchanan, Fishes of Ganges, p. 341, 393, pl. 6, fig. 94 (type-locality: rivers and ponds of Bengal).


Material examined: (i) 2 exs., 66-76 mm, Chakpi river at Nungpan, 9 kms from I.B., Sugnu, Coll. A.K.K. & party, 16.iii.93 (ii) 1 ex., 75 mm, Jiri river at Gopalthal village, 4 kms north of Jiribam, Coll. A.K.K. & party, 19.iii.93.

Geographical Distribution: India: northern India to the Krishna-Godavari river system.

Elsewhere: Pakistan; Nepal and Bangladesh.

Fishery Information: This pretty fish attains a length of 100 mm and is a fairly popular aquarium fish.

Genus Esomus Swainson, 1839

Body elongate and slender, strongly compressed. Mouth small, upwardly directed. Symphysial knob on lower jaw absent. Barbels 2 pairs, maxillary barbels very long extending upto anal fin. Dorsal fin inserted almost above anal fin, with 6 branched rays; anal with 5 branched rays. Lateral line when present, strongly arched anteriorly and passes through the lower half of caudal peduncle, with 27 to 34 scales.

**25. Esomus danricus** (Hamilton)


*Material examined:* (i) 2 exs., 64-66 mm, Takmu Lake, Coll. T.R. & party, 29.i.92 (ii) 4 exs., 47-57 mm, Khordak River, West of Keibul Lamjao Sanctuary, Coll. T.R. & party, 2.iii.92 (iii) 1 ex., 35 mm, Thanga village, 50 km from Imphal, Coll. P.K. & party, 28.xi.91 (iv) 1 ex., 45 mm, Floating Sanctuary, Keibul, Coll. T.R. & party, 3.iii.92 (v) 3 exs., 44-52 mm, Takmu Fish Farm, Loktak Lake, Coll. A.K.K. & party, 13.iii.92 (vi) 7 exs., 50-55 mm, Khutikhang Fish Farm at Jiribam, Coll. A.K.K. & party, 18.iii.92 (vii) 24 exs., 50-56 mm, Fish farm at Kamalmabbi, Pallel, Coll. A.K.K. & party, 15.iii.93 (viii) 7 exs., 45-53 mm, Pachau Fish Breeding Farm, 3 kms south of P.W.D.I.B., Jiribam, Coll. A.K.K. & party, 18.iii.93 (ix) 17 exs., 52—81 mm, Fish Farm at Tuibuanje, 2 kms from Churachandpur Circuit House, Coll. A.K.K. & party, 11.iii.93 (x) 31 exs., 37-56 mm, Khuga river, 2 kms east of Circuit House, Churachandpur, Coll. A.K.K. & party, 11.iii.93 (xi) 2 exs., 50-52 mm, Khuga river near Churachandpur (Market Coll.), Coll. A.K.K. & party, 10.iii.93 (xii) 7 exs., 50-73 mm, Fish Farm, 1 km from Circuit House, Churachandpur, Coll. A.K.K. & party, 11.iii.93.

*Geographical Distribution:* India : throughout.

*Elsewhere:* Pakistan; Nepal; and probably also Sri Lanka and Myanmar.

**Fishery Information:** It attains a length of 120 mm, very active, a surface feeder, equipped with exceptionally wide pectoral fins and is an accomplished jumper.

Genus *Raiamas* Jordan, 1918


Body elongate and laterally compressed. Head sharply pointed, its length 4.3 to 4.6 times in standard length. Mouth obliquely directed upward; very wide; maxilla extends well behind posterior margin of eye. Lower jaw with a well-developed symphysial knob. Barbels a minute maxillary pair, or absent. Dorsal fin with 7 to 8 branched rays, devoid of any osseous ray; anal with 9 to 10 branched rays. Lateral line with 44 to 95 scales.

**Key to the species of Genus Raiamas**

1. (a) Scales small, 85 to 95 in lateral line; barbels absent in adults ......................... *R. bola*
   (b) Scales moderate, 44 to 48 in lateral line; barbels minute, a maxillary pair present, rostral pair may be absent........ *R. guttatus*

27. *Raiamas guttatus* (Day)


*Material examined:* (i) 1 ex., 250 mm, Serou village, 12 kms away from Sugnu, Coll. A.K.K. & party, 13.iii.93 (ii) 1 ex., 90 mm, Kharungpat lake, Thoubal district, Coll. W. Vishwanath & Manoj Kumar, July 1982.

*Geographical Distribution:* India : Manipur

*Elsewhere:* Nepal; Myanmar; Shan states; Thailand; Cambodia and Malay Peninsula.

*Fishery Information:* It attains a length of 250 mm and a food fish; minor fisheries interest in Manipur and Myanmar.
Genus *Rasbora* Bleeker, 1860


Body elongate, moderately deep and laterally compressed. Mouth moderate, upwardly directed, with a projecting lower jaw. Lower jaw with a symphysial knob. Barbels usually absent. Dorsal fin inserted opposite interspace between pelvic and anal fin, with 9 to 10 soft rays, no spine. Anal fin with 7 to 8 rays. Lateral line concave, complete, 25 to 37 scales in longitudinal series.

**Key to the species of Genus Rasbora**

1. (a) Lateral line with 32 to 34 scales. A black lateral stripe along centre of body .......... R. daniconius daniconius 
(b) Lateral line with 28 to 31 scales. Caudal fin with well defined blackish hind-border R. rasbora

28. *Rasbora daniconius daniconius* (Hamilton)

1822. *Cyprinus daniconius* Hamilton-Buchanan, *Fishes of Ganges*, 327, 391, pl. 15, fig. 89 (type-locality: rivers of southern Bengal).

1981. *Rasbora daniconius daniconius* : Jayaram, *The Freshwater Fishes of India; Pakistan, Bangia Desh, Myanmar and Sri Lanka*, 84, fig. 43.

**Material examined**: (i) 2 exs., 31-44 mm, Khuga river, 2 kms away from Circuit House, Churachandpur, Coll. A.K.K. & party, 11.iii.93 (ii) 4 exs., 28-50 mm, Fish farm at Tuibuang, 2 kms west of Circuit House, Churachandpur, Coll. A.K.K. & party, 11.iii.93.

**Geographical Distribution**: India: throughout. Elsewhere: Pakistan; Sri Lanka; Bangla Desh; Myanmar and Thailand.

**Fishery Information**: This species attains a length of about 130 mm and because of its beauty and hardiness, it has established itself as an aquarium fish.

31. *Rasbora rasbora* (Hamilton)


**Material examined**: 1 ex., 80 mm, Jiri river at Gopalthal village, 4 kms north of Jiribam; Coll. A.K.K. & party, 19.iii.93.

**Geographical Distribution**: India: Gangetic provinces, Assam, Manipur. Elsewhere: Pakistan; Bangla Desh; Myanmar and Thailand.

**Fishery Information**: This species attains a length of about 100 mm and is hardy and active; not important from fisheries point of view.

Subfamily CYPRININAE

Genus *Acrossocheilus* Oshima, 1919


Body elongate, not very deep, compressed. Head short, broad, with several rows of horny tubercles on sides and infront of nasal below eyes. Snout obtusely rounded; mouth moderate, subterminal. Lips thick and continuous round the angle of mouth. Labial fold interrupted in the middle. Lower jaw covered by a horny covering. Four barbels. Dorsal fin inserted slightly ahead of pelvic fin, with 13 rays and a smooth spine. Anal fin with 8 rays. Lateral line complete with 22-32 large scales.

**Key to the species of Genus Acrossocheilus**

1. (a) Dorsal fin osseous and smooth with 9 branched rays. Lateral line scales 28-31, pre-dorsal scales 8 .......... *A. hexagonolepis* 
(b) Dorsal fin osseous and denticulated with 8 branched rays. Lateral line scales 40-41, pre-dorsal scales 13 .......... *A. manipurensis*

31. *Acrossocheilus manipurensis* Datta, Karmakar & Laishram

Material examined: 1 ex., 130 mm, Taret hill stream at Saibol, 20 kms east of Tengnoupal, Manipur, Coll. I.S. Laishram, 15.v.1981.

Geographical Distribution: Manipur, India.

Fishery Information: Not known as it is a recently described species.

Genus **Cirrhinus** Cuvier, 1817


Body elongate; abdomen rounded. Snout depressed, often with pores. Mouth wide, lower jaw with a small symphysical knob. Upper lip not continuous with lower lip around corners of mouth. Barbels one or two pairs, or absent. Dorsal fin inserted anterior to pelvic fins, with 10 to 19 rays, the last simple ray nonosseous and nonserrated. Anal fin with 7 to 8 rays. Lateral line complete with 35 to 45 scales.

Key to the species of Genus **Cirrhinus**

1. (a) Dorsal fin with 8 branched rays.
   - Lateral line scales 35-38 ............... *C. reba*
   (b) Dorsal fin with 12-13 branched rays.
   - Lateral line scales 40-45 ........... *C. mrigala*

33. **Cirrhinus mrigala** (Hamilton)


Material examined: 4 exs., 47-67 mm, Fish Farm at Churachandpur, 1 km away from Circuit House, Coll. A.K.K. & party, 11.iii.93.

Geographical Distribution: India: northern India from Punjab to West Bengal and Assam. Also successfully transplanted into water of peninsular India and other states for aquaculture.

Elsewhere: Pakistan; and Bangla Desh.

Fishery Information: It attains a length of about one meter and a weight of 13 kg and is an important major carp in India and quite a game fish. A large number of intergeneric hybrids has been produced at the Central Inland Fisheries Research Institute, Barrackpore.

Genus **Cyprinus** Linnaeus, 1758


Body robust, elongate and compressed. Abdomen rounded. Head relatively small with a bluntly rounded snout. Eyes moderate, placed on the upper half of the head. Mouth small, terminal. Barbels 2 pairs, rostral and maxillary. Dorsal fin very long, inserted opposite to pelvic fins, with 3 spines and 18 rays. Anal fin short with 3 spines and 5 rays. Scales large; lateral line with 30 to 40 scales.

36. **Cyprinus carpio** var. **communis** Linnaeus


Material examined: (i) 2 exs., 38-67 mm, Fish Farm, 1 km away from Circuit House, Churachandpur, Coll. A.K.K. & party, 11.iii.93.

Geographical Distribution: Naturally found in China; Korea; Japan; Thailand; Europe; America; introduced in India for culture.

Fishery Information: It attains a length around 1 meter and a maximum 10 kg body weight. Cultivated in freshwater impoundments all over the world.

Genus **Labeo** Cuvier, 1817


Body cylindrical, elongate; abdomen rounded. Generally overhanging mouth, inferior, transverse and semicircular. Snout broadly rounded or obtusely pointed. Lips thick, covering the jaws, continuous at the angle of mouth. Barbels one or two pairs, or absent; when single pair, always
Fishes

maxillary. Dorsal fin inserted anterior to pelvic fins, with 11 to 26 rays, devoid of spine. Anal fin short with 7 to 8 rays. Lateral line complete, with 36 to 85 scales.

Key to the species of Genus Labeo

1. Lower lip separated from isthmus by a post labial groove. Branched dorsal rays 10 to 16 .........................................................2
   - Lower lip not separated from isthmus by a post labial groove. Branched dorsal rays 8 to 10 ..................................................4

2. Branched dorsal rays 12 to 16 .....................3
   - Branched dorsal rays 10 ............... L. angra

3. Branched dorsal rays 12 to 13, lateral line scales 40 to 42 ...................... L. rohita
   - Branched dorsal rays 14 to 16, lateral line scales 40 to 46 ...................... L. calbasu

4. No horny covering inside lower jaw
   (a) Eyes 4.0 to 4.3 in head length ... L. bata
   (b) Eyes 6.0 to 9.0 in head length ............. L. dyocheilus
   - A thin horny covering inside lower jaw .......5

5. Snout grooved, lateral line scales 41 to 44 .. ............................................. L. dero
   - Snout not grooved, frontal area beset with pores. Lateral line scales 40 to 42 ............. L. pangusia

+37. Labeo angra (Hamilton)


Geographical Distribution : India : Assam, West Bengal, Bihar, Uttar Pradesh, Punjab and Orissa (new record from Manipur).

Elsewhere : Bangla Desh; Nepal and Myanmar.

Fishery Information : It generally grows up to 220 mm in length. This species is fairly common in the Mahanadi River where it breeds during monsoon months.

Genus Osteobrama Heckel, 1842


Body deep and strongly compressed. Abdominal edge sharp and trenchant entirely or only from pelvic fin base to vent. Mouth small, somewhat directed upwards. Upper jaw slightly longer. Barbels 2 pairs, 1 pair or entirely absent. Dorsal fin inserted considerably behind pelvic fin, with 11 to 12 soft rays and a strong serrated spine. Anal fin with 14 to 36 rays. Lateral line complete with 42 to 80 scales.

Key to the species of Genus Osteobrama

1. Anal fin with less than 20 branched rays. Abdominal edge keeled throughout ................. O. belangeri
   Anal fin with more than 20 branched rays. Abdominal edge keeled between pelvic and anal fins ...........................................2

2. Lateral line scales 42 to 58. Predorsal scales 18 to 24. Scales between lateral line and pelvic fin 7 1/2 to 9 1/2 .......... O. coto coto
   Lateral line scales 57 to 70. Predorsal scales 24 to 28. Scales between lateral line and pelvic fin 10 1/2 to 13 ........... O. coto cunma

44. Osteobrama belangeri (Valenciennes)

1844. Leuciscus belangeri Valenciennes, Hist. nat. Poiss, 17 : 99 (type-locality: 'Eaux douces de Bengale').


Material examined : (i) 1 ex., 225 mm, Takmu Fish Farm, Loktak Lake, Coll. A.K.K. & party, 13.iii.93.

Geographical Distribution : India : Manipur.

Elsewhere : Myanmar and China.
Fishery Information: It attains a length of about 380 mm. This species is restricted to Manipur in India and is of interest to fisheries in Manipur where it is cultured.

45. Osteobrama cotio cotio (Hamilton)

1822. Cyprinus cotio Hamilton-Buchanan, Fishes of Ganges: 339, 393, pl. 39, fig. 93 (type-locality: ponds and ditches of Bengal).


Material examined: (i) 1 ex., 73 mm, Imphal Fish Market, P.K. & party, 25.xi.91 (ii) 1 ex., 82 mm, Bishnupur, Coll. P.K. & party, 27.xi.91 (iii) 4 exs., 76-95 mm, Keibul Lamjao Sanctuary, Coll. T. R. & party, 1.iii.92 (iv) 1 ex., 75 mm, Thanga village, 50 kms from Imphal, Coll. P.K. & party, 28.xi.91 (v) 1 ex., 97 mm, Thoubul village, 15 kms from Imphal, Coll. P.K. & party, 23.xi.91 (vi) 1 ex., 80 mm, Moirang Market, Coll. P.K. & party, 24.xi.91 (vii) 4 exs., 90-122 mm, Takmu Fish Farm, Loktak Lake, Coll. A.K.K. & party, 13.iii.93 (viii) 3 exs., 84-93 mm, Thanga village (Loktak Lake coll.), Coll. A.K.K. & party, 13.iii.93 (ix) 1 ex., 101 mm, Khuga river near Churachandpur (Market coll.), Coll. A.K.K. & party, 10.iii.93.

Geographical Distribution: India: Assam, West Bengal, Bihar, Manipur, Madhya Pradesh, Uttar Pradesh and Punjab.

Elsewhere: Pakistan and Bangla Desh.

Fishery Information: It attains a length of about 150 mm and is of no interest to fisheries.

46. Osteobrama cotio cunma (Day)

1878. Rohite cotio (nec Hamilton-Buchanan) Day (partim). Fishes of India: 587, pl. 147, fig. 2.

1991. Rohite cotio cunma: Talwar and Jhingran, Inland Fishes of India and Adjacent Countries: 239-240, fig. 82.

Material examined: (i) 2 exs., 73-90 mm, Jiri River at Gopalthal village, 4 kms north of Jiribam, Coll. A.K.K. & party, 13.iii.93.

Geographical Distribution: India: Manipur valley.

Elsewhere: Myanmar.

Fishery Information: It is the commonest form of Osteobrama in Myanmar. It attains a length of about 150 mm and is of no interest to fisheries.

Genus Puntius Hamilton-Buchanan, 1822


Body short or moderately elongate, often deep and slightly compressed; with rounded abdomen. Mouth terminal to inferior; lips thin, devoid of horny covering. Symphysial knob or tubercle absent. Barbels 2 pairs, 1 pair or absent. Dorsal fin short, inserted nearly opposite to pelvic fins, with 9 to 13 rays and with or without spine. Anal fin with 7 to 9 rays. Lateral line complete or incomplete, with 20 to 47 scales in longitudinal series.

Key to the species of Genus Puntius

1. Barbels present ............................................. 2
   - Barbels absent ............................................. 7
2. Two pairs of barbel ..................................... 3
   - One pair of barbel ..................................... 6
3. Dorsal spine as long as depth of the body. Lateral line scales 42.............. P. clavatus
   - Dorsal spine equal to or shorter than body depth. Lateral line scales less than 40 ...... 4
4. A finger like mark on caudal peduncle present ............................................. 5
   - No such finger like mark on caudal peduncle. Lateral line scales 28 to 32 ...... P. jayarami
5. Dorsal fin inserted nearer caudal fin base than tip of snout. Lateral line scales 36 to 38. Predorsal scales 15 to 16 ...... P. shanensis
   - Dorsal fin inserted nearer tip of snout than to caudal base. Lateral line scales 26-34. Predorsal scales 11 to 12 P. sarana sarana
   - Dorsal fin inserted nearer to base of caudal fin than to tip of snout. Lateral line scales 28-31. Predorsal scales 10 to 11. Caudal fin with a distinctive longitudinal black marginal band on each lobe ...... P. sarana orphoides
6. Scale between middle of back and lateral line 5 or $5\frac{1}{2}$, Predorsal scales 10-12. A dark block from 23-25 scales of the lateral line. A dark spot along base of first to fourth anterior dorsal ray ....................... *P. chola*

- Scales between middle of back and lateral line 4 or $4\frac{1}{2}$, Predorsal scales 10. A dull block before the base of caudal fin. A dull band in the centre of dorsal fin .................. *P. burmanicus*

7. Dorsal spine serrated ......................... 8

- Dorsal spine smooth. Body depth 3.5 to 3.75 in total length. A round black block at the root of caudal fin .......................... *P. sophore*

8. Body without any vertical black coloured bands ............................................................ 9

- Body with vertical black coloured bands 11

9. Branched ray in dorsal fin 7. 6 or 7 rows of transverse scales. A horizontal blue line on body and two spots on tail ....... *P. shalynius*

- Branched ray in dorsal fin 8. About 12 rows of transverse scales. No band on body ... 10

10. Body depth 2.4 in total length. Predorsal scales 9. Lateral line incomplete. One black spot ........................................ *P. conchonius*

- Body depth 3 to 3.5 in total length. Predorsal scales 11. Lateral line incomplete. Two black spots ........................................ *P. tioto*

11. L. Tr. row of scales 8/10. Body with 4 vertical black bands ........................................ *P. phutunio*

- L. Tr. row of scales 3$\frac{1}{2}$/5. Body with 3 vertical black bands .......................... *P. gelius*

49. *Puntius chola* (Hamilton)


**Material examined**: (i) 4 exs., 70-89 mm, Imphal Fish Market, Coll. P.K. & party, 25.xi.91 (ii) 5 exs., 82-120 mm, Moirang Market, Coll. P.K. & party, 1.xii.91 (iii) 5 exs., 38-81 mm, Takmu Fish Farm, Loktak Lake, Coll. A.K.K. & party, 13.iii.93 (a) 1 exs., 90 mm, Thangal Fish Market, Imphal, Coll. A.K.K. & party, 5.iii.93 (v) 2 exs., 76-78 mm, Jiri River at Gopalthal village, 4 kms north of Jiribam, Coll. A.K.K. & party, 19.iii.93.

**Geographical Distribution**: India : throughout; Pakistan; Nepal; Bangla Desh; Myanmar and Sri Lanka.

**Fishery Information**: It attains length of about 120 mm and is of only minor interest to fisheries.

50. *Puntius clavatus* (McClelland)


**Material examined**: (i) 2 exs., 85-92 mm, Chakpi river at Chakpi Karang, Coll. W. Viswanath and Manoj Kumar, 12.xi.92.

**Geographical Distribution**: India : North Bengal below the himalayan foot hills, Sikkim, Manipur.

**Elsewhere**: Nepal; Bangla Desh and Myanmar.

**Fishery Information**: It attains a length of about 240 mm, is of only minor interest to fisheries.

51. *Puntius conchonius* (Hamilton)


**Material examined**: (i) 7 exs., 60-66 mm, Bishenpur, Coll. P.K. & party, 27.xi.91 (ii) 1 ex., 85 mm, Thoubal Fishing Centre, Coll. P.K. & party, 29.xi.91 (iii) 5 exs., 60-83 mm, Thanga village, 50 kms from Imphal, Coll. P.K. & party, 28.xi.91 (iv) 1 ex., 78 mm, Moirang Market, Coll. P.K. & party, 1.xii.91 (v) 6 exs., 75-82 mm, Takmu Fish Farm, Loktak Lake, Coll. A.K.K. & party, 13.iii.93 (vi) 12 exs., 22-55 mm, Khutikhong.

Geographical Distribution: India: Ganga, Brahmaputra, Mahanadi and Cauvery river systems.

Elsewhere: Pakistan, Nepal and Bangla Desh.

Fishery Information: It attains a length of about 100 mm. This is one of the most important ornamental Puntius species and a very beautiful aquarium fish.

52. Puntius jayarami Vishwanath & Tombi


Material examined: (i) 2 exs., 95-145 mm, Chakpi river at Sherow, Coll. W. Viswanath & Tombi Singh, 18.iii.92.

Geographical Distribution: Chakpi river, Imphal, Manipur.

Fishery Information: Not known.

+53. Puntius gelius (Hamilton)


Material examined: (i) 7 exs., 47-87 mm, Nightingam, 35 kms from Imphal, Coll. P.K. & party, 26.xi.91.

Geographical Distribution: India: throughout except peninsular India south of Krishna river. Elsewhere: Pakistan; Nepal; Bangla Desh and Bhutan.

Fishery Information: It attains a length of about 300 mm and is widely distributed all over India in rivers and tanks. A barb of significant fisheries importance.

+57. Puntius shalynius Yazdani & Talukdar


Material examined: (i) 7 exs., 56-64 mm, Chakpi River at Nungpan, 9 kms from I.B., Sugnu, Coll. A.K.K. & party, 16.iii.93.

Geographical Distribution: India: Meghalaya, Assam (new record from Manipur).

Fishery Information: It attains a length of about 70 mm; is one of the common species in the Khasi hill-stream and is of minor fishery value.

++58. Puntius shanensis (Hora & Mukherjee)

1936. Barbus shanensis Hora and Mukherjee, Rec. Indian Mus., 36 (3) : 362, fig. 3 (type-locality: Lawksawk, South Shan States, Myanmar).

**Material examined**: (i) 1 ex., 60 mm, Chakpi river at Nungpan, 9 kms from I.B., Sugnu, Coll. A.K.K. & party, 16.iii.93.

**Geographical Distribution**: Myanmar: South Shan States (new record from India).

**Fishery Information**: Not known.


**Material examined**: (i) 1 ex., 63 mm, Thangal market, Imphal, Coll. P.K. & party, 22.xi.91 (ii) 1 ex., 50 mm, Thoubal Fishing Centre, Coll. P.K. & party, 29.xi.91 (iii) 1 ex., 77 mm, Nightingam, 35 kms from Imphal, Coll. P.K. & party, 26.xi.91 (iv) 2 exs., 82-101 mm, Takmu Fish Farm, Loktak Lake, Coll. A.K.K. & party, 13.iii.93 (v) 1 ex., 60 mm, Pachau Fish Breeding Farm, 3 kms south of P.W.D.I.B., Jiribam, Coll. A.K.K. & party, 18.iii.93 (vi) 2 exs., 68-73 mm, Jiri River at Gopalthal village, 4 kms north of Jiribam, Coll. A.K.K. & party, 19.iii.93.

**Geographical Distribution**: India: throughout. Elsewhere: Pakistan; Nepal; Sri Lanka; Bangladesh; Myanmar and Thailand.

**Fishery Information**: It attains a length of about 100 mm, a popular barb in the aquaria.


Body elongate; deep anteriorly, the trunk and peduncle smoothly tapered. Head small, with a prominent snout. Mouth varying from inferior to sub-inferior, upper jaw often protractile. Lips thick and well developed, lower lip with a distinctive median fleshy lobe below the mandibular symphysis. Barbels 2 pairs and well developed. Dorsal fin inserted opposite to pelvic fins, with 12 to 13 rays and a strong and smooth spine. Anal fin with 7 to 8 rays. Lateral line complete, with 22 to 37 scales.

**Key to the species of Genus Tor**

1. Length of head considerably greater than body depth; lower fins yellowish .......... *T. putitora*
   - Length of head equal to or shorter than body depth; lower fins usually red or orange ..... 2
2. Length of head almost equal to body depth; eyes not visible from underside of head...... T. progeneius
Length of head shorter than body depth; eyes visible from underside of head ........ T. tor

Subfamily GARRINAE
Genus Crossocheilus Kuhl et van Hasselt, 1823


Body moderately elongate with a rounded abdomen. Head rather small; snout obtusely rounded. Mouth inferior; upper lip well developed, lower lip fleshy. Usually 1 pair of rostral barbel. Dorsal fin inserted in advance of pelvic fins, with 10 to 11 soft rays and without a spine. Anal fin with 7 rays. Lateral line complete, with 33 to 46 scales.

Key to the species of Genus Crossocheilus
- Head length less than 5 times (4.3 to 5.0) in standard length. Lateral line scales 35 ........ C. burmanicus
- Head length more than 5 times (5.1 to 5.2) in standard length. Lateral line scales 37 to 42 ........ C. latius

65. Crossocheilus burmanicus Hora


Material examined : (i) 3 exs., 72-74 mm, Iril river, a tributary of Imphal river, Coll. Shyam Kishore Singh, 4.x.92.

Geographical Distribution : India : Manipur.
Elsewhere : Myanmar.

Fishery Information : It attains a length of about 130 mm and of no interest to fisheries.

Genus Garra Hamilton-Buchanan, 1822

Body elongate and subcylindrical. Under surface of the head and body flattened. Mouth inferior, transverse and semicircular; a suctorial disc present on chin. A proboscis may be present. Barbels 1 or 2 pairs or entirely absent. Dorsal fin inserted in advance of pelvic fins, with 9 to 12 rays and no spine. Paired fins horizontally placed. Anal fin with 6 to 8 rays. Lateral line complete, with 32 to 40 scales.

Key to the species of Genus Garra
1. Proboscis present ............................................ 2
Proboscis absent ................................................ 4
2. Proboscis trilobed, 2 pairs of barbels present ............................................ G. nasuta
Proboscis a single projection without lateral lobes ........................................................ 3
3. Proboscis weakly developed without lateral tubercular area .......................... G. gravelyi
Proboscis well developed with well defined lateral tubercular area ....................... G. gotyla
4. Lateral line scales 34 or fewer ................................ 5
Lateral line scales 35-40 ........................................ 6
5. Dorsal fin with a light black bar across and caudal fin with broad W-shaped bands
(a) Back and post-pelvic region scaled .......................... G. lissorhynchus
(b) Back and post-pelvic region nacked ............................................ G. rupecula

Dorsal and caudal fins without such markings ................................................ G. manipuresis
6. Vent situated almost midway between anterior origin of anal and pelvic fins ........ G. kempi
Vent not situated midway between anterior origin of anal and pelvic fins G. naganensis

72. Garra naganensis Hora

Material examined: (i) 1 ex., 58 mm, Moirang Market, Coll. P.K. & party, 1.xii.91 (ii) 1 ex., 57 mm, Nong Sung Kong (stream), 20 kms south of Ukhrul, Coll. A.K.K. & party, 8.iii.93 (iii) 1 ex., 52 mm, Rangazak stream, 15 kms north of Ukhrul, Coll. A.K.K. & party, i.iii.93 (iv) 7 exs., 32-38 mm, Chakpi river at Chakpi Karang, 13 kms from I.B., Sugnu, Coll. A.K.K. & party, 16.iii.93 (v) 3 exs., 82-90 mm, Chakpi river at Chakpi Karang, Dist. Chandel, Coll. W. Vishwanath and Manoj Kumar, 12.xi.92.

Geographical Distribution: India: Naga Hills, Nagaland, Manipur.

Fishery Information: This species attains a length of about 100 mm and is of no interest to fisheries.

Family HOMALOPTERIDAE
Subfamily NOEMACHEILINAE
Genus Noemacheilus Bleeker, 1823


Body elongate, almost cylindrical and somewhat depressed. Mouth small and inferior. Eyes minute to small. Preorbital spine on head absent. Barbels 2 to 4 pairs. Dorsal fin inserted opposite to pelvic fins, with 8 to 20 soft rays and devoid of any spine. Anal fin with 6 to 8 soft rays. Caudal fin emarginate, truncate, or lunate. Scales minute. Lateral line complete or incomplete.

Key to the species of Genus Noemacheilus
1. Dorsal fin with 9 to 11 branched rays ....... 2
   - Dorsal fin with 6 to 8 branched rays ....... 3
2. Lateral line usually complete often ending only beyond base of anal fin. Caudal fin slightly emerginate ......................... N. botia
   - Lateral line incomplete, ending below dorsal fin base. Caudal fin emerginate ......................... N. zonalternans
3. Caudal fin truncate. Lateral line incomplete. Body with many narrow bands, narrower than interspace between them and descending upto ventral surface ................. N. manipurensis
   - Caudal fin deeply forked ..................... 4
4. Lateral line incomplete ............................ 5
   - Lateral line complete ............................ 6
5. Dorsal fin with 6 to 7 branched rays. Body with 7 to 11 broad black complete bands ..... ........................................ N. kangjupkulensis
   - Dorsal fin with 8 branched rays. Body above lateral line marked by characteristic reticulations ............................ N. prashadi

6. Bands on body not continuous from back but disjoined and not descending to ventral surface. Caudal fin with V-shaped band ..................... ........................................ N. scaturigina
   - Body with 12 to 13 black bands encircling the body, nearly upto base of pectoral fin. A black bar at the base of caudal fin .. N. sikmaiensis

76. Noemacheilus botia (Hamilton)


Material examined: (i) 9 exs., 50-80 mm, Jiri river at Gopalthal village, 4 kms north of Jiribam, Coll. A.K.K. & party, 19.iii.93 (ii) 1 ex., 65 mm, Khuga river, 2 kms away from Circuit House, Churachandpur, Coll. A.K.K. & party, 10.iii.93.

Geographical Distribution: India: Northern India, Brahmaputra and Ganga basins.

Elsewhere: Pakistan; Nepal; Myanmar; Bangla Desh and Sri Lanka.

Fishery Information: This species attains a length of 90 mm and is of no interest of fisheries.

78. Noemacheilus kangjupkulensis Hora

Material examined: 2 exs., 40-52 mm, Sekmai river at Sekmai, dist. Imphal, Coll. W. Viswanath and Manoj Kumar, 11.xii.92.

Geographical Distribution: Manipur.

Elsewhere: Myanmar.

Fishery Information: It attains a length of about 52 mm and is of no interest to fisheries.

79. Noemacheilus manipurensis Chaudhuri 1912. Nemacheilus manipurensis Chaudhuri, Rec. Indian Mus., 7: 443, pl. 40, figs. 4, 4a, 4b and pl. 41, figs. 1, 1a, 1b (type-locality: Manipur).


Geographical Distribution: India: Manipur valley and Nagaland.

Fishery Information: It attains a length of about 52 mm and is of no interest to fisheries.


Material examined: (i) 3 exs., 50-53 mm, Jiri river at Gopalthal village, 4 kms north of Jiribam, Coll. A.K.K. & party, 19.iii.93 (ii) 2 exs., 60-63 mm, Chakpi river at Chakpikarang, Coll. Manoj Kumar, 12.xi.92.

Geographical Distribution: India: Manipur valley.

Fishery Information: It attains a length of about 70 mm and is of no interest to fisheries.


Material examined: (i) 3 exs., 45-60 mm, Nung Sung Kong (stream), 20 kms south of Ukhrul, Coll. A.K.K. & party, 8.iii.93 (ii) 2 exs., 60-63 mm, Chakpi river at Chakpikarang, Coll. Manoj Kumar, 12.xi.92.

Geographical Distribution: India: North Bengal, Assam, Arunachal Pradesh, Manipur.

Elsewhere: Nepal.

Fishery Information: It attains a length of 70 mm and is of no interest to fisheries.

Genus Botia Gray, 1831

Body robust, moderately elongate and laterally compressed. Head long and pointed downwards. A bifid spine present in the antero-ventral direction of the eye. Mouth small and ventral; lips thick. Barbels 3 to 4 pairs. Dorsal fin inserted above or anterior to origin of pelvic fins, with 10-16 rays. Anal fin with 7 to 9 rays. No scales on head. Lateral line present.

Key to the species of the Genus Botia

1. Three pairs of barbels present
   B. berdmorei
2. Four pairs of barbels present

2. Dorsal fin inserted slightly behind insertion of pelvic fin and originates nearer base of caudal fin than to snout tip. Eye diameter 2.5 in snout length
   B. histrionica

Dorsal fin inserted opposite pelvic fin and originates almost equidistant from snout tip and caudal fin base. Eye diameter 3.0 in snout length
   B. dario
84. *Botia berdmorei* (Blyth)


**Material examined**: (i) 2 exs., 108-128 mm, Ithai barage (on Imphal river), Bishenpur district, Coll. W. Vishwanath, July 1991 (ii) 1 ex., 82 mm, Imphal river, Coll. Shyam Kishore Singh, 12.xii.92.

**Geographical Distribution**: India: Manipur.

**Elsewhere**: Myanmar and Central Thailand.

**Fishery Information**: It attains a length of about 140 mm, a rare loach in India and of no interest to fisheries.

85. *Botia dario* (Hamilton)

1822. *Cobitis dario* Hamilton-Buchanan, *Fishes of Ganges*: 354, 394, pl. 29, fig. 95 (type-locality: northern rivers of Bengal).


**Material examined**: (i) 1 ex., 103 mm, Jiri river at Gopalthal village, 4 kms north of Jiribam, Coll. A.K.K. & party, 19.iii.93 (ii) 2 exs., 65-90 mm, Jiri river at Jiribam, Coll. W. Vishwanath, 1989.

**Geographical Distribution**: India: Ganga and Brahmaputra drainages.

**Elsewhere**: Bangla Desh.

**Fishery Information**: It attains a length of about 110 mm and is of no interest to fisheries.

Subfamily COBITINAE

Genus *Acanthophthalmus* Van Hasselt, 1824


Body very elongate or anguilliform, laterally compressed. Head small, with inferior mouth. 6 barbels. Mental lobes well developed. Dorsal fin inserted above the interspace between ventral and anal. Ventral fin on the second half of the body. Caudal truncated. Scales minute, slightly imbricated. Head naked. Lateral line absent or very short.

87. *Acanthophthalmus pangia* (Hamilton)


**Material examined**: (i) 6 exs., 58-83 mm, Imphal river at Imphal, Coll. W. Viswanath, 1989.

**Geographical Distribution**: India: North-eastern Bengal, Assam and Manipur.

**Elsewhere**: Bangla Desh and Myanmar.

**Fishery Information**: This loach attains a length of about 85 mm and is of no interest to fisheries. But consumed by local people at Manipur and sold in the fish market there.

Genus *Lepidocephalus* Bleeker, 1858


**Key to the species of Genus Lepidocephalus**

1. Dorsal side of head scaled. Dorsal and pelvic fins inserted in second half of body ..................

2. Caudal fin deeply emarginate ..................

3. Caudal fin truncate, rounded, slightly emarginate ..................

- Dorsal side of head naked. Dorsal and pelvic fins inserted in first half of body ........... 2
3. Pectoral fin with 9 to 10 rays. Body depth 7.0 to 7.7 times in total length. Caudal fin slightly emerginate .............................. L. berdmorei

Pectoral fin with 7 to 8 rays. Body depth 5.8 to 6.8 times in total length. Caudal fin rounded or cut square .............................. L. guntea

88. Lepidocephalus berdmorei (Blyth)

Material examined: (i) 6 exs., 65-70 mm, Serou village, 12 kms away from Sugnu, Coll. A.K.K. & party, 16.iii.93 (ii) 2 exs., 72-75 mm, Khuga river near Churachandpur (Market coll.), Coll. A.K.K. & party, 10.iii.93 (iii) 1 ex., 75 mm, Fish Farm, 1 km away from Circuit House, Churachandpur, 11.iii.93.

Geographical Distribution: India : Manipur; and Myanmar.

Fishery Information: It attains a size of about 80 mm and is of no interest to fisheries.

+89. Lepidocephalus caudofurcatus Tilak & Hussain
1978. Lepidocephalus caudofurcatus Tilak and Hussain, Matsya, (3) : 60, figs. 1-3 (type-locality : Rishikesh, Uttar Pradesh).

Material examined: (i)1 ex., 63 mm, Jiri River at Gopalthal village, 4 kms north of Jiribam, Coll. A.K.K. & party, 19.iii.93.

Geographical Distribution: India : Doon Valley, Uttar Pradesh and Assam (new record from Manipur).

Fishery Information: It attains a length of about 75 mm and is of no interest to fisheries.

90. Lepidocephalus guntea (Hamilton)


Material examined: 1 ex., 35 mm, Bishenpur, Coll. P.K. & party, 27.xi.91 (ii) 1 ex., 65 mm, Thoubal Fishing Centre, Coll. P.M. & party, 29.xi.91 (iii) 1 ex., 70 mm, Khuga River, 5 kms east of I.B., Churachandpur, Coll. T.R. & party, 9.iii.92 (iv) 1 ex., 80 mm, Keibul Lamjao, Coll. T.R. & party, 1.iii.92 (v) 3 exs., 42-82 mm, Nightingam, 35 kms from Imphal, Coll. P.K. & party, 26.xi.91 (vi) 1 ex., 51 mm, Nung Sung Kong (stream), 20 kms from Ukhruli, Coll. A.K.K.& party, 8.iii.93.

Geographical Distribution: India : throughout except Karnataka, Kerala and south of Krishna.
Elsewhere: Pakistan; Bangla Desh; Nepal; Myanmar; and Thailand.

Fishery Information: It attains a length of about 150 mm and of no interest to fisheries. But it is widely used as an aquarium fish.

Order: SILURIFORMES
Family: BAGRIDAE
Genus: Mystus Scopoli, 1777


Body moderately elongate, posteriorly compressed. Head rather depressed and smooth. Eyes moderately large, not visible from underside of head. Mouth terminal and moderately wide. 4 pairs of barbels, maxillary barbels extend beyond dorsal fin. Rayed dorsal fin with one serrated spine and 7 soft rays; adipose dorsal low. Anal fin short, with 9 to 16 soft rays. Lateral line complete.

Key to the species of Genus Mystus
1. Occipital process not reaching basal bone of dorsal fin. Eye diameter 6.0 to 8.0 in head length. No spot at the base of caudal fin .... M. microphthalmus

− Occipital process reaching basal bone of dorsal fin
2. Adipose dorsal fin commencing immediately after rayed dorsal fin ......................3

   - Adipose dorsal fin commencing after an interspace from rayed dorsal fin; longer than anal fin base. A dark blotch at the base of caudal fin .................. M. armatus

3. Maxillary barbels reach base of pelvic fins. Head length not more than 4 times in total length ................. M. tengara

   - Maxillary barbels reach base of anal fin. Head length more than 5 times in total length ....... M. bleekeri

95. Mystus bleekeri (Day)


   Geographical Distribution : India : Ganga, Jamuna and Indus River Systems (First record from Manipur).

   Elsewhere : Bangla Desh; and Pakistan.

   Fishery Information : It attains a length of 100 mm and is of no interest to fisheries.

Genus Clupisoma Swainson, 1839


   Body elongate and compressed. Abdominal edge either rounded or keeled (entirely or partly). Eyes moderate, visible from under-side of head. Nostrils prominent and closely placed. Mouth moderate, subterminal; its gape not extending to eye. Barbels 4 pairs, all placed at same level. Gill membranes free from isthmus. Dorsal fin inserted considerably in advance of pelvic fins, with 1 spine and 6 to 9 soft rays. A small adipose dorsal usually present. Anal fin long, with 29 to 54 soft rays.

   +102. Clupisoma prateri Hora

Material examined: (i) 3 exs., 60-75 mm, Jiri river at Gopalthal village, 4 kms north of Jiribam, Coll. A.K.K. & party, 19.iii.93 (ii) 1 ex., 65 mm, Jiri river at Jiribam, W. Viswanath, 1989.

Geographical Distribution: India: Punjab, Delhi, Uttar Pradesh, Bihar, West Bengal, Assam and Orissa, Manipur.

Elsewhere: Pakistan; Bangla Desh; Nepal; and Myanmar.

Fishery Information: It attains a length of about 170 mm, fairly common in the rivers of northern India and also in Assam. This fish is considered a wholesome food.

110. Gagata gagata (Hamilton)


Geographical Distribution: India: Ganga and Brahmaputra river systems.

Elsewhere: Bangla Desh and Myanmar.

Fishery Information: It attains a length of about 300 mm and is of no interest to fisheries.

Genus Glyptothorax Blyth, 1861


Key to the species of Genus Glyptothorax

1. Occipital process not reaching basal bone of dorsal fin. Dorsal spine strong. Dark patches
KARMAKAR & DAS: *Fishes*

at the base of dorsal and caudal fins conspicuous ............ *G. sinense manipurensis*

- Occipital process reaching basal bone of dorsal fin ................................................................. 2

2. Body depth 4.5 in standard length. Body with three longitudinal stripes .......... *G. trilineatus*

- Body depth 5.0 to 5.5 in standard length. Skin with prominent tubercles arranged in regular longitudinal lines .......... *G. platypogonoides*

115. *Glyptothorax trilineatus* Blyth


*Material examined*: (i) 2 exs., 80-88 mm., Serou village, 12 kms away from Sugnu, Coll. A.K.K. & party, 16.iii.93 (ii) 1 ex., 80 mm, Chakpi river at Nungpan, 9 kms from I.B., Sugnu, Coll. A.K.K. & party, 16.iii.93.

*Geographical Distribution*: India : Manipur.

*Elsewhere*: Myanmar and Thailand.

*Fishery Information*: It is reported to attain a length of 300 mm and is of minor interest to fisheries in Manipur.

Genus *Nangra* Day, 1877


Body short and compressed: with rounded abdomen. Head short and snout rounded. Eyes large, not visible from ventral side of head. Mouth narrow, ventral and transverse. Barbels 4 pairs; maxillary barbels with stiff bases; mandibular barbels are placed on a transverse row at different levels. Dorsal fin inserted above postero-quarter of pectoral fin, with 1 strong spine and 6 to 10 soft rays. Anal fin with 11 to 13 rays. Gill membranes confluent with each other, also with isthmus.

116. *Nangra viridescens* (Hamilton)


*Geographical Distribution*: India : Yamuna river at Delhi, rivers of North Bengal, Punjab, Uttar Pradesh, Bihar and Assam (new record from Manipur).

*Elsewhere*: Bangla Desh and Nepal.

*Fishery Information*: It attains a length of 85 mm; a good fishery of this species exists in the Some river at Bihar and minor fishery in North Bengal.

Family *CLARIIDAE*

Genus *Clarias* Scopoli, 1777


118. *Clarias batrachus* (Linnaeus)


*Material examined*: (i) 1 ex., 101 mm, Withou village, 15 kms from Imphal, Coll. P.K. & party, 23.xi.91 (ii) 1 ex., 118 mm, Imphal Fish Market, Coll. P.K. & party, 25.xi.91 (iii) 2 exs., 90-108 mm, Thangal Market, Imphal, Coll. P.K. & party, 22.xi.91 (iv) 1 ex., 85 mm, Bishenpur, Coll. P.K. & party, 27.xi.91 (v) 1 ex., 120 mm, Pond at NampaI, Coll. T.R. & party, 26.xi.92 (vi) 1 ex., 102 mm, Keibul Lamjao Sanctuary, Coll. T.R. & party, 1.iii.92 (vii) 1 ex., 95 mm, Thanga village, 50 kms from Imphal, Coll. P.K. & party, 28.xi.91.
Geographical Distribution: India: throughout; Pakistan; Nepal; Sri Lanka; Bangla Desh; Myanmar; Indonesia; Singapore; Borneo and Phillippines.

Fishery Information: A fish of high economic importance. It attains a length of about 450 mm and found in all types of water but more so in derelict and swampy waters. This is a hardy fish and can live out of water of quite sometime and move short distance on land and has a accessory respiratory organ.

This catfish is cultured in shallow ponds, cages, cement cisterns, paddy fields and sewage water. It is highly esteemed for its nourishing properties and quick recovery from prolonged illness.

Family HETEROPNEUSTIDAE

Genus Heteropneustes Muller, 1840


Body elongate, compressed; almost tarpedo-shaped. Head greatly depressed. Mouth small, lips fleshy and papillated. Barbels 4 pairs, well developed. Dorsal fin very short, inserted above tip of pectoral fins and without any spine. Pectoral fin with 1 strong serrated spine and 7 to 8 soft rays. Anal fin base very long with 60 to 79 rays. Caudal fin almost rounded. Lateral line complete.

119. Heteropneustes fossilis (Bloch)

1794. Silurus fossilis Bloch, Naturgesch ausl. Fische, 8: 46, pl. 370, fig. 2 (type-locality: Tranquebar, Tamil Nadu).


Material examined: (i) 1 ex., 90 mm, Pond at Lzeikrei, Coll. T.R.& party, 25.ii.92 (ii) 1 ex., 175 mm, Khuga river, 5 kms east of I.B., Churachandpur, Coll. T.R. & party, 9.iii.92 (iii) 1 ex., 175 mm, Khutikhong Fish Farm at Jiribam, Coll. A.K.K. & party, 18.iii.93 (iv) 1 ex., 140 mm, Thanga village (Loktak Lake coll.), Coll. A.K.K. & party, 13.iii.93.

Geographical Distribution: India: throughout; Pakistan; Nepal; Bangla Desh; Sri Lanka; Myanmar; Thailand and Laos.

Fishery Information: A fish of high economic importance. It attains a length of about 300 mm and is well known because of its nourishing properties and for quick recovery from illness. It is primarily found in ponds, ditches, bheels, swamps, marshes and sometimes in muddy rivers.

This fish is much dreaded for its aggressive behaviour and causes painful wounds with its potentially dangerous pectoral spines.

Order Atheriniformes

Family CYPRINODONTIDAE

Genus Aplocheilus McClelland, 1839


120. Aplocheilus panchax (Hamilton)

1822. Esox panchax Hamilton-Buchanan, Fishes of Ganges : 211, 380, pl. 3, fig. 69 (type-locality: Bengal).


Material examined: (i) 3 exs., 41-54 mm, Khutikhong Fish Farm at Jiribam, Coll. A.K.K. & party, 18.iii.93 (ii) 18 exs., 27-48 mm, Pachau Fish Breeding Farm, 3 kms. south of P.W.D. I.B., Jiribam, Coll. A.K.K. & party, 18.iii.93.

Geographical Distribution: India: mainly north.

Elsewhere: Pakistan; Bangla Desh; Myanmar; and Indo-Malaysian Archipelago.

Fishery Information: It attains a length of 80 mm, is a larvivorous fish and its utility for mosquito control has been established.
Order CHANNIFORMES
Family CHANNIDAE
Genus Channa Scopoli, 1777


Key to the species of Genus Channa

1. 4 to 5 scales between orbit and angle of preopercle. 12 to 13 predorsal scales ........... 2
   - 9 to 10 scales between orbit and angle of preopercle. 15 to 20 predorsal scales .......... 4

2. Pelvic fin less than half length of pectoral fin. Pectoral fin spotted in zones, darker and lighter patches ........................................................... 3
   - Pelvic fin more than half length of pectoral fin. pectoral fin plain ...................... C. punctatus

3. Anal fin with 26 rays. Dorsal fin with 30 to 40 rays. Circular black spot present in each scale ............................................. C. stewartii
   - Anal fin with 21 to 23 rays. Dorsal fin with 32 to 37 rays. No black spots on scales .......... C. orientalis

4. 18 to 20 predorsal scales. Several dark vertical bands below lateral line .............. C. striatus
   - 15 to 16 predorsal scales. A large black white edged ocellus on caudal fin base ................. C. marulius

122. Channa orientalis Bloch & Schneider

1801. Channa orientalis Bloch and Schneider, Syst. Ichth : 496, pl. 90. fig. 2 (type-locality: India).


Material examined: (i) 1 ex., 135 mm, Moirang Market, Coll. P.K. & party, 24.xi.91 (ii) 2 exs., 70-122 mm, Thangal Market, Imphal, Coll. P.K. & party, 22.xi.91 (iii) 1 ex., 125 mm, Bishenpur, Coll. P.K. & party, 27.xi.91 (iv) 1 ex., 110 mm, Pond at Nampal, Coll. T.R. & party, 26.ii.92 (v) 2 exs., 70-90 mm, Takmu Lake, Coll. T.R. & party, 29.ii.92 (vi) 2 exs., 90-130 mm, Thoubal Fishing Centre, Coll. P.K. & party, 29.xi.91 (vii) 1 ex., 110 mm, Withou village, 15 kms from Imphal, Coll. P.K. & party, 23.xi.91 (viii) 6 exs., 60-135 mm, Takmu Fish Farm, Loktak Lake, Coll. A.K.K. & party, 13.iii.93 (ix) 1 ex., 116 mm, Chakpi River at Nungpan, 9 kms from I.B., Sugnu, Coll. A.K.K. & party, 16.iii.93 (x) 3 exs., 54-56 mm, Fish Farm, 1 km away from Circuit House, Churachandpur, Coll. A.K.K. & party, 09.iii.93.

Geographical Distribution: India : throughout.

Elsewhere : Afghanistan; Iran; Pakistan; Nepal; Sri Lanka; Bangla Desh; Myanmar and East Indies.

Fishery Information : It attains a length of about 200 mm and is of minor interest to fisheries in the Indian region.

123. Channa punctatus (Bloch)


Material examined: (i) 4 exs., 95-105 mm, Khutikhang Fish Farm at Jiribam, Coll. A.K.K. & party, 18.iii.93.

Geographical Distribution : India : throughout.

Elsewhere : Afghanistan; Pakistan; Sri Lanka; Nepal; Bangla Desh; Myanmar and China.

Fishery Information : It attains a length of about 300 mm; very common throughout the plains of India and is of moderate interest to
fisheries (can be cultured also in derelict water) in Indian region.

+124. **Channa stewartii** (Playfair)


Material examined: (i) 2 exs., 50-55 mm, Fish Farm at Tuibuang, 2 kms from Circuit House, Churachandpur, Coll. A.K.K. & party, 11.iii.93.

**Geographical Distribution** : India: Assam, Bihar, Meghalaya, Arunachal Pradesh and West Bengal (New record from Manipur).

**Fishery Information**: It attains a length of about 250 mm and is of minor fishery interest in the Eastern Himalayan Region.

Order **PERCIFORMES**  
Family **CHANDIDAE**

Genus **Chanda** Hamilton-Buchanan, 1822


Body ovate and fairly transparent, with the vertebral column and its adjoining elements visible externally. Lower limit of preopercle provided with double serrated edge; operculum devoid of a prominent spine. Mouth particularly large, with a conspicuous lower jaw. First dorsal fin with 7 spines and second one with 1 spine and 9 to 17 soft-rays. Anal fin with 3 spines and 9 to 17 rays. Lateral line complete, incomplete, interrupted or absent.

**Key to the species of Genus Chanda**

1. Lateral line indistinct, discontinuous or absent.  
A dark blotch generally present on the upper edge of the dorsal fin .................. *C. nama*  
Lateral line distinct. No such colour blotch on dorsal fin ........................................2

2. A dark shoulder spot present .......... *C. ranga*

Shoulder spot absent. A golden spot on occipit .................................................. *C. baculis*

127. **Chanda baculis** Hamilton


Material examined: (i) 3 exs., 47-53 mm, Thanga village, 50 kms from Imphal, Coll. P.K. & party, 28.xi.91.

**Geographical Distribution**: India: Orissa, West Bengal, U.P., Bihar, up to Punjab.

Elsewhere: Pakistan; Bangla Desh; Myanmar and Thailand.

**Fishery Information**: It attains a length of about 60 mm, is common in catches in the Indo-Gangetic plains, but is of no interest to fisheries.

128. **Chanda nama** Hamilton


Material examined: (i) 4 exs., 50-58 mm, Moirang Market, Coll. P.K. & party, 24.xi.91  
(ii) 2 exs., 46-52 mm, Impal Fish Market, Coll. P.K. & party, 25.xi.91  
(iii) 2 exs., 53-69 mm, Thangal Market, Impal, Coll. P.K. & party, 22.xi.91  
(iv) 1 ex., 56 mm, Nightingam, 35 kms from Impal, Coll. P.K. & party, 26.xi.91  
(v) 2 exs., 45-50 mm, Thoubal Fishing Centre, Coll. P.K. & party, 29.xi.91  
(vi) 1 ex., 45 mm, Loktak Lake, Coll. T.R. & party, 27.ii.92  
(vii) 2 exs., 38-60 mm, Khuga river near Churachandpur (Market coll.), Coll. A.K.K. & party, 10.iii.93  
(viii) 1 ex., 45 mm, Jiri River at Gopalthal village, 4 kms north of Jiribam, Coll. A.K.K. & party, 19.iii.93.

**Geographical Distribution**: India.

Elsewhere: Pakistan; Nepal; Bangla Desh; and Myanmar.

**Fishery Information**: It attains a length of about 90 mm and are sold in heaps along with other small fishes as low priced fishes.
129. **Chanda ranga** Hamilton


**Material examined**: (i) 1 ex., 37 mm, Takmu Lake, Coll. T.R. & party, 29.ii.92 (ii) 1 ex., 48 mm, Thoubal Fishing Centre, Coll. P.K. & party, 29.xi.91 (iii) 4 exs., 48-58 mm, Withou village, 15 kms from Imphal, Coll. P.K. & party, 23.xi.91 (iv) 4 exs., 55-72 mm, Takmu Fish Farm, Loktak Lake, Coll. A.K.K. & party, 13.iii.93.

**Geographical Distribution**: India: throughout.

**Elsewhere**: Pakistan; Nepal; Bangla Desh; Myanmar; Thailand and Malaysia.

**Fishery Information**: It attains a length of about 75 mm and are sold in the market alongwith other small fishes. It does fairly well in the aquarium.

Family NANDIDAE
Genus *Badis* Bleeker, 1853


Body fairly elongate and slightly compressed. Mouth small and slightly protrusible. Operculum triangular, its posterodorsal corner with a prominent spine. Dorsal fin large, with 16 to 18 spines and 7 to 10 soft rays. Anal fin with 3 spines and 6 to 8 soft rays. Caudal fin wedge-shaped. Lateral line interrupted or absent, 26 to 33 scales in longitudinal series.

130. **Badis badis** (Hamilton-Buchanan)

1822. *Labrus badis* Hamilton-Buchanan, *Fishes of Ganges*, : 70, 368, pl. 25, fig. 23 (type-locality: Gangetic provinces).


**Geographical Distribution**: India: Ganga, Jamuna and Brahmaputra river systems.

**Elsewhere**: Pakistan and Bangla Desh.

**Fishery Information**: This mullet attains a length of about 110 mm, very common in the upper waters of Ganga and Jamuna and is of some interest to fisheries.

Family MUGILIDAE
Genus *Sicamugil* Fowler, 1939


Body robust and compressed. Head much flattened on dorsal side. A strong spine on operculum. Lips thin, lower lip with a symphysial knob. First dorsal fin with 4 spines; second one with 1 spine and 8 soft rays. Anal fin with 3 spines and 8 to 9 soft rays. Scales 36 to 47 in longitudinal series.

132. **Sicamugil cascasia** (Hamilton)


**Geographical Distribution**: India : Ganga, Jamuna and Brahmaputra river systems.

**Elsewhere**: Pakistan and Bangla Desh.

**Fishery Information**: This mullet attains a length of about 110 mm, very common in the upper waters of Ganga and Jamuna and is of some interest to fisheries.

Family GOBIIDAE
Genus *Glossogobius* Gill, 1862

Body elongate, anteriorly cylindrical, posteriorly compressed. Head depressed, pointed; scaled above behind eyes. Gill-openings from below rear of preopercle to below eyes. Isthmus narrow. Mouth slightly oblique; lower jaw prominent. First dorsal with 6 spines; second one with 1 spine and 6 to 10 soft rays. Pelvic fin united forming a disc. Caudal fin oblong to rounded. 28 to 36 scales along lateral series.

133. *Glossogobius giuris* (Hamilton)


**Material examined**:

(i) 2 exs., 88-102 mm, Moirang Market, Coll. P.K. & party, 24.xi.91
(ii) 2 exs., 108-110 mm, Withou village, 15 kms from Imphal, Coll. P.K. & party, 23.xi.91
(iii) 5 exs., 95-118 mm, Imphal fish Market, Coll. P.K. & party, 25.xi.91
(iv) 3 exs., 110-138 mm, Thangal Market, Imphal, Coll. P.K. & party, 22.xi.91
(v) 2 exs., 95-125 mm, Bishenpur, Coll. P.K. & party, 27.xi.91
(vi) 5 exs., 140 mm, Khordak River, West of Keibul Lamjao Sanctuary, Coll. T.R. & party, 1.xii.91
(vii) 2 exs., 83-85 mm, Loktak Lake, Manipur, Coll. T.R. & party, 26.ii.92

**Geographical Distribution**: India: throughout.

**Elsewhere**: Pakistan; Nepal; Bangla Desh; Sri Lanka; Myanmar; Malay Archipelago; Singapore; and Philippines.

**Fishery Information**: It attains a length of about 300 mm and forms a minor fishery specially in the Hooghly Estuary, West Bengal.

**Family ANABANTIDAE**

**Genus Anabas** Cuvier & Cloquet, 1816


Body oblong and compressed. Head and anterior part of body broad, posterior portion compressed. Mouth small, terminal; upper jaw slightly protrusile. Dorsal inserted above pectoral fin base, with 16 to 18 spines and 8 to 10 soft rays. Anal fin with 8 to 10 spines and 9 to 11 soft rays. Caudal fin rounded. Lateral line interrupted with 21 to 29 ctenoid scales.

134. *Anabas testudineus* (Bloch)


**Material examined**:

(i) 1 ex., 91 mm, Withou village, 15 kms from Imphal, Coll. P.K. & party, 23.xi.91
(ii) 1 ex., 115 mm, Pond at Nampal, Coll. T.R. & party, 26.ii.92

**Geographical Distribution**: India.

**Elsewhere**: Pakistan; Bangla Desh; Sri Lanka; Myanmar; Malay Archipelago; Singapore; and Philippines.

**Fishery Information**: It attains a length of 200 mm and is of considerable fisheries interest. Despite its moderate size, this fish is regarded as a highly esteemed fish for its flavour, restorative values and prolonged freshness.

**Family BELONTIDAE**

**Genus Colisa** Cuvier, 1831


Body oblong and compressed. Mouth small, terminal, upwardly directed and protrusile. Ventral
border of preopercle serrated. Dorsal fin long, with 15 to 18 spines and 6 to 14 soft rays. Anal fin with 15 to 22 spines and 11 to 20 soft rays. Pelvic fin in the form of a single elongated filiform ray. Caudal fin slightly emarginate or truncate. Lateral line when present interrupted with 27 to 31 scales.

Key to the species of Genus Colisa

1. Body with a single black longitudinal band from eye to lower half of tail............ C. sota
   - Body with many oblique bands from back to belly...........................................2

2. Bands on body 8 to 10. Caudal fin wedge shaped........................................... C. labiosus
   - Bands on body 14 or more. Caudal fin cut square or slightly notched ........... C. fasciatus

135. Colisa fasciatus Schneider

1801. Trichogaster fasciatus Schneider, Syst. Ichth. : 164, pl. 36 (type-locality : Tranquebar).


Geographical Distribution : Elsewhere : South Myanmar (new record from India : Manipur).

Fishery Information : It attains a length of about 70 mm. A colourful aquarium fish, well behaved in community aquaria.

137. Colisa sota (Hamilton)


Material examined : 1 ex., 41 mm, Bishenpur, Coll. P.K. & party, 27.xi.91 (ii) 2 exs., 36-40 mm, Nightingam, 34 kms from Imphal, Coll. P.K. & party, 26.xi.91 (iii) 3 exs., 38-41 mm, Thoubal Fishing Centre, Coll. P.K. & party, 29.xi.91 (iv) 1 ex., 47 mm, Khutikhong Fish Farm at Jiribam, Coll. A.K.K. & party, 18.iii.93.

Geographical Distribution : India : Gangetic provinces and Assam, Manipur.

Elsewhere : Bangla Desh.

Fishery Information : It is a beautiful aquarium fish and easily bred and adopts well to life in community aquaria. It attains a length of about 50 mm. This is an uncommon species and is of no interest to fisheries.

Order MASTACEMBELIFORMES
Family MASTACEMBELIDAE

Genus Mastacembelus Scopoli, 1777

Body elongate, eel-like and compressed. Mouth inferior, cleft narrow. The long fleshy appendage of the snout not transversely striated below. Preorbital spine present. Dorsal fin inserted above middle of pectoral fin, with 24 to 39 detached spines and 50 to 90 soft rays. Anal fin with 3 spines and 31 to 98 soft rays. Dorsal and anal fins may or may not be confluent with caudal fin, which is rounded. Lateral line present.

**Key to the species of Genus Mastacembelus**

1. Preopercular spine absent. *M. caudiocellatus*  
   - Preopercular spine present, sometimes hidden beneath the skin .................................................... 2

2. Dorsal fin with 24 to 30 spines and 30 to 42 rays. Dorsal and anal fins separate from caudal fin ................................................ 
   - Dorsal fin with 32 to 40 spines and 64 to 92 rays. Dorsal and anal fins broadly joined to caudal fin ........................................... *M. armatus*

139. **Mastacembelus armatus** (Lecepede)


1891. *Mastacembelus armatus* : Talwar and Jhingran, Inland Fishes of India and Adjacent Countries : 1031-1032.

**Material examined**: (i) 1 ex., 370 mm, Moirang Market, Coll. P.K. & party, 24.xi.91 (ii) 1 ex., 250 mm, Loktak Lake, Coll. T.R. & party, 27.ii.92 (iii) 1 ex., 250 mm, Thanga village (Loktak Lake coll.), Coll. A.K.K. & party, 13.iii.93.

**Geographical Distribution**: India : throughout.

**Elsewhere**: Pakistan; Sri Lanka; Nepal; Myanmar; through Thailand and Malaya, to south China.

**Fishery Information**: It attains a length of about 650 mm and is the largest spiny eel. It is reported to be a good food fish specially when freshly caught.

++140. **Mastacembelus caudiocellatus** Boulenger


**Material examined**: (i) 1 ex., 240 mm, Rangazak stream, 15 kms north of Ukhrul, Coll. A.K.K. & party, 9.iii.93.

**Geographical Distribution**: (First record from India : Manipur).


**Fishery Information**: This species attains a length of 240 mm and is of no interest to fisheries in Indian region.

141. **Mastacembelus pancalus** (Hamilton)

1922. *Macrognathus pancalus* Hamilton-Buchanan, Fishes of Ganges, : 30, 364, pl. 22, fig. 7 (type-locality : tanks of Gangetic provinces).


**Material examined**: 20 exs., 61-100 mm, Pachau Fish Breeding Farm, 3 kms south of P.W.D.I.B., Jiribam, Coll. A.K.K. & party, 18.iii.93.

**Geographical Distribution**: India : throughout.

**Elsewhere**: Pakistan; and Bangla Desh.

**Fishery Information**: This species attains a length of 180 mm and is of little commercial importance. It is often used as an aquarium fish.

SUMMARY

An attempt has been made in this present study to provide an up to date classification, nomenclature including both scientific and local names, details of material studied, size-ranges, distributional records, fishery information along with a species identification key under each genera. During the preparation of this faunal work, we have made use of all the earlier informations available in the literature in addition to the study of the fish material collected by three extensive field surveys recently conducted by Zoological Survey of India survey parties; fish specimens received from Dr. W. Viswanath Singh, Manipur University; and also earlier identified
collection available in National Zoological Collection. The fish collection show Assamese, endemic and Burmese elements. The Assamese elements are observed in the southern part of the Brahmaputra Drainage System while endemic and Burmese elements are found in the eastern part including the valley which is drained by the Chindwin Drainage System. In all 141 species belonging to 9 orders, 24 families and 64 genera have been dealt with in detail in this work. Out of these 10 species under 9 genera are recorded for the first time from Manipur and 4 species under 4 genera are recorded for the first time from India. A map showing drainage system and collecting stations has also been included.

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We want to express our sincere thanks and gratitude to the Director of Fisheries, Govt. of Manipur, Imphal and his officers and other staff members for their co-operation during the field surveys throughout Manipur.

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ANIMAL FOSSILS

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INTRODUCTION

The State of Manipur is situated in the extreme north-eastern part of India. It is predominantly a hilly terrain, but there is a small plain of alluvial soil in its central part. In past, the Tethys sea continued to receive sediments of conglomerates, shales, sandstones and limestones, eroded from the Archaean rocks, during the Palaeozoic and much of the Mesozoic period. This geological unit underwent an orogenic activity in the late Cretaceous and early Caenozoic period that influenced the geographic and tectonic alignments of the region and established a new pattern of sedimentation. This orogeny was accompanied by extensive igneous activity. The Shan plateau was uplifted in the east and a narrow belt along the west, which marked the beginning of a tectonic highland of Arakan-Yoma and Naga Hills. In this region, rocks of upper Cretaceous to the present alluvium are found. Rock units exposed in the Manipur-Nagaland Hills can be broadly grouped from west to east, representing various stages of basin evolution and orogeny into the following (Chungkham & Jafar, 1998):

<table>
<thead>
<tr>
<th>Facies</th>
<th>Lithounits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molasse</td>
<td>Barail Group</td>
</tr>
<tr>
<td>Flysch</td>
<td>Disang Formation</td>
</tr>
<tr>
<td>Olistostromal deposits</td>
<td>Mélange zone</td>
</tr>
<tr>
<td>Ophiolite suite</td>
<td>Oceanic Pelagic sediments, Manipur</td>
</tr>
<tr>
<td></td>
<td>Ophiolite / Nagaland Ophiolite</td>
</tr>
<tr>
<td>Metamorphic</td>
<td>Naga Metamorphic Complex</td>
</tr>
</tbody>
</table>

Structurally, each of these units is overthrust by the next from the east and folded all together. The flyschoid Disang Formation gradually merges into the postorogenic mollasic Barail Group of rocks towards the west (Fig. 1). The olistolithic blocks of pelagic limestones and chert could hitherto be dated as Late Cretaceous (Late Santonian to Late Maestrichtian) (Acharyya et al., 1986; Mitra et al., 1986; Chungkham & Caron, 1996). A number of fossil beds are exposed, especially along the eastern part of the territory (Figs. 2 & 3). The exploration and updating of records of animal fossils from Manipur were a part of the programme of the preparation of an exhaustive faunal atlas of the State by the ZSI.

PHYSIOGRAPHIC SETTING

Situation and greater surroundings: Manipur is situated in the northeastern corner of the country between 23°50' and 25°41' North latitudes and 93°2' and 94°47' East longitudes and covers an area of about 22,329 sq km. The State is bounded on the west by Nagaland, on the south by Mizoram, on the west by Assam and on the east by Myanmar. The oval shaped central plain has an area of about 1765 sq km. Out of about 885 km. boundary line of the State, approximately 352 km. form international border with Myanmar.

Topographic characteristics: There are two main relief features in Manipur namely, hills and plains. Hills cover about 92 per cent of the total...
Fig. 1. Geological map of area around Ukhrul (modified after Khan & Gupta, 1990).
Fig. 2. Sketch map showing prospective fossil beds in Manipur (solid rounds and square).
Fig. 3. Map of Naga Hills ophiolite with its envelope and enclaves showing fossil localities (After Ghosh et al., 1984).
geographical area of the State and they stretch northeast-southwest as parallel folds with altitudes varying between 762 m (200 ft.) and 3048 m (10,000 ft.) above msl. They are part of Assam-Myanmar Tertiary ranges, which sweep in a long curve from the northeastern corner of Assam to Cape Negaris of Myanmar. The Central plain is a small, high level plain, at an altitude of about 792 m (2600 ft.) above msl. The whole of Assam–Arakan Tertiary belt has undergone strong folding, and long anticlinal axes can sometimes be followed for some long distance, the more sharply folded ones are associated with thrust faults. Though some anticlinal crests remain at the surface, they have usually been removed by thrusting. In the hills between Manipur valley and Cachar of Assam, folding is more dominant than faulting and asymmetrical anticlines are separated by broader synclines. The appearance of the mountain belt is that of a succession of long parallel ranges separated by deep valleys; still further south the whole belt gradually narrows forming the Arakan Yomas.

The hill ranges have occasional connecting spurs and ridges of lower elevation between them. Their highest altitude is attained in the north near Mao, close to Manipur–Nagaland border (on Mount Japvo) The Japvo range sends out numerous spurs towards the east and west. From this point southwards there is a steady decrease in the height of the hill ranges. Along the eastern part of Manipur through which runs the Indo-Myanmar border, there are series of ranges through which the rivers have passed to the valley.

The central plain or the valley of Manipur is the most striking topographic feature in a mountainous State. It is roughly oval in shape, irregular in outline and about 57.9 km long (in N-S axis) and 32.1 km wide (in E-W axis). It is a flat plain surrounded by hills or mountains. The plain extends right up to the foot of the bordering range where the slope abruptly changes. The plain slopes from north to south. The lowest part of the plain is occupied by the Loktak lake. The plain however, is dotted by a few hillocks.

**Natural drainage**: The State lies in the catchment area of two river systems namely, Ganga-Brahmaputra and Chindwin-Irrawaddi. The western half of the State falls in the catchment of the former and the remaining eastern half including the central plain lies in the catchment of the later. In general, the rivers occupy parallel valleys separated by parallel ranges except where they have cut transverse valleys. They carve out very narrow V-shaped valleys. The rivers of the valley take their rise in the hills towards north. On the east is the Thoubal river, which rises in the hills not far from Ukhrul. West of Thoubal is the Iril, which rises about 24.1 km east of Maram, and after skirting the town of Imphal falls, like Thoubal, into the Imphal river. Through the capital town itself flow the Imphal and Nambol rivers. The Nambol falls into the Loktak, from which it emerges under the name of Kortak. This stream eventually joins the Imphal, and another river called Nambol, which rises near Kangjupkul and flow to the west of Imphal and Loktak. Their united waters, which are known as Achauba, Imphal or Manipur river, finally fall into the Kendat and thus into the Chindwin. In the cold weather these rivers are shallow, muddy streams, creeping along the bottom of the deep channels which they have cut through the alluvium. But in times of flood during monsoon they rise to a considerable height and sometimes overtop their banks. In the eastern hills there are numerous small streams which drain into the Yu and thence into the Chindwin. The principal rivers of the western hills are the Barak and its tributary, the Irang. The Barak rises about 16.1 km from Mao Thana, and flows a westerly course as far as Kairong. Here it takes a bend towards north, and then turns westward, till it reaches the north-west corner of the State. The river then curves away towards south and flows to Tipaimukh, which till lately was the tri-junction point of Manipur, Cachar and Lushai Hills. At Tipaimukh, the Barak turns sharply to the north, and as far as Jirighat. In this portion of its course it forms boundary between Cachar and Manipur. Two other rivers of some importance are the Jiri and the Makru, while coming from Cachar to Manipur.

The Loktak is the largest sheet of water, and is said to be 12.9 km long and 8 km. wide at the
broadest part. It is a broad, shallow sheet of water.

Soilscape: The physical composition of soil is generally loose and hence it does not hold water. On exposed hill slopes the combination of tropical sun and torrential rains cause leaching of minerals from the soils. Soils are generally light except in the river valleys where silt accumulates. Perpetual burning of vegetation due to shifting cultivation, in some parts of the hills, has rendered the soil devoid of humus. The soils of the central plain are greatly transported from the surrounding hills through rains and contain high proportion of clay.

Climatic condition: The State enjoys a typical monsoon climate with variants ranging from tropical to temperate conditions. The rapid changes in topography result in climatic changes within short distance. There are two seasons separated by two short transitions. From November to February is the period of winter. The summer commences in April and continues up to September. The summer season is also the period of rains. The October is the period of transition between the summer and winter, so is the month of March between the winter and summer. The temperature in the central plain seldom touches freezing point, nor at any time of the year it is too hot. Hill areas are much cooler. The rains commence in April and continue up to September. The period from June to September accounts for more than half of the annual rainfall. There is little rain during December and January. The rainfall is high and well distributed, over both time and space.

GEOLOGY AND STRATIGRAPHY

General Geology

The rock formations occurring in the State are the Cretaceous limestone, the Disangs with serpentinites (Lower and Middle Eocene – Upper Cretaceous), the Barails (Upper Eocene and Oligocene, the Surmas and the Tipams (Miocene).

A brief account of the rock types in the eastern hills of the State was given by Bhattacharya & Bhattacharya (1984). The rock types in this part consist mainly of sandstone and shale siltstone, geosynclinal flysches with minor bands of greywacke. These flysches also show presence of irregular blocks of limestone, conglomerate, calcareous sandstone, greywacke, serpentinite and chert. These sedimentary, to the east, is further tectonically overlain by a host of gabbro-ultrabasics to basics ranging from serpentinite, peridotite, basic volcanics and diorite.

The limestone etc. was earlier referred to as Cretaceous bed (Oldham; 1883; Pascoe, 1912; Raina, 1959) or Ukhrul bed (Nandy & Sriram, 1970; Ghosal, 1972). The slightly metamorphosed sandstone and shale-siltstone flysches were classified by the earlier workers as the Disang Series (Oldham, 1883; Pascoe, 1912; Raina, 1959, Nandy & Sriram, 1970; Ghosal, 1972).

Details of the Disang and Barail Groups as well as the ophiolitic sediments exposed in Manipur East (Ukhrul) and Chandel Districts are given below:

Disang Group: It was first described by Mallet (1876) as ‘Disang Series’ which consists of a great thickness of splintery grey shales interbedded with fine grained sandstones. Towards upper part, it passes into a sequence of thinly bedded sandstone. The type of Mallet is located in Dilli (Disang) river in Upper Assam where the lowest beds are almost entirely dark grey shales (Evans, 1932). A large tract of the interior hills of Manipur is occupied by the Disang Group of rocks. Tectonically, this part of Disang country is known as ‘Inner Palaeozoene fold belt’ being constituted by alternately disposed large synclinal ridges and intervening anticlinal valleys. The Disang rocks are not yet known from NW of Haflong – Disang thrust (Evans, 1932). In Manipur the Disang rocks consist of a monotonous sequence of dark grey, splintery shales (Pascoe, 1912). The interbedded sandstones, and also the sandstones towards the top, are sub-greywacke, greywacke or lithic arenites. At some places the shale/siltstone sequence is metamorphosed into phyllites and slates. The Disangs have a thickness
of approximately 300 m. (Mathur & Evans, 1964) though it is difficult to estimate the exact thickness because of tightly and repeatedly folded nature of its strata as well as due to intermittent dissection by a series of thrusts and faults.

In Manipur-Nagaland, the Disang has been subdivided into two Formations namely, (i) Lower Disang, and (ii) Upper Disang Formations. The Lower Disang Formation consists mainly of argillaceous lithounits such as phyllitic shales, phyllites, slates and slaty shales with interbedded minor sandstones/siltstones. It is usually devoid of any megabiota but fragmentary leaf impressions of Graminae are quite common indicating sedimentation in a distal shelf facies. The Upper Disang Formation, which lies unconformably over the Lower Disang Formation, comprises a rhythmite sequence of alternate shale/siltstone and sandstone beds. The olistostromal biozones containing olistoliths of limestone, chert, sandstone, calcareous sandstone and siltstone are well exposed in the eastern part of Manipur. The Disang Group is overlain by the Laisong Formation of the Barail Group.

Barail Group: The name 'Barail' was taken from the Barail range (formerly Bor Ali range) which forms the backbone of the North Cachar Hills in Assam. The part of the range north of Silchar is regarded as the type area of the Barail Group (Evans, 1932) but the type section is provided by the Jenam river. Conformably, overlying the Disang the Barail rocks occur in the Kohima synclinorium in the Schuppen belt as tectonic slices and in the Inner Palaeogene fold belt along with cherts of the synclinal ridges in Manipur. The subdivisions of the Barail Group as given by Evans (1932) is cited below (Table 1).

Laisong Formation: It is the lower subdivision of the Barail Group, about 200 m. to 2500 m. in thickness and consists largely of very hard, thin bedded, indurated, grey sandstones alternating with hard sandy shales. Some of the best exposures in Assam are observed in the Jatinga and Jenam river sections near Laisong in North Cachar Hills district (Evans, 1932). There is no distinguishable boundary between the Disang shales and the overlying arenaceous alternations at the base of Laisong Formation. The boundary is conformable.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Lithology</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renji Formation (883 m.)</td>
<td>Bedded sandstone</td>
<td>215 m.</td>
</tr>
<tr>
<td></td>
<td>Massive sandstone</td>
<td>396 m.</td>
</tr>
<tr>
<td></td>
<td>Bedded sandstone</td>
<td>152 m.</td>
</tr>
<tr>
<td></td>
<td>Massive sandstone</td>
<td>122 m.</td>
</tr>
<tr>
<td></td>
<td>Bedded sandstone, sandy shale</td>
<td>122 m.</td>
</tr>
<tr>
<td></td>
<td>Carbonaceous shale</td>
<td></td>
</tr>
<tr>
<td>Jenam Formation (1,259 m)</td>
<td>Shale, thin bedded sandstone and sandy shale</td>
<td>213 m.</td>
</tr>
<tr>
<td></td>
<td>Shale bedded sandstone</td>
<td>366 m.</td>
</tr>
<tr>
<td></td>
<td>Shale and sandy shale</td>
<td>244 m.</td>
</tr>
<tr>
<td></td>
<td>Bedded and thin bedded sandstone, shale</td>
<td>305 m.</td>
</tr>
<tr>
<td></td>
<td>and sandy shale</td>
<td></td>
</tr>
<tr>
<td>Laisong Formation (2,483 m.)</td>
<td>Bedded and thin bedded sandstone with some shale and sandy shale</td>
<td>488 m.</td>
</tr>
<tr>
<td></td>
<td>Shale with thin bed and bedded sandstone</td>
<td>518 m.</td>
</tr>
<tr>
<td></td>
<td>Thin bedded and bedded sandstone with shale</td>
<td>305 m.</td>
</tr>
<tr>
<td></td>
<td>Bedded and thin bedded sandstone</td>
<td>670 m.</td>
</tr>
<tr>
<td></td>
<td>Bedded sandstone, shale, sandy shale</td>
<td>457 m.</td>
</tr>
</tbody>
</table>
and, in general, the incompetent Disangs are more contorted in nature than the Barails which contain competent beds. In eastern Naga Hills and Manipur, the Laisong Formation is at places underlain by a ferruginous nodule-bearing horizon of upper Disang Formation. The Laisong rocks occur in the Schuppen belt, Kohima synclinorium (SW of Kohima), and Inner Palaeogene fold belt of Manipur-Nagaland along the top of the synclinal ridges.

**Jenam Formation**: The Laisong Formation passes upward into a more argillaceous lithoformation known as Jenam Formation which consists of shale, sandy shale and carbonaceous shale with beds of sandstones which are relatively thin-bedded. There are occasional streaks, lenses, and beds of coal associated with this Formation. The best section of this Formation occurs in the Jenam river in the North Cachar Hills district (Assam). The thickness of the Formation is about 700m. to 1200m. On Mariani–Mokokchung road section, the Jenam Formation has a thickness of about 750 m.

The Jenam Formation conformably overlies the Laisong Formation and underlies the Renji Formation of the Barail Group. The Jenam Formation occurs mainly in the belt of Schuppen, Chingtang Saddle-Konya syncline, and Kohima synclinorium. This Formation has not yet been reported from the Inner Palaeogene fold belt of Nagaland and Manipur except in the area occupied by Konya syncline. Well developed sections of the Jenam Formation occur in Changki-Chongliyimsen sector of the Schuppen belt where thick coal seams measuring up to 2 m in thickness are seen to the west of Chanki village. It is observed that the development of workable coal seams is restricted to the Jenam Formation in the Northern part of the Schuppen belt.

**Renji Formation**: Overlying the soft sediments of the Jenam Formation there occurs a great thickness of hard, ferruginous, massive to thick bedded, multistoried sandstone with small proportion of shale/sandy shale known as Renji Formation. The sandstones exhibit large-scale current bedding, ripple marks and sole markings. The Formation constitutes the hills known as Renji Hills to the north of Badarpur in Cachar district.

The Surma and Tipam Groups occur in the western margin of the state and are represented by argillaceous and aranaceous sequences respectively and separated by a major anticline formed of the Cretaceous limestone in between. Within the synclinorium, the synclines form ridges and the anticlines valleys.

The regional strike of all the rock formations in Manipur varies between north-south and north-east to south-west. The Patkai and Kohima synclinorium continue southward into Manipur and form part of the folded and faulted belt known as Burmese arc.

**Stratigraphy**:

Sinha *et al.* (1982) had put forward the sequence of rock formations in the Manipur State as follows:

<table>
<thead>
<tr>
<th>Mio – Pliocene</th>
<th>Tipam Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miocene</td>
<td>Surma Group</td>
</tr>
<tr>
<td>Oligocene to Upper Eocene</td>
<td>Barail Group</td>
</tr>
<tr>
<td>Lower to Middle Eocene to Upper Cretaceous</td>
<td>Disang Group with = Jaintia Group serpentinites Cretaceous limestone = Axial Group of Burma.</td>
</tr>
</tbody>
</table>

Probable Equivalents
The following stratigraphic succession for the eastern part of Manipur was presented by Bhattacharya & Bhattacharya (1984):

<table>
<thead>
<tr>
<th>Group</th>
<th>Formation</th>
<th>Rock Units</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sirohi</td>
<td>Mainly consisting of igneous suite of rocks ranging from ultrabasic to basic, viz., Serpentinite, Coarse grained and Altered Periodotite, Dunite, and basic Volcanics, Diorite with minor metamorphosed or enites and argillites</td>
<td>Early Eocene-Late Cretaceous</td>
</tr>
<tr>
<td></td>
<td>Ukhrul</td>
<td>Essentially shale-siltstone of flysch facies, poorly fossiliferous, exhibiting presence of exotic blocks argillaceous limestone (Cretaceous) having marly intercalations, chert, calcareous sandstone, greywacke (ages not known) and serpentinites and holocrystalline diabase (possibly late Cretaceous/ Early Eocene age)</td>
<td>Miocene</td>
</tr>
<tr>
<td></td>
<td>Lamlang</td>
<td>Predominantly a sandstone flysch consisting of greywacke, feldspathic Eocene and Calcareous sandstone with argillites, poorly fossiliferous</td>
<td>Paleocene-Eocene</td>
</tr>
</tbody>
</table>

**Lamlang Formation**: This Formation is predominantly a sandstone flysch. The main rocky types consist of alteration of greywacke with minor coarse sandstone and fine sandstone. Presence of thinly bedded feldspathic sandstone, calcareous sandstone, grey shale and impersistent pebbly horizons are also present. The assemblage, in general, is poorly fossiliferous with the exception of calcareous sandstones and grey shale association which is rich in lamellibranchs and gastropods.

The greywackes are buff to grayish brown in colour. Thin impersistent minor pebbly/bouldery bands are noted within this horizon only. The fine sandstone is buff or grayish brown in colour and exhibits rhythmic and ripple mark. The intercalated siltstone bands are ferruginous/pyriteous, darkish in colour, and exhibits load casts, convolutes etc. Occasional presence of exotic blocks of serpentinite and calcareous sandstone is also noted within this Formation. This Formation is well exposed along the road section from Litan to Lamlang on Imphal-Ukhrul road from 40 km post to 60 km post.

**Ukhrul Formation**: Lamlang Formation is overlain (tectonically) by the Ukhrul Formation. The main constituent is alteration of thick sequence of shale and siltstone with minor calcareous sandstone and silty sandstone. The shale is darkish in colour, occasionally carbonaceous as well as splintery. Siltstone/Silty-sandstone is grayish in colour and flaggy and shows graded bedding. The calcareous sandstone is hard and compact and buff in colour.

The roofless exotic blocks consist of argillaceous limestone, calcareous sandstone, conglomerates, greywacke, chert and serpentinite of which limestone exotics constitute the major part. Conglomerate exotic blocks consists mostly of boulders and pebbles of chert, jaspar, quartzite,
greywacke siltstone, embedded in an otherwise siliceous, aranaceous or argillaceous matrix. Within these conglomerates, bands of mudstone and ferruginous shale have been traced. All these exotic blocks show divergent trend.

This Formation is exposed between Sirohi-Ukhrul-Hundung-Sangsak area.

**Sirohi Formation** : Ukhrul Formation is tectonically overlain by assemblage of igneous rocks. Considering the distribution of this part of rocks Bhattacharya & Bhattacharya (1984) have grouped this as 'Sirohi Formation'.

These rocks consist predominantly of ultrabasics like serpentinite, altered peridotites and durites, etc. These ultrabasics are generally green to darkish green in colour, fine to coarse grained, highly fractured and traversed by criss-cross veins of actinolite asbestos. The thrust contact between this Formation and the underlying Ukhrul Formation is evidenced at the Sangsak-Chaugma and Chaugma-Cambin Sections. These rocks are well exposed around Sirohi and extend almost north-south for a considerable distance. Occasional presence of thinly bedded unfossiliferous metamorphosed, feldspathic sandstone and argillite are also met within this assemblage. However, the relationship between the volcanics and these metasediments is yet to be ascertained.

**MINERAL RESOURCES**

Manipur is endowed with some economically valuable minerals which are as follows :

i) **Asbestos** : Thin veins and veinlets of antigorite and chrysotile asbestos have been recorded in the massive serpentine bearing rocks near Moreh (24° 19' N and 94°19' E), Nepali Basti (24°19' N and 94°15'E) and Kwatha (24°22' N and 94°18' E), but none of these occurrences seem to be of much economic importance.

ii) **Chromite** : Two chromite lenses have been located in the serpentinites a little north of the Sirohi peak (25°09'20" N and 94°28'E) in Ukhrul District, at an altitude of 1120 m. The lens to the north is large with a strike length of 11 m. and a width of 8 m. exposed down to a depth 2.5 m. and filling a fracture within the serpentinite. The southern lens is 0.5 m. by 1.0 m. The chromite has a black metallic lustre giving a brown streak.

The result of chemical analysis of six chip samples is as follows (GSI, 1974):

<table>
<thead>
<tr>
<th></th>
<th>%Cr₂O₃</th>
<th>%Fe₂O₃</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Northern exposure i</td>
<td>55.38</td>
<td>14.70</td>
</tr>
<tr>
<td>ii</td>
<td>55.06</td>
<td>14.13</td>
</tr>
<tr>
<td>iii</td>
<td>56.34</td>
<td>14.02</td>
</tr>
<tr>
<td>iv</td>
<td>56.59</td>
<td>13.91</td>
</tr>
<tr>
<td>2. Southern exposure i</td>
<td>47.31</td>
<td>15.21</td>
</tr>
<tr>
<td>ii</td>
<td>47.68</td>
<td>15.10</td>
</tr>
</tbody>
</table>

The high Chromic oxide content and hard lumpy character reveal that it is of metallurgical grade which is in short supply in the country.

Another small pocket of chromite occurs near Nepali Basti. It covers about 90 sq km area and has a maximum thickness of about 0.3 m. Sporadic occurrences of chromite as pockets and lenses within peridotites and serpentinite rocks have been recorded near the 49th 56th and 62nd mile-posts on the Tengnoupal-Moreh Road.

Three chromite lenses have been located in Theralichi Ridge, the first one being about 2 km. southeast of the Khudengthabri Village, the second one about 1 km south of the first one and the third one about 1 km further south. Mining of this material was carried out by the Orissa Industries Ltd. from 1976.

NW of Gamnom at Naruni Khayui peak (2230 m.) and east-west tending elongated pod of chromite occurs within serpentinised peridotite.

Ten elongated en echelon pods of chromite within serpentinite host rock was located in an area of 200m × 150m, about 800 m east of the crossing point of Gamnom-Pushing Road with Gamnom-Chasad Road. Three pockets of massive chromite within the ultrabasic rocks were recorded from northwest of Sirohifurar (Ghosh et al., 1984). Chromite lenses within the ultrabasic country
rock were also noted near Phangrai (dimension 5 m × 5 m), Thangrai (dimension 2 m × 2 m) and three lenses around Pashing Village (dimensions 5 m × 10 m, 1 m × 2 m, and a minor body).

iii) Copper: Nickelferous copper sulphides, chalcopyrite and chalcocite with cuprite and malachite were found at Nungan (24° 39' N and 94° 24' E) and Kongal Thana (24° 43' N and 94° 83' E) as small lenses and veins in basic and ultrabasic rocks. Samples from Nungan contain 1.23 to 3.3 per cent Copper with small quantities of Cobalt and Nickel. Several other minor occurrences of copper-ore were noticed near Ningthi (24° 52' N and 94° 26' E), Kwatha and Humine (24° 43' N and 94° 34' E). A few old pits in Sandangching Hill (24° 22' N and 94° 17' 30" E), about 5.6 km north of Kwatha Village show malachite, azurite and magnetite minerals along foliation and joint planes of the main serpentinite body. Maximum values in a batch of eight grab samples collected from pits are 10.56 per cent copper and 0.33 per cent Nickel. Specks of chalcopyrite with pyrite were found within dark grey shale exposed in a land slip near Kanglalingbi (24° 59' N and 95° 53' E) about 24 km. NNW of Imphal.

iv) Lignite: Investigation of the lignite occurrence near Kongvai Village (24°26'35" N and 93°42'32" E), Tureelo Valley, Manipur South District by detailed drilling was carried out by the GSI.

Overlying the Disang shale, the lignite was found in a narrow shallow basin. It was about 300 m long (N-S) and 200 m. wide (E-W) along the foot of a hill. It occurred as thin wide spaced lenses, associated with clay of various colours. It showed moderate dip (average 45°) towards west, striking almost N-S and is generally brown to brownish black in colour, soft and can be easily powdered. An E-W running fault along Tureelo Nala caused discontinuation of the lignite seam towards its northern bank.

A study of borehole data revealed that in general, the thickness of lenses down to a depth of 25 m (inclined depth) ranged from 0.1 to 0.5 m. Beyond this depth, the thickness in most cases do not exceed 0.1 m. Proved reserve of the lignite is of the order of 12,262 tons, while that of the associated clay stand at 2.52 million tons. The clay showed high plasticity when mixed with water.

v) Clay: Associated with lignite a 2 m thick bluish grey plastic clay occurred in an area, 2 km. west of Kongvai Village in Tureelo Valley (Bhattacharyya, 1973). Clay occurs as terrace deposits around Pallel along Mahaturel and Sekmeiturel rivers. It was derived from weathering of shales.

vi) Coal: The reported occurrence of coal in Jiribam Subdivision of Manipur, South District were actually carbonized wood found in rocks of the Surma and Tipam Groups. A 8 cm thick coal layer in sandstone was found towards SW of Kongai. The coal was friable in nature and dull in lustre, giving a sulphurous smell on burning.

vii) Nickel: Nickel, associated with serpentinite body, was reposted from Nampesh (24° 43' N and 94° 34' E) and Kwatha (24° 20' N and 94° IT E) areas lying on the eastern fringe of the State. This area was originally prospected by shallow pits for copper before the First World War but was later abandoned as the output was not encouraging. Geological mapping by the GSI in the Kwatha area, followed by analysis of the soil by geochemical method at Kwatha-Nampesh, Humine (24° 43' N and 94° 34' E) areas revealing that metallic nickel was dispersed in the soil as high concentrations mostly of the order of 4000 ppm. Quantitative estimation by conventional chemical analysis showed that the percentage of nickel varied up to 0.9 indicating the probability of concentration in the soil to merit further detailed exploration for assessment of the metal content (Alwar & Banerjee, 1963).

Soil samples in Moreh (24°15' N and 94°19' E) area contained 4000 ppm. of nickel and the surface weathered serpentinite rock contained 0.24 to 0.90 per cent nickel in a combined state. The chemical analysis of 9 soil samples collected from a pit over the Sirohi hill, in Ukhrul District
showed encouraging results in respect of nickel. There was increase of nickel from 0.15 per cent at ground surface to 0.86 per cent between 240 and 270 cm depth.

viii) Limestone: The limestone occurs as lenses in a sequence of gritty sandstone and buff-coloured shale. It is grey in colour, highly jointed and fossiliferous containing grains of pyrite and veins of calcite. The limestone bearing bed has been included in 'Axial Group' which was considered to be older than Eocene in age by Oldham (1883).

Ukhrul area: The limestone deposit occurs about 400 m. east of Ukhrul town (25°06' N and 94°22' E) near Ukhrul-Sirohi Road. There are two limestone bands separated by a 15 m thick interbed of shale. The lower band is 90 m by 120 m and is totally unexposed in the surface. Its configuration is extrapolated only from the drilling data. The upper band extends for 260 m along the strike and 165 m in the dip direction. In a broad outline, the limestone deposit is a lensoid body with a maximum thickness of 80 m in the central part. The limestone is fine-grained showing varying shades of grey and brown, generally massive, and highly jointed at places.

The average grades of the limestone in the two bands are as follows:

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<tr>
<th></th>
<th>CaO</th>
<th>Insoluble</th>
<th>R2 O2</th>
<th>MgO</th>
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<tr>
<td>Band I (Upper)</td>
<td>43.18%</td>
<td>15.50%</td>
<td>4.55%</td>
<td>below 1%</td>
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<tr>
<td>Band II (Lower)</td>
<td>44.70%</td>
<td>15.55%</td>
<td>4.00%</td>
<td>below 1%</td>
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</table>

The total proved reserve at Ukhrul is of the order of 5.79 million tons down to a maximum depth of 105 m.

Other Limestone areas adjacent to Ukhrul: Hundung Area (25°03' N and 94°23'30" E) about 4 km to the south of lower Hundung Village, small lenses of limestones are exposed over a strike length of about 1.3 km. The longest of the three (Hundung North deposit) is exposed just by the side of old Ukhrul-Imphal Road. The second lens (Hundung South deposit) occurs a little to the south of it. The limestone deposit reported at Mova occurs just in the Nungsang Kheng nala. The deposits at Hundung South and Mova are exposed fully in pyramidal or conical bodies. The base areas of the two deposits are 4000 sq m for Hundung South and 1750 sq m for Mova. The Hundung North deposit consists of two bands separated by a 25 m thick parting of shale. The lower band is 30 m in average thickness and extends for about 60 m. The band is reddish brown in colour and pinches out gradually towards down dip. The upper band is 40 m thick extending for about 130 m along the strike. It pinches out within 80 m along down dip. It is also massive, brownish red in colour.

Khanggoi (Kankhui) area (25°30' N and 94°24'E)–the deposit is located at a distance of 18 km. south-east of Ukhrul, approachable via Choither Village. The limestone is massive, highly jointed and almost fully exposed in a cone-shaped body occupying a base area of 2500 sq km up to the road level.

Lambui area: The deposit is located about 28 km. south-west of Ukhrul and is approachable by the old Ukhrul-Imphal Road via Lambui (25°00' N and 94°16' E). The deposit, exposed in an old quarry face is in the form of a small lensoid body, the probable extension of the deposit being approximately 50 m.

The probable reserves (in million tons) are:

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<tbody>
<tr>
<td>Khanggoi (Kankhui)</td>
<td>0.26</td>
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<tr>
<td>Mova</td>
<td>0.045</td>
</tr>
<tr>
<td>Hundung South</td>
<td>0.17</td>
</tr>
<tr>
<td>Hundung North</td>
<td>1.77</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2.245</strong></td>
</tr>
</tbody>
</table>

Considering 20 per cent mining loss, the available reserves will be of the order of 1.80 million tons. The above deposits including Ukhrul is in a position to sustain a Cement Plant of 300 tons per day for about 45 years. The poorer grade material from Ukhrul and Hundung North consisting of 42 per cent to 43 per cent of CaO and higher insoluble require to be blended with
the high grade limestone from Hundung South, Mova and Khanggoi for improving the grade. The R2 O3 in all these deposits is low, mostly in the range of 3 per cent to 5 per cent in which alumina-iron ratio varies between 1 : 2 to 2 : 3.

Other Minor Deposits: Limestone deposits near Kasam (24°58' N and 94°15' E) in the Ukhrul Sub-division and New Mongbung in the Churachandpur Sub-division have deposits.

There are three small deposits along the nala flowing roughly NW-SE on the eastern side of the old Ukhrul Road between Kasam and Sokapo villages. The first one is exposed in a small quarry (roughly 25 m in diameter) along the nala about 1 km. East of Kasam. The limestone resembles Lambui deposit. The second deposit is exposed in a small cliff section along the nala about 1 km. downstream of the first one for strike length of 75 m and the thickness being 12-14 m. The probable reserves for a depth of 15 m are of the order of 27,000 tons. The third deposit is exposed about 0.8 km further downstream for a strike length of 50 m and the thickness is 10.1 m. The probable reserves of limestone for a depth of 15 m are of the order of 18,000 tons. Limestone exposures are seen in a small quarry at the foot of the hills on the western bank of Tuinong stream, where it takes a south-easterly course. The local people use limestone for lime making.

The Disang shale between Pallel (24°28' N and 94°02' E) and Chapikarong (24°13' N and 94°54' E) contain a few particular bands of limestone. They are (1) between 32/4 and 32/6 milestones on the Imphal–Moreh Road, east of Pallel, (2) east Tanporpi (24°15' N and 93°55' E), (3) near Charangling Khuron (24°21' N and 93°57' E), (4) near Beru Khunon (24°18' N and 93°57' E) and (5) at Chapikarong. The thickness of the band is 5 m. at Chapikarong, 30 m. near Topokpi and 106 m on Imphal–Moreh Road. The limestones are grey to cream coloured, massive and compact and at places carry veins of white calcite.

ix) Salt: A number of salt springs occur at Waikhung (24°25' N and 93°56' E), Kikhong (24°39' N and 94°06' E), Chandrakhong (24° 42' N and 94°08' E) and Keithalmanbai (24°44' N and 94°08' E) along the foothills in the eastern part of the Imphal Valley. These springs located along a probable fault zone. Local people tap most of the springs by driving 1 m diameter lined wells for manufacture of salt in small scale.

PREVIOUS WORKS

Geological activities in Manipur and adjacent regions were of the nature of scanty traverses during the pre-independent period of India. The earliest geological information of Manipur was given by Theobald (1873). Oldham (1883) was one of the early workers to give a broad geological account of Manipur. He correlated the limestone bearing bed around Ukhrul as “Axials of Arakan Yoma”, the southern tectonic equivalent of the Manipur Hill ranges. Clegg (1938) further found similar limestone from the adjoining Burman (=Myanmarese) part of the Indo-Burmese range and suggested a Cretaceous age to these exposures.

Pascoe (1912) studied the rocks exposed in east and west of Imphal valley and considered that ‘Axials’ of Oldham were in fact much similar to Mallet's description (1876) of the ‘Disang Series’ of Upper Assam. He also pointed out that bulk of the Disang had more in common with the Negaris beds in Burma (Myanmar).

Raina (1959) differed with Oldham and considered only the ‘Cretaceous bed’ and not the ‘Disang Series’ as Axials. However, he also supported earlier workers in classifying the ultrabasic intrusives.

Evans (1932) and Mathur & Evans (1964) referred the sequence of dark grey shales with thin bands of sandstones to ‘Disang Series’ and noted that near Ukhrul the Disang shales are closely associated with Cretaceous limestone but the field relationship was not fully established.

Pascoe (1950) mentioned that the contact of Disang and Makware beds of Myanmar (more
like Disang but shows greater degree of metamorphism, foliated habit and harder texture) are characterised by serpentinite intrusions which are probably of Upper Cretaceous age.

Geologists of the GSI had carried out mineral investigation and systematic geological mapping from time to time in different parts of Manipur State. Preliminary studies for copper and nickel were carried out by Chakraborty & Raina (1958). Dutt (1959) carried out preliminary investigation for nickel at Kwatha, Nampesha, Huimine areas and indicated nickel concentration in the soil resting over ultramafic rocks. Alwar, Banerjee & Dayal (1960-61) carried out investigation for nickel and copper mineralisation in Moreh area.

Biswas (1962) recorded *Globigerina, Globotruncanca* and *Pseudotextularia* to be the dominant Foraminifera in the basinal marl facies developed near Taupokpi and suggested that these may correspond to the Langpar Formation of Meghalaya.

Dayal & Duara (1962-63) carried out geological mapping and mineral investigation in Ukhrul subdivision and they classified the sedimentaries, with limestone pockets, as Axials. They opined that the Chimi conglomerate of Pascoe resembles Ukhrul conglomerate.

Brunnsewheiler (1966, 1974), who mapped the contiguous Arakan Yoma-Nagal Hills and Chin Hill tracts of the Burmese (Myanmarese) part of the Indo-Burma range differed considerably with all the existing views. According to him these limestones were exotic floaters within an otherwise ‘Exotic’ flysch Formation. He even identified limestone exotic blocks indicating Cretaceous and Eocene ages. Other such rootless blocks identified by him consist of greywacke, calcareous sandstone, chert, serpentinite, conglomerate etc. He did not agree in grouping these exotic blocks as well as the ‘Exotic flysch’ within the so-called ‘Axials’ of Theobold (1872). He stated that the tectonosedimentary set up resulting in such occurrences of exotic blocks in the Indo-Burmese range was having legacy to the Pre-Oligocene evolution.

Nandy & Sriram (1970) classified the rocks into a Cretaceous Ukhrul bed and a Eocene Disang Formation, and had their disagreement in grouping the rocks under ‘Axial’. They noticed some Upper Cretaceous fossils in one of the limestone bands.

Sriram & Mukhopadhyay (1971) and Sriram *et al.* (1972) carried out mapping near Ukhrul and classified the rocks of eastern Manipur on lithological basis into three Formations as follows:

- Sirohi Formation: Intrusive serpentinite bodies
- Ukhrul Formation: Shale, Siltstone, Sandstone grit, Conglomerate, Limestone, etc.
- Litan Formation: Dark grey shale, Siltstone.

Ghosal (1972) carried out investigation on the economic potentiality of the limestone deposits in Ukhrul, Hundung, Mova and Kankhui areas and observed that the contact of Cretaceous beds overlying the Diasang shale was tectonic and allochthonous in nature.

GSI (1974) brought out an account of the geology and mineral resources of the State of Manipur on the basis of earlier works carried by the geologists in this area.

Chattopadhyay & Roy (1975) attempted to establish a stratigraphic sequence around Chingai in eastern Manipur. They classified the rocks into two groups *viz.*, Lower argillaceous Chingai group and Upper arenaceous Kongai group. They noticed following invertebrate fossils from Chingai Group (Argillaceous strata):

- Bivalvia: *Cardium* sp., *Chlamys* sp., *Lucinia* sp., *Ostrea* sp., *Trigonia* sp., *Pinna* sp., *Spondylus* sp., *Tellina* sp., and *Pecten* sp.
- Gastropoda: *Turritella* sp.
- Foraminifera: *Globotruncanca* sp., *Globigerina* sp., *Nodosaria* sp.

They noticed a small pocket of limestone and calcareous strata containing planktonic
Foraminifera, *Globotruncana* in the lower part of Chingai Group, indicative of Upper Cretaceous age.

Satsangi & Chatterjee (1979) identified fossils of *Arca, Barbatia, Corbicula, Ostrea, Pinna* and *Tellina* (all Bivalves); *Turritella* (Gastropoda), and *Trochocysthaeus* (Cocleenterata) in the Disang Group near Sundal in Ukhrul District.

Roy (1980) recognized a few radiolarian forms in a collection of arkosic sandstone and cherts from Gammom area of Ukhrul District.

Sinha *et al.* (1982) presented a concise account of the palaeontological studies carried out on the various sedimentaries in Manipur, and in other States of the north-eastern India.

Bhattacharya & Bhattacharya (1984) made detail study of the stratigraphy and palaeontology of rocks of eastern parts of Manipur. They reconstructed the stratigraphic succession as follows: Sirohi Formation, Ukhrul Formation and Lamlang Formation. They recorded a number of Foraminifera, Corals, Ostracoda, Pelecypoda and Gastropoda from fossilized limestone blocks. They opined that the limestone of Manipur part of the Indo-Burma orogene are like those of the contiguous Chin hills, Arakan-Yoma and coastal Burma (Myanmar) where such exotic floaters have already been noted within (Palaeocene-Lower Eocene) rock association (Shale-Siltstone geosynclinal flysch facies).

Ghosh *et al.* (1984) recorded the presence of a rich radiolarian microfauna in parts of eastern Manipur.

GSI (1985) recorded foraminifer microfauna from lime stones in Chandel District, which were referred to Lower Eocene age.

Mitra *et al.* (1986) traced an olistostromal belt on the eastern part of Manipur, lying west of Naga Hills ophiolite belt. They revealed that the exotics were of varying age viz., Palaeocene, Lower Eocene, Middle Eocene and Upper Eocene. They recorded a number of microfauna and molluscan forms from these rock beds.

Bhattacharya & Bhattacharya (1987) reviewed the palaeontology of the Upper Cretaceous rocks of eastern part of Manipur, while dealing with the sediments of north-eastern India.

Saxena (1987) made observations on the lithostratigraphy of the Barail Group of rocks in Manipur and suggested for regrouping of the succession.

GSI (1987) identified a rich fossiliferous zone within the Disang Formation in a hill, east of Thoubal in NW-SE direction.

Mishra (1990) reported the result of palaeontological study of Disang-Barail sediments in parts of Ukhrul and Chandel Districts of Manipur. He (1991) reported the results of similar study in the Ukhrul, Churachandpur and Bishenpur Districts.

Chungkham Prithiraj *et al.* (1992) worked out the foraminifer assemblages from exotic blocks in the Melange zone of Ukhrul area providing data on deep oceanic sediments in Late Cretaceous and their subsequent abduction along the eastern margin of the Indian plate.

Mishra (1993) updated the palaeontological data on micro- and megabiota of the ophiolite belt and adjoining Disang and Barail Formations of Manipur.

Chungkham Prithiraj & Caron (1996) compared the foraminifer assemblages of Ukhrul Melange zone of Manipur with the wildflysch zone of Switzerland, two distant parts of the Tethys Sea.

Chungkham Prithiraj & Jafar (1998) worked out the preserved assemblage of Foraminifera and Coccoliths from the pelagic limestones of Melange zone of Manipur ophiolite belt of Ukhrul area. The biostratigraphy of five exotic limestone blocks encompassing a Late Santonian/Early Campanian to Late Maestrichtian time slice was also postulated.
<table>
<thead>
<tr>
<th>Phylum</th>
<th>PROTOZOA</th>
<th>Genus</th>
<th>Systematic Palaeontology</th>
<th>List of Taxa</th>
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<td>31.</td>
<td><em>G. wiedenmayeri</em> (Gandolfi)</td>
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<tr>
<td>Genus</td>
<td><strong>Globotruncanella</strong> Reiss</td>
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<td>32.</td>
<td><em>Globotruncanella</em> havanensis (Woorwijk)</td>
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<td>33.</td>
<td><em>G. palaoidea</em> (Gandolfi)</td>
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<td>34.</td>
<td><em>G. pschadae</em> (Keller)</td>
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<tr>
<td>Genus</td>
<td><strong>Dicarinella</strong> Porthault</td>
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<td>35.</td>
<td><em>Dicarinella asymetrica</em> Sigal</td>
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<tr>
<td>Genus</td>
<td><strong>Marginotruncana</strong> Hofker</td>
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<td>36.</td>
<td><em>Marginotruncan</em> coronana (Bolli)</td>
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<td>37.</td>
<td><em>M. marginata</em> (Reuss)</td>
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<td>38.</td>
<td><em>M. pseudolinneiana</em> Pessagno</td>
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<td>39.</td>
<td><em>M. sinuosa</em> Porthault</td>
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<td>40.</td>
<td><em>M. undulata</em> (Lehman)</td>
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<td>Family</td>
<td><strong>Heterohelicidae</strong></td>
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<tr>
<td>Genus</td>
<td><strong>Planoglobulina</strong> Cushman</td>
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<td>41.</td>
<td><em>Planoglobulina</em> acervulinaeides (Egger)</td>
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<tr>
<td>Genus</td>
<td><strong>Pseudoguembelina</strong> Brönnimann &amp; Brown</td>
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<td>42.</td>
<td><em>Pseudoguembelina</em> excolata (Cushman)</td>
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<td>43.</td>
<td><em>P. sp.</em></td>
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<tr>
<td>Genus</td>
<td><strong>Pseudotextularia</strong> Rzehak</td>
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<td>44.</td>
<td><em>Pseudotextularia</em> elegans Rzehak</td>
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<td>45.</td>
<td><em>P. intermedia</em> De Klasz</td>
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<td>46.</td>
<td><em>P. nuttali</em> (Voorwijk)</td>
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<tr>
<td>Genus</td>
<td><strong>Racemiguembelina</strong> Montanaro Gallitelli</td>
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<td>47.</td>
<td><em>R. fructicosa</em> (Egger)</td>
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</tbody>
</table>
Genus *Gublerina* Kikione

48. *Gublerina* sp.

Genus *Heterohelix* Ehrenberg

49. *Heterohelix* sp.

Family NUMMULITIDAE
Genus *Nummulites* Lamarck

50. *Nummulites* sp.

Family DISCOCYCLINIDAE
Genus *Discocyclina* Gümbel

51. *Discocyclina* sp.

Family BOLIVINITIDAE
Genus *Bolivina* d'Orbigny

52. *Bolivina* sp.

Family TEXTULARIIDAE
Genus *Vulvulina* d'Orbigny

53. *Vulvulina* sp.

Genus *Textularia* Defrance

54. *Textularia* sp.

Family GLOBOROTALIIDAE
Genus *Globorotalia* Cushman

55. *Globorotalia* sp.

Family BULIMINIDAE
Genus *Bulimina* d'Orbigny

56. *Bulimina* sp.

Family NONIONIDAE
Genus *Nonion* de Montfort

57. *Nonion* sp.

Family NODOSARIIDAE
Genus *Dentalina* Risso

58. *Dentalina* sp.

Genus *Lagena* Walker & Jacob

59. *Lagena* sp.

Family CIBICIDIDAE
Genus *Cibicides* de Montfort

60. *Cibicides* sp.

Family HANTKENINIDAE
Genus *Globanomalina* Haque

61. *Globanomalina* sp.

Genus *Hastigerina* Thomson

62. *Hastigerina* sp.

Family PLEUROSTOMELLIDAE
Genus *Nodosarella* Rzehak

63. *Nodosarella* sp.

Family MILIOLIDAE
Genus *Quinqueloculina* d'Orbigny

64. *Quinqueloculina* sp.

Family ALVEOLINIDAE
Genus *Borelis* de Montfort

65. *Borelis* sp.

Family ROTALIIDAE
Genus *Rotalia* Lamarck

66. *Rotalia trochidiformis* Lamarck

Family ASTORHIZIDAE
Genus *Bathysiphon* M. Sars

67. *Bathysiphon* sp.

Family LITUOLIDAE
Genus *Haplophragmoides* Cushman

68. *Haplophragmoides* sp.

Class ACTINOPODA
Subclass RADIOLARIA
Order PORULOSIDA
Suborder SPUMELLINA
Family LIOSPHAERIDAE
Genus *Caenosphaera* Ehrenberg

69. *Caenosphaera* sp.

Family ELLIPSIDIIDAE
Genus *Ellipsidium* Haeckel

70. *Ellipsidium* sp.

Genus *Lithapium* Haeckel

71. *Lithapium* sp.

Family DRUPPULIDAE
Genus *Druppula* Haeckel

72. *Druppula* sp.

Family SPONGURIDAE
Genus *Spongoprurnum* Haeckel

73. *Spongoprurnum* sp.
Genus *Spongurus* Haeckel

74. *Spongurus* sp.

Family CYPHANTIDAE

Genus *Ommatospyris* Ehrenberg

75. *Ommatospyris* sp.

Family CYPHANTIDAE

Genus *Cendodiscus* Haeckel

76. *Cendodiscus* sp.

Family CYPHANTIDAE

Genus *Sethodiscus* Haeckel

77. *Sethodiscus* sp.

Genus *Periphaena* Ehrenberg

78. *Periphaena* sp.

Genus *Triactis* Haeckel

79. *Triactis* sp.

Family PHACODISCIDAE

Genus *Spongophacus* Haeckel

80. *Spongophacus* sp.

Genus *Dictyocoryne* Ehrenberg

81. *Dictyocoryne* sp.

Order OCULOSIDA

Suborder NASSELLINA

Family THEOCORYTHIDAE

Genus *Archiochorys* Haeckel

83. *Archiochorys* sp.

Genus *Cornutana* Haeckel

84. *Cornutana* sp.

Genus *Cyrtochelys* Haeckel

85. *Cyrtochelys* sp.

Genus *Archicapsa* Haeckel

86. *Archicapsa* sp.

Family LOPHOPHAENIDAE

Genus *Sethocyrtis* Haeckel

87. *Sethocyrtis* sp.

Genus *Lithocampana* Clarke & Campbell

88. *Lithocampana* sp.

Genus *Adelocytis* Pantanelli

89. *Adelocytis* sp.

Genus *Cryptocapsa* Haeckel

90. *Cryptocapsa* sp.

Genus *Dicanthocapsa* Haeckel

91. *Dicanthocapsa* sp.

Family THEOCORYTHIDAE

Genus *Theocyrtis* Haeckel

92. *Theocyrtis* sp.

Genus *Theocapsa* Haeckel

93. *Theocapsa* sp.

Genus *Trilocapsa* Haeckel

94. *Trilocapsa* sp.

Family ARTOPHORMIDIDAE

Genus *Kassina* Chabakov

95. *Kassina* sp.

Family STICHOCORYTHIDAE

Genus *Diplostrobus* Squinabol

96. *Diplostrobus* sp.

Genus *Lithocampe* Ehrenberg

97. *Lithocampe* sp.

Genus *Lithomitra* Bütschli

98. *Lithomitra* sp.

Genus *Stichocapsa* Haeckel

99. *Stichocapsa* sp.

Family GLYCOBOTRYIDIDAE

Genus *Glycobotrys* Campbell

100. *Glycobotrys* sp.

Family POLYBOTRYIDIDAE

Genus *Polybotrys* Haeckel

101. *Polybotrys* sp.

Genus *Botryocampe* Haeckel

102. *Botryocampe* sp.

Phylum COELENTERATA

Subphylum ANTHOZOAA

Class ZOANTHARIA

Order SCLERACTINA
Family MUSSIDAE
Genus *Circophyllia* Milne-Edwards & Haime
103. *Circophyllia* sp.

Family CARYOPHYLLIDAE
Genus *Oxysmilia* Duchassaing
104. *Oxysmilia* sp.

Genus *Trochocyathus* Milne-Edwards & Haime
105. *Trochocyathus* sp.

Genus *Tethocyathus* Kühn
106. *Tethocyathus* sp.

Phylum BRYOZOA
Subphylum ENTOPROCTA
Class GYMNOLAEMATA
Order CHEILOSTOMATA
Family HINCKSINIDAE
Genus *Hincksinia* Norman
107. *Hincksinia* sp.

Genus *Aplousina* Canu & Bassler
108. *Aplousina* sp.

Family CALLOPORIDAE
Genus *Alderina* Norman
109. *Alderina* sp.

Phylum ARTHROPODA
Class CRUSTACEA
Order PODOCAPIDA
Family BAIRDIIDAE
Genus *Bairdia* McCoy
110. *Bairdia* sp.

Family LEGUMINOCYTHERIDAE
Genus *Leguminocythereis* Howe
111. *Leguminocythereis* sp.

Genus *Acuticythereis* Edwards
112. *Acuticythereis* sp.

Order DECAPODA
Suborder PLEOCYEMATA
Infraorder BRACHYURA
Superfamily PORTUNOIDEA

Family PORTUNIDAE
Genus *Portunus* Weber
113. *Portunus* sp.

Superfamily XANTHOIDEA
Family GONEPLACIDAE
Genus *Galenopsis* Milne-Edwards
114. *Galenopsis* sp.

Phylum MOLLUSCA
Class BIVALVIA (PELECYPODA)
Subclass PALAEOTAXODONTA
Order NUCULOIDA
Family NUCULIDAE
Genus *Nucula* Lamarck
115. *Nucula* sp.

Genus *Nuculana* Link
116. *Nuculana* sp.

Subclass PTERIOMORPHA
Order ARCOIDA
Family ARCIDAE
Genus *Barbatia* Gray
117. *Barbatia* sp.

Family GLYCYMERIDIDAE
Genus *Glycymeris* da Costa
118. *Glycymeris* sp.

Order MYTILOIDA
Family MYTILIDAE
Genus *Brachiodontes* Swainson
119. *Brachiodontes* sp.

Genus *Mytilus* Linnaeus
120. *Mytilus* sp.

Family PINNIDAE
Genus *Pinna* Linnaeus
121. *Pinna* sp.

Order PTERIOIDA
Family PECTINIDAE
Genus *Euberneopecten* Conrad
122. *Euberneopecten* sp.
Genus *Chlamys* Roeding

123. *Chlamys* (*Chlamys*) sp.

124. *Chlamys* (*Aequipeclen*) sp.

Genus *Pecten* Müller

125. *Pecten* (*Pecten*) sp.

Family **SPONDYLIDAE**

Genus *Spondylus* Linnaeus

126. *Spondylus* (*Spondylus*) sp.

Subclass **PALAEOHETERODONTA**

Order **UNIONOIDA**

Family **UNIONIDAE**

Genus *Potomida* Swainson

127. *Potomida* sp.

Order **TRIGONIOIDA**

Family **TRIGONIDAE**

Genus *Trigonia* Bruguiere

128. *Trigonia* sp.

Subclass **HETERODONTA**

Order **VENEROIDIA**

Family **LUCINIDAE**

Genus *Lucinia* Bruguiere

129. *Lucinia* sp.

Family **UNGULINIDAE**

Genus *Diplodonta* Bronn

130. *Diplodonta* sp.

Family **CARDITIDAE**

Genus *Cardiocardita* Anton

131. *Cardiocardita* sp.

Genus *Venericardia* Lamarck

132. *Venericardia* sp.

Family **CARDIIDAE**

Genus *Cardium* Linnaeus

133. *Cardium* sp.

Genus *Loxocardium* Cossmann

134. *Loxocardium* sp.

Genus *Vepricardium* Iredale

135. *Vepricardium* sp.

Genus *Trachycardium* Moerch

136. *Trachycardium* sp.

Family **TELLINIDAE**

Genus *Tellina* Linnaeus

137. *Tellina* sp.

Family **PSAMMOBIIDAE**

Genus *Gari* Schummacher


Family **ARCTICIDAE**

Genus *Arctica* Schummacher

139. *Arctica* sp.

Family **KELLIELLIDAE**

Genus *Allopagus* Stoliczka

140. *Allopagus* sp.

Family **GLOSSIDAE**

Genus *Glossus* Poli

141. *Glossus* (*Cytherocardia*) sp.

Family **CORBICULIDAE**

Genus *Corbica* Mergele von Mühlfeld

142. *Corbica* sp.

Family **VENERIDAE**

Genus *Pitar* Römer

143. *Pitar* sp.

Genus *Mercenaria* Schummacher

144. *Mercenaria* sp.

Order **MYOIDA**

Family **CORBULIDAE**

Genus *Corbula* Bruguiere

145. *Corbula* sp.

Genus *Caestocorbula* Vincent

146. *Caestocorbula* (*Parmicorbula*) sp.

Family **PHOLADIDAE**

Genus *Scobinopholas* Grant & Gayle

147. *Scobinopholas* sp.

Family **HIATELLIDAE**

Genus *Panopea* Menard

148. *Panopea* sp.
Order HIPPURITOIDA
Family MONOPLEURIDAE
Genus *Paramonopleura* Korabkov

149. *Paramonopleura* sp.

Subclass ANOMALODESMATA
Order PHOLADOMYOIDA
Family CUSPIDARIIDAE
Genus *Cuspidaria* Nardo

150. *Cuspidaria* sp.

Order MYTILOIDA
Suborder OSTREINA
Family OSTREIDAE
Genus *Ostrea* Linnaeus

151. *Ostrea* sp.

Class GASTROPODA
Subclass PROSOBRANCHIA
Order ARCHAEOGASTROPODA
Family TROCHIDAE
Genus *Margarites* Gray

152. *Margarites* sp.

Genus *Solariella* Wood

153. *Solariella* sp.

Family TURBINIDAE
Genus *Collonia* Gray

154. *Collonia* sp.

Suborder NERITOPSINA
Family NERITIDAE
Genus *Nerita* Linnaeus

155. *Nerita* sp.

Family PATELLIDAE
Genus *Helcion* Montfort

156. *Helcion* sp.

Order MESOGASTROPODA
Family LITTORINIDAE
Genus *Littorina* Ferussac

157. *Littorina* sp.

Family EPITONIDAE
Genus *Cirrotrema* Moerch

158. *Cirrotrema* sp.

Family TURRITELLIDAE
Genus *Turritella* Lamarck

159. *Turritella* sp.

Family CERITHIIDAE
Genus *Cerithium* Bruguiere

160. *Cerithium* sp.

Family NATICIDAE
Genus *Natica* Scopoli

161. *Natica* sp.

Family FICIDAE
Genus *Ficus* Roeding

162. *Ficus* sp.

Order NEOGASTROPODA
Superfamily MURICOIDAE
Family *Mazzalina* Conrad

164. *Mazzalina* sp.

Subclass HETEROBRANCHIA
Superorder ALLOGASTROPODA
Family *Architectonica* Roeding

165. *Architectonica* sp.

Order OPHISTOBANCHIA
Suborder NUDIBRANCHIA
Family *Cadlina* Bengli

166. *Cadlina* sp.

Class CEPHALOPODA
Superfamily BOLITAENOIDEA
Family *Japetella* Hoyle
SYSTEMATIC ACCOUNT

Phylum PROTOZOA
Subphylum SARCODINA
Class RHIZOPODA
Order FORAMINIFERA
Family GLOBOTRUNCANIDAE
Genus Globotruncana Cushman


1. Globotruncana aegyptica Nakkady


Diagnosis: Umbilical side: Primary aperture umbilical; sutures radial, straight to slightly curved, depressed; 3–5 chambers, subtrapezoidal, with a convex pustulose surface becoming smooth towards the end of the whorl. Spiral side: Outline lobate; chambers globular initially, then petaloid and finally elongated; chambers increasing rapidly in size as added. Lateral view: Profile asymmetrical, two keels on all chambers, equally developed, parallel. Size: 3–5 mm.

Locality: Manipur, Ukhrul District, Mova limestone.

Geological horizon: Late Cretaceous (Maastrichtian).

2. Globotruncana arca (Cushman)


1984. Globotruncana arca : Robaszynski, Caron, Gonzalez Donoso & Wonders, Rev. de Micropaleontol. 26 (3-4) : 182.

Diagnosis: Umbilical side: Primary aperture umbilical; sutures generally curved and always lined by a raised and beaded sutural ridge; normally 6–7 chambers, elongated, somewhat rectangular, generally with a flat to concave, smooth to pustulose surface; adumbilical ridges developed on all chambers. Spiral side: Outline lobate to subcircular; chambers of variable shape, chambers increasing slowly to moderately in size as added. Lateral view: Trochospire moderately high; two keels on all chambers. Size: 0.5–0.6 mm.

Locality: Manipur, Ukhrul District, Hundung North and Mova limestone.

Geological horizon: Late Cretaceous (Maastrichtian).

3. Globotruncana bulloides Vogler


1984. Globotruncana bulloides : Robaszynski, Caron, Gonzalez Donoso & Wonders, Rev. de Micropaleontol. 26 (3-4) : 186.

Diagnosis: Umbilical side: Primary aperture umbilical; sutures curved to straight, depressed, 6–7 chambers, trapezoidal, with an inflated and slightly pustulose surface; adumbilical ridges developed on all chambers, tangential. Spiral side: Outline lobate; sutures curved, raised and beaded; chambers petaloid, semicircular to crescent-shaped with an inflated surface; chambers increasing slowly in size as added. Lateral view: Trochospire low; profile symmetrical with chambers typically convex on either side; two keels on all chambers, equally developed and parallel. Size: 0.4–0.5 mm.

Locality: Manipur, Ukhrul District, Hundung North and Mova limestone.

Geological horizon: Late Cretaceous (Maastrichtian).

4. Globotruncana dupeubleri Caron, Gonzales Donoso, Robaszynski & Wonders

1984. Globotruncana dupeubleri Caron, Gonzalez Donoso, Robaszynski & Wonders, Rev. de Micropaleontol. 26 (3-4) : 188.

Diagnosis: Umbilical side: Primary aperture umbilical; sutures straight to curved, often depressed; 7–9 chambers, trapezoidal to rectangular, smooth surface; adumbilical ridges developed on all chambers, oblique. Spiral side: Outline lobate; sutures curved to straight;
chambers increasing slowly in size as added. Lateral view: Trochospire of variable height; one peripheral keel. Size: 0.8–0.9 mm.

**Locality:** Manipur, Ukhrul District, Kangkhui, Hundung and Lambin.

**Geological horizon:** Late Cretaceous (Maastrichtian).

5. *Globotruncana falsostuarti* Sigal


**Diagnosis:** Umbilical side: Primary aperture umbilical; sutures curved but straight between final chambers; 7–8 chambers, trapezoidal, with a flat to slightly concave, smooth surface; adumbilical ridges developed on all chambers, tangential to oblique; umbilical system composed of large tegilla. Spiral side: Outline lobate; sutures generally curved; chambers petaloid; chambers increasing slowly in size as added. Lateral view: Trochospire of variable height; two keels, but umbilical keel less developed and often absent towards the end of the last whorl. Size: 0.6–0.7 mm.

**Locality:** Manipur, Ukhrul District, Hundung North and Mova limestones.

**Geological horizon:** Late Cretaceous (Maastrichtian).

6. *Globotruncana linneiana* (d' Orbigny)


**Diagnosis:** Umbilical side: Primary aperture umbilical; sutures curved, depressed, but often lined by a slightly raised and beaded sutural ridge; 5–7, rarely 4½–8 chambers, subtrapezoidal, slightly convex, but weakly convave towards end of the whorl; adumbilical ridges developed on all chambers, tangential or oblique; peripheral keel, sutural ridge and adumbilical ridge forming a horse-shoe shaped pattern. Umbilicus: 1/3 to ½ of maximum diameter; umbilical system composed of large tegilla. Spiral side: Outline lobate, sutures generally curved; chambers petaloid to crescent-shaped, with a smooth and flat surface; chambers increasing variably, but generally slowly, in size as added. Lateral view: Trochospire very low; profile slightly asymmetrical; two keels on all chambers equally developed and parallel, separated by a rather wide imperforate peripheral band. Size: 0.3–0.6 mm.

**Locality:** Manipur, Ukhrul District, Hundung North and Mova limestones.

**Geological horizon:** Late Cretaceous (Maastrichtian).

7. *Globotruncana mariei* Banner & Blow


**Diagnosis:** Umbilical side: Primary aperture umbilical; sutures curved and often depressed; 4 ½ to 5 ½ chambers, kidney-shaped with convex surface; adumbilical ridges generally well developed on all chambers, oblique to tangential; Umbilicus about one-third of maximum diameter; umbilical system composed of tegilla. Spiral side: Outline moderately lobate, more lobate towards end of the last whorl; sutures curved, but often straight between the last chambers, raised and beaded; chambers crescent-shaped, the last one or two petaloid or semicircular; chambers increasing fairly rapidly in size as added in the last whorl. Lateral view: Trochospire low; profile nearly symmetrical with the umbilical side sometimes more convex; two keels on all chambers. Size: 0.3 to 0.6 mm.

**Locality:** Manipur, Ukhrul District, Hundung North and Mova limestones.

**Geological horizon:** Late Cretaceous (Maastrichtian).
8. *Globothunca orientalis* El Naggar


*Diagnosis*: Primary aperture umbilical; sutures curved, variably depressed; 5–7 chambers, sometimes 8, rectangular to trapezoidal, with a variably convex and smooth surface; adumbilical ridges generally most developed in the first chambers, tangential to oblique; adumbilical ridge, sutureal ridge and peripheral keel in continuity on the first chambers, forming a horse-shoe shaped pattern; umbilical system composed of large tegilla. Spiral side: Outline slightly lobate to subcircular; sutures slightly curved to almost straight, raised and beaded; chambers crescent-shaped to petaloid, with a smooth and flat surface; chambers increasing slowly to moderately in size as added. Lateral view: Trochospire moderately high; profile symmetrical to slightly asymmetrical; two keels but umbilical keel often less developed; keels parallel, separated by a narrow imperforate peripheral band. Size: 0.5 to 0.9 mm.

*Locality*: Manipur, Ukhrul District, Hundung North limestones.

*Geological horizon*: Late Cretaceous (Maastrichtian).

9. *Globothunca pseudoconica* Solakius


*Diagnosis*: Profile almost plano-convex, with a strongly convex spiral side and an almost flat umbilical side, giving the appearance of a cone. It has two keels which are somewhat falsostuarti-like on the early chambers of the last whorl and a single keel on the later chambers. *G. pseudoconica* differs from other *Globothunca* in having a test with a very high trochospire and with a subcircular outline.

*Locality*: Manipur, Ukhrul District, Hundung North and South, Mova and Kangkhui in Ukhrul Melange Zone.

*Geological horizon*: Late Cretaceous (Maastrichtian).

10. *Globothunca rosetta* (Carsey)


*Diagnosis*: Umbilical side: Primary aperture umbilical; sutures curved to straight, generally lined by a raised sutural ridge between the first chambers; 4 to 5½ chambers, mostly 5, trapezoidal to kidney-shaped, with a flat to convex and smooth surface; adumbilical ridges developed on all chambers, tangential to slightly oblique; umbilicus one-third to little more than one-third of maximum diameter; umbilical system composed of large tegilla. Spiral side: Outline moderately lobate, more lobate at the end of the last whorl; sutures curved, sometimes almost straight towards the end of the last whorl, with a flat smooth surface; chambers increasing rapidly in size as added. Lateral view: Trochospire generally low; profile asymmetrical; two keels, parallel, separated by a narrow imperforate peripheral band. Size: 0.4 to 0.6 mm.

*Locality*: Manipur, Ukhrul District, Kangkhui, Hundung.

*Geological horizon*: Late Cretaceous (Maastrichtian).

11. *Globothunca ventricosa* White


*Diagnosis*: Umbilical side: Primary aperture umbilical; sutures slightly curved to straight, depressed, but sometimes lined by pustules; 6–7, rarely 5, 5½ or 8 chambers, trapezoidal, with a flat to convex surface, pustulose but becoming smooth towards end of the whorl; adumbilical ridges developed on all chambers except occasionally on the last one or two oblique, sutural ridges often enveloped by succeeding chambers; umbilicus about half of the maximum
diameter; umbilical system composed of large tegilla. Spiral side: Outline lobate, sutures curved, raised and beaded, joining spiral suture often at acute angle; chambers crescent-shaped, semicircular towards end of the last whorl, with a smooth and generally flat surface; chambers increasing slowly in size as added towards end of the last whorl. Lateral view: Trochospire very low; profile typically asymmetrical, spiral side flat and umbilical side convex, chambers triangular in outline; two keels on all chambers, equally developed and parallel, separated by an imperforate peripheral band of variable width. Size: 0.4–0.7 mm.

**Locality**: Manipur, Ukhrul District, Hundung North and South, Kangkhui and Mova limestones.

**Geological horizon**: Late Cretaceous (Maastrichtian).

**Genus Globotruncanita** Reiss


12. *Globotruncanita angulata* (Tilev)


**Diagnosis**: Umbilical side: Primary aperture umbilical; sutures curved and depressed; 5–6 chambers, triangular, with a convex and at least in the first chambers pustulose surface; adumbilical ridges more or less developed on all chambers, tangential to slightly oblique; umbilicus one-third to half of the maximum diameter; umbilical system composed of large, flat and inbricated portici with their edges partly merging inside the umbilicus. Spiral side: Outline polygonal, of variable aspect depending on the development of tubulospines produced by posterior part of each chamber, largest tubulospine often in the older part of the last whorl; sutures straight, sometime sinuous, joining spiral suture at acute angles; chambers triangular with a flat and smooth surface in the last whorl, globular in the first whorls; chambers increasing moderately in size as added. Lateral view: Trochospire low; profile asymmetrical, spiral side slightly convex to slightly concave, umbilical side generally strongly convex; one peripheral keel. Size: 0.4–0.7 mm.

**Locality**: Manipur, Ukhrul District, Hundung North limestone.

**Geological horizon**: Late Cretaceous (Campanian).
14. *Globotruncanita conica* (White)


**Diagnosis:** Umbilical side: Primary aperture umbilical; sutures straight, but curved near umbilicus, lined by a row of pustules; 6–9 chambers, trapezoidal, with a flat and smooth surface; adumbilical ridges moderately developed on all chambers, tangential and almost touching one another, sutural ridges generally enveloped by succeeding chambers; umbilicus one-third of maximum diameter; umbilical system composed of trumpet-shaped portici, merging inside the umbilicus. Spiral side: Outline practically circular; sutures straight to slightly curved, raised and beaded, joining spiral suture at acute angle but at right angle towards end of the last whorl; chambers triangular to crescentic, with a smooth and flat surface; chambers increasing slowly in size as added. Lateral view: Trochospire high; profile asymmetrical, spiral side flat to concave in the last whorl; one peripheral keel. Size: 0.6–0.9 mm.

**Locality:** Manipur, Ukhrul District, Hundung North limestone.

**Geological horizon:** Late Cretaceous (Santonian to Companian).

15. *Globotruncanita elevata* (Brotzen)


**Diagnosis:** Primary aperture umbilical; sutures curved, generally depressed, lined by a raised sutural ridge in first half of the whorl; 5–9 chambers, trapezoidal, with a smooth and convex to flat surface; adumbilical ridges often developed on all chambers, tangential to slightly oblique, sutural ridges enveloped by succeeding chambers towards end of the whorl; umbilicus one-third to half of maximum diameter; umbilical system composed of trumpet-shaped portici, merging inside the umbilicus. Spiral side: Outline slightly lobate; sutures oblique, straight to curved, raised and beaded, joining the spiral suture at acute angle but at right angle towards end of the last whorl; chambers triangular to crescentic, with a smooth and flat surface; chambers increasing slowly in size as added. Lateral view: Trochospire low; profile strongly asymmetrical, spiral side flat to concave in the last whorl; one peripheral keel. Size: 0.6–0.8 mm.

**Locality:** Manipur, Ukhrul District, Mova limestones.

**Geological horizon:** Late Cretaceous (Maastrichtian).

16. *Globotruncanita pettersi* (Gandolfi)


**Diagnosis:** Umbilical side: Primary aperture umbilical; sutures straight to curved, depressed, lined by a slightly raised sutural ridge in earlier part of the whorl; 4–5 chambers, scattered rugosities; adumbilical ridges little developed, tangential to oblique; umbilicus one-third to half of the maximum diameter; umbilical system composed of trumpet shaped or flattened portici, merging inside the umbilicus by their distal edges. Spiral side: Outline lobate to slightly lobate, suture more or less curved, raised and beaded, joining the spiral suture at acute angles; chambers more or less elongated, crescentic, with a flat and smooth surface; chamber increasing rapidly in size as added. Lateral view: Trochospire very low; profile distinctly asymmetrical, spiral side flat to little convex, umbilical side strongly convex; one peripheral keel, sometimes lined by a row of
small pustules at the umbilical side. Size: 0.4–0.6 mm.

**Locality**: Manipur, Ukhrul District, Mova limestones

**Geological horizon**: Late Cretaceous (Maastrichtian).

17. *Globotruncanita stuarti* (de Lapparent)


**Diagnosis**: Umbilical side: Primary aperture umbilical; sutures straight but slightly curved near umbilicus, slightly depressed but lined by sutural ridges; 7–9 chambers, trapezoidal, with a flat to smooth surface; adumbilical ridges developed on all chambers, tangential and almost in continuity; umbilicus one-third to half of the maximum diameter, umbilical system composed of trumpet-shaped portici merging inside the umbilicus. Spiral side: Outline typically circular to subpolygonal; sutures straight, raised and beaded, joining the spiral suture almost at right angles; chambers trapezoidal to subrectangular, with a flat and smooth surface; chambers increasing very slowly in size as added. Lateral view: Trochospire of moderate height; profile symmetrical to slightly asymmetrical due to a higher convexity of one side or the other; one peripheral keel, two close rows of beads on the first chambers of the last whorl. Size: 0.5–0.8 mm.

**Locality**: Manipur, Ukhrul District, Hundung North and Mova limestones.

**Geological horizon**: Late Cretaceous (Santonian to Maastrichtian).

19. *Globotruncanita subspinosa* (Pessagno)


**Diagnosis**: Umbilical side: Primary aperture umbilical; sutures slightly curved, depressed, sometimes lined by a row of pustules; 5–8 chambers, trapezoidal, generally with a flat and smooth surface; adumbilical ridges developed on all chambers, tangential, sutural ridges often enveloped by succeeding chambers, except between the first chambers; umbilicus one-third to half of the maximum diameter; umbilical system composed of trumpet-shaped portici, merging inside the umbilicus. Spiral side: Outline strongly lobate, angularly polygonal with asymmetrical concave sides; sutures straight, raised and beaded, joining the spiral side at acute angles; chambers triangular to trapezoidal, radially elongated with a smooth and undulated surface; chambers increasing at variable rates in size as added. Lateral view: Trochospire low; profile...
strongly asymmetrical, spiral side flat or slightly convex, umbilical side convex; one peripheral keel. Size: 0.5–0.6 mm. but often larger (0.8–1.0 mm).

**Locality** : Manipur, Ukhrul District, Hundung North limestone.

**Geological horizon** : Late Cretaceous (Campanian–Maastrichtian).

Genus *Rosita* Caron, Gonzalez Donoso, Robaszynski & Wonders


20. *Rosita contusa* (Cushman)


**Diagnosis** : Umbilical side: Primary aperture umbilical; sutures curved to subradial, slightly depressed and not lined by pustules; 5–7 chambers, sometimes 4 and rarely upto 9, subtrapezoidal, with a flat, smooth to pustulose surface; adumbilical ridges poorly developed; umbilicus one-third to half of the maximum diameter; umbilical system composed of more or less flattened portici, imbricated, with their distal edges merging inside the umbilicus. Spiral side: Outline variable depending on undulation of the chambers, subcircular to polygonal; sutures curved and oblique, raised and beaded, joining the spiral suture at variably acute angles; chambers globular initially, then strongly elongated in the direction of coiling to the end of the last whorl; chambers increasing slowly in size as added. Lateral view: Trochospire very high; profile very asymmetrical, spiral side strongly convex, umbilical side flat to concave; two keels, closely spaced and equally developed on all chambers. Size: 0.4–0.5 mm, sometimes up to 0.7 mm.

**Locality** : Manipur, Ukhrul District, Mova limestone.

**Geological horizon** : Late Cretaceous (Maastrichtian).


**Diagnosis** : Umbilical side: Primary aperture umbilical; sutures curved, generally slightly depressed but often lined by pustules or sometimes by a sutural ridge towards the end of the whorl; 4–5 chambers, sometimes 3 and rarely up to 7, kidney-shaped, elongated in the direction of coiling; adumbilical ridges developed on all chambers except sometimes on the last one, tangential to oblique, sutural ridges sometimes enveloped by succeeding chambers; umbilicus one-third to half of the maximum diameter; umbilical system composed of large portici, more or less flattened and imbricated. Spiral side: Outline slightly lobate, subpolygonal to circular; sutures curved to straight, very oblique, raised and beaded, joining the spiral suture at acute to right angles; chambers globular initially, those of last whorl crescentic, with a smooth and undulated surface; chambers increasing rapidly in size as added. Lateral view: Trochospire low to moderate high; profile asymmetrical, spiral side and umbilical side variably convex; two equally developed keels on all chambers, keels separated by an imperforate peripheral band of variable width. Size: 0.4–0.5 mm, sometimes up to 0.7 mm.

**Locality** : Manipur, Ukhrul District, Hundung North limestone.

**Geological horizon** : Late Cretaceous (Maastrichtian).

22. *Rosita patelliformis* (Gandolfi)


**Diagnosis** : Umbilical side: Primary aperture umbilical; sutures curved to subradial, slightly
depressed but lined by a row of pustules; 4-5 chambers, trapezoidal, elongated surface; adumbilical ridges poorly developed but present on almost all chambers, tangential, sutural ridges enveloped by more or less by succeeding chambers; umbilicus one-third to half of the maximum diameter; umbilical system with flattened portici. Spiral side: Outline subpolygonal to circular; suture curved, oblique, lined by slightly raised and beaded sutural ridges, joining the spiral suture at acute to right angles; chambers globular initially, those of last whorl elongated, crescentic, with a smooth and undulated surface; chambers increasing rapidly in size as added. Lateral view: Trochospire moderately to fairly high; profile asymmetrical, spiral side convex, umbilical side flat to concave; two keels, equally developed on all chambers. Size: 0.6-1.0 mm.

**Locality**: Manipur, Ukhrul District, Hundung North and Mova limestones.

**Geological horizon**: Late Cretaceous (Campanian-Maastrichtian).

**Genus** *Hedbergella* Brönniman & Brown


23. *Hedbergella holmdelensis* Olsson

**Diagnosis**: Umbilical side: Primary aperture extrumbilical-umbilical, arcuate, bordered by a thin lip; sutures radial, depressed; 5-6 chambers, globular to trapezoidal, with a smooth and finely perforate surface; umbilicus one-eighth of the maximum diameter. Spiral side: Outline lobate; sutures depressed, curved on the early whors, radial and straight on the last whorl, joining the spiral suture almost at right angles; chambers moderately inflated, elongated in the direction of coiling; chambers slowly increasing in size in the early whors, rapidly increasing in the last whorl. Lateral view: Trochospire very low to flat; profile slightly asymmetrical with umbilical side little more convex; chamber periphery oval in the first chambers, rounded in the last ones; primary aperture partially straddling the periphery. Size: 0.2-0.3 mm.

**Locality**: Manipur, Ukhrul District, Hundung limestone.

**Geological horizon**: Santonian-Maastrichtian, possibly crossing Cretaceous-Paleocene boundary.

24. *Hedbergella flandrini* Porthault

**Diagnosis**: Umbilical side: Primary aperture extrumbilical-umbilical extending to the periphery, lip well developed; sutures generally radial and depressed; 5-6 chambers, spatulate in shape except the first of the last whorl, which is globular; surface smooth; umbilicus about one-fifth of the diameter of the test. Spiral side: Equatorial periphery very lobulate; sutures radial and depressed; chambers spatulate in shape, increasing very rapidly in size as added. Lateral view: Compressed, slightly biconvex, almost symmetrical, chamber outline ogival. Size: 0.4-0.5 mm.

**Locality**: Manipur, Ukhrul District, Kangkhui Section.

**Geological horizon**: Late Cretaceous (Maastrichtian).

**Genus** *Abathomphalus* Bolli, Loeblich & Tappan


25. *Abathomphalus intermedius* (Bolli)

**Diagnosis**: Umbilical side: Primary aperture extrumbilical-umbilical; sutures radial, depressed; 4-6 chambers, trapezoidal, with a convex surface ornamented with rugosities; umbilicus about one-fourth of the maximum diameter; umbilical system composed of portici which are coalescent to a
variable extent. Spiral side: Outline slightly lobate; sutures curved, raised at first and later ones depressed, joining the spiral suture at right angles; chambers petaloid, surface slightly inflated to convex, ornamented with elongated rugosities.

Lateral view: Trochospire low to moderately high, profile generally biconvex, sometimes asymmetrical, with a convex spiral side and a slightly convex, flat or concave umbilical side; two keels, parallel, composed of radially arranged rugosities, keel band tilted towards the umbilicus.

Size: 0.3–0.6 mm.

Locality: Manipur, Ukhrul District, Mova limestones.

Geological horizon: Late Cretaceous (Maastrichtian).

26. Abathomphalus mayaroensis (Bolli)


Diagnosis: Umbilical side: Primary aperture extraumbilical-umbilical; sutures radial to slightly curved or sinuous, depressed; 4½ 6 chambers, often 5, trapezoidal, with a flat surface, ornamented with rugosities arranged in a meridional pattern; umbilical system composed of portici which merge to a variable extent; diameter of umbilicus difficult to assess. Spiral side: Outline lobate; sutures curved and raised, lined by obliquely arranged rugosities, joining the spiral sutures at right angles; first chambers of the last whorl crescentic type, last ones more petaloid, ornamented with pustules or elongated rugosities; chambers slowly increasing in size as added.

Lateral view: Trochospire low; profile almost symmetrical; chambers periphery rounded, occasionally lined with two very faint rows of pustules. Size: 0.4–0.5 mm.

Locality: Manipur, Ukhrul District, Ukhrul limestones, Kangkhui, Hundung.

Geological horizon: Upper part of Coniacian to upper part of Maastrichtian, possibly crossing Cretaceous – Paleocene boundary.

Genus Archaeoglobigerina Pessagno


27. Archaeoglobigerina blowi Pessagno


Diagnosis: Umbilical side: Primary aperture umbilical; sutures radial, depressed; 4-5 chambers, globular, with a rugose surface; umbilicus one-fourth to one-third of maximum diameter; umbilical system composed of tegilla. Spiral side: Outline lobate; sutures radial, depressed; chambers globular, with a rugose surface, pustules and rare costellae never arranged in a meridional pattern; chambers slowly increasing in size in the first whorls, increasing very rapidly in the last one. Lateral view: Trochospire low to flat; profile almost symmetrical; chambers periphery rounded, occasionally lined with two very faint rows of pustules. Size: 0.4–0.5 mm.

Locality: Manipur, Ukhrul District, Ukhrul limestones.

Geological horizon: Upper part of Coniacian to upper part of Maastrichtian.

Genus Rugoglobigerina Brönnimann


28. Rugoglobigerina hexacamerata Brönnimann


Diagnosis: Umbilical side: Primary aperture umbilical; sutures radial and depressed; typically 6 chambers, globular, with a surface covered by rugosities and costellae; umbilicus one-third to half of the maximum diameter; umbilical system composed of tegilla with both proximal and distal infralaminal accessory apertures. Spiral side: Outline lobate; sutures radial and depressed; chambers globular, with a surface covered by rugosities and costellae; chambers increasing slowly in size as added. Lateral view: Trochospire
low to flat; profile slightly biconvex, almost symmetrical with spiral side more convex; chamber periphery rounded, sometimes with two rows of rugosities separated by a variably thick imperforate peripheral band on the first chamber of the last whorl. Size: 0.3–0.4 mm.

**Locality**: Manipur, Ukhrul District, Ukhrul limestone, Kangkhui, Hundung.

**Geological horizon**: Late Cretaceous (Maastrichtian).


**Diagnosis**: Primary aperture umbilical; sutures radial and depressed; 3–3½ chambers, exceptionally 4, chambers globular with a surface covered by thick rugosities and costellae; umbilicus generally less than one-fourth of the maximum diameter; umbilical system composed of tegilla with both proximal and infralaminar accessory apertures. Spiral side: Outline lobate; sutures radial and depressed; chambers globular, with a surface covered by thick rugosities and costellae arranged in meridional pattern; chambers increasing very rapidly in size as added, with prominent last chamber. Lateral view: Trochospire low to flat; profile biconvex, slightly asymmetrical with spiral side more convex; chamber periphery rounded, sometimes with two rows of rugosities. Size: 0.3–0.4 mm.

**Locality**: Manipur, Ukhrul District, Ukhrul limestone, Kangkhui, Hundung.

**Geological horizon**: Late Cretaceous (Maastrichtian).


Diagnosis: Umbilical side: Primary aperture umbilical; sutures radial and depressed; 4–7 chambers, rarely 8, trapezoidal, with somewhat hemispherical surface, covered with thick pustules and rarely rugosities; adumbilical ridges absent; umbilicus about one-third of maximum diameter; umbilical system composed of trumpet-shaped portici with their distal edges merging inside the umbilicus, tegilla sometimes present in the end of the last whorl. Spiral side: Outline slightly lobate; sutures curved, commonly raised, but sometimes slightly depressed, marked by sutural ridges, joining the spiral side at acute to right angles; chambers petaloid to crescentic with a flat surface, often provided with a central bulge; chambers increasing rapidly in size as added. Lateral side: Trochospire very low; profile strongly asymmetrical with a flat to slightly concave, rarely convex spiral side and a convex umbilical side; one keel on all chambers of the last whorl. Size: 0.3–0.6 mm.

**Locality**: Manipur, Ukhrul District, Kangkhui, Hundung South and Mova sections.

**Geological horizon**: Late Cretaceous (Maastrichtian).


Diagnosis: Umbilical side: Primary aperture umbilical; sutures straight, radial to oblique, depressed; 5–7 chambers, exceptionally 8, subtrapezoidal, very pustulose surface; adumbilical ridges virtually absent, but sometimes an imperforate adumbilical margin; umbilicus one-third to half of the maximum diameter; umbilical system composed of trumpet-shaped portici merging inside the umbilicus with their distal edges. Spiral side: Outline slightly lobate to subcircular; sutures curved to straight, raised, joining the spiral sutures at acute angles; Chambers petaloid, with a smooth, flat to slightly convex surface; chambers increasing slowly in
size as added. Lateral view: Trochospire very low; profile strongly asymmetrical, with a flat to very slightly convex spiral side and a convex umbilical side; two keels about equally developed, separated by a narrow imperforate peripheral band.

Size: 0.4–0.5 mm.

Locality: Manipur, Ukhrul District, Mova limestone.

Geological horizon: Late Cretaceous (Maastrichtian).

Genus *Globotruncanella* Reiss


32. *Globotruncanella havanensis* (Woorwijk)


Diagnosis: Umbilical side: Primary aperture extraumbilical-umbilical; sutures radial, depressed; 4 ½ to 5 chambers, triangular to trapezoidal, subglobular, with a surface bearing pustules and sometimes rugosities; umbilicus less than one-fourth of the maximum diameter; umbilical system composed of partly coalescing portici. Spiral side: Outline strongly lobate; sutures radial, depressed; chambers petaloid, with a surface bearing pustules, except on the last chambers; chambers increasing very rapidly in size as added. Lateral view: Trochospire moderately to very high; profile biconvex to concave-convex, slightly to strongly asymmetrical, with spiral side more convex than umbilical side, sometimes a narrow imperforate peripheral band on the last whorl. Size: 0.40–0.45 mm.

Locality: Manipur, Ukhrul District, Ukhrul limestone, Kangkhui, Hundung.

Geological horizon: Late Cretaceous (Maastrichtian).

33. *Globotruncanella petaloidea* (Gandolfi)


Diagnosis: Umbilical side: Primary aperture extraumbilical-umbilical, sometimes almost peripheral; sutures radial, depressed; 4 chambers, trapezoidal, subglobular, with a surface bearing scattered pustules; umbilicus less than one-fourth of the maximum diameter; umbilical system composed of partially coalescing portici. Spiral side: Outline strongly lobate; sutures radial, depressed; chambers petaloid, with a surface bearing pustules, except on the last chambers; chambers increasing very rapidly in size as added. Lateral view: Trochospire moderately to very high; profile biconvex to concave-convex, slightly to strongly asymmetrical, with spiral side more convex than umbilical side, sometimes a narrow imperforate peripheral band on the last whorl. Size: 0.3–0.4 mm.

Locality: Manipur, Ukhrul District, Ukhrul limestone, Kangkhui, Hundung.

Geological horizon: Late Cretaceous (Maastrichtian).

34. *Globotruncanella pschadae* (Keller)


Diagnosis: Umbilical side: Primary aperture extraumbilical-umbilical; sutures radial, depressed; 4 ½ to 5 chambers, triangular to trapezoidal, with a surface bearing scattered pustules and rugosities; umbilicus less than one-fourth of the maximum diameter; umbilical system composed of partly or entirely coalescing portici. Spiral side: Outline lobate; sutures radial, curved and oblique towards the end of the last whorl, depressed; chambers petaloid, with a surface bearing pustules and rugosities; chambers rapidly increasing in size as added. Lateral view: Trochospire low to moderately high; profile biconvex, slightly asymmetrical, with spiral side more convex than umbilical side; chamber periphery angular, marked
by a keel composed of a row of meridional pustules. Size : 0.35–0.45 mm.

**Locality** : Manipur, Ukhrul District, Ukhrul limestone, Kangkhui, Hundung.

**Geological horizon** : Late Cretaceous (Maastrichtian).

Genus *Dicarinella* Porthault


35. *Dicarinella asymetrica* (Sigal, 1952)

**Diagnosis** : Umbilical side : Primary aperture umbilical to slightly extraumbilical, bordered by well developed portici; sutures radial and depressed; 5-6 strongly inflated chambers with a rugose surface; umbilicus at least one-third of maximum diameter. Spiral side : Equatorial periphery lobulate; sutures oblique, meeting the inner whorl perpendicularly, slightly thickened to gently beaded; chambers petaloid, slowly increasing in size as added. Lateral view : Clearly asymmetrical, plano-convex to concavo-convex, low trochospire; two close keels separated by a thin imperforate peripheral band; periumbilical ridge truncates clearly the profile which becomes subrectangular. Size : 0.6–0.7 mm.

**Locality** : Manipur, Ukhrul District, Kangkhui Section.

**Geological horizon** : Late Cretaceous (Santonian-Campanian).

Genus *Marginotruncana* Hofker


36. *Marginotruncana coronata* (Bolli)


**Diagnosis** : Umbilical side : Primary aperture extraumbilical-umbilical; umbilicus surrounded or covered by portici which may coalesce to form tegilla; sutures sigmoid, curved to form U-Shape; 6-8 reniform chambers with a flat to concave surface; umbilicus about one-third of the maximum diameter. Spiral side : Equatorial periphery somewhat lobulate; sutures raised, curved, joining the preceding spiral suture almost at right angles; chambers typically petaloid with a flat to concave surface; chambers slowly and regularly increasing in size as added. Lateral view : Low trochospire, profile almost symmetrical; two keels separated by a narrow imperforate peripheral band. Size : 0.6–0.8 mm.

**Locality** : Manipur, Ukhrul District, Ukhrul limestone, Kangkhui, Hundung.

**Geological horizon** : Late Cretaceous.

37. *Marginotruncana marginata* (Reuss)


**Diagnosis** : Umbilical side : Primary aperture extraumbilical-umbilical, portici more or less well developed; sutures depressed appearing radial, but marked by largely U-shaped sigmoidal rims; 5-8 globular chambers with surface smooth or very slightly rugose; umbilicus less than one-fourth to more than one-third of the maximum diameter. Spiral side : Equatorial periphery lobulate; sutures depressed to slightly raised, oblique; chambers petaloid, globular, irregularly increasing in size as added. Lateral view : Biconvex, low trochospire; two slightly developed keels separated by a narrow peripheral band which sometimes often does not truncate globular profile of the chamber. Size : 0.4–0.8 mm.

**Locality** : Manipur, Ukhrul District, Ukhrul limestone, Kangkhui, Hundung.

**Geological horizon** : Late Cretaceous.

38. *Marginotruncana pseudolinneiana* Pessagno


**Diagnosis** : Umbilical side : Primary aperture extraumbilical-umbilical; umbilicus surrounded or
covered by portici leaving accessory infralaminal apertures between them; sutures sigmoid, raised; 5-7 reniform chambers, sometimes 8; umbilicus rather wide, one-fourth to one-third of the largest diameter. Spiral side: Equatorial periphery slightly lobulate; sutures raised, curved joining the preceding spiral sutures at a rather low angle; chambers somewhat elongate, surface flat but occasionally little concave; chambers increasing rather irregularly in size as added. Lateral view: Low trochospire, with a characteristically rectangular outline; two keels separated by a wide, imperforate peripheral band. Size: 0.5–0.7 mm.

**Locality**: Manipur, Ukhrul District, Ukhrul limestone, Kangkhui, Hundung.

**Geological horizon**: Late Cretaceous.


**Diagnosis**: Umbilical side: Primary aperture extraumbilical-umbilical; umbilical surrounded by portici; sutures sigmoid and V-shaped, raised, sutural ridges continuing around the umbilical depression; 5-6 imbricated chambers, strongly elongated in the direction of coiling; umbilicus forming about one-third of the maximum diameter. Spiral side: Equatorial periphery subcircular; marginal keel of each chamber straight or slightly curved forming an angle with its sutural continuation; sutures forming a rather low angle with the preceding spiral suture; chambers trapezoidal and with an undulated surface; chambers slowly increasing in size as added. Lateral view: Moderately high trochospire; biconvex, slightly asymmetrical, with undulated chamber surfaces; single keel formed by a double row of alternating pustules, becoming very closely spaced in the later part of the test. Size: 0.6–0.8 mm.

**Locality**: Manipur, Ukhrul District, Ukhrul limestone, Kangkhui, Hundung.

**Geological horizon**: Late Cretaceous.

30. *Planoglobulina acervulinoides* (Egger, 1899)

**Diagnosis**: Early stage coiled in microspheric form, later biserial, and finally with chamber proliferation in plane of biseriality, resulting in flabelliform test; exterior commonly ornamented with longitudinal striae; aperture multiple, on final series of chambers.

**Locality**: Manipur, Ukhrul District, Ukhrul limestone, Kangkhui, Hundung.

**Geological horizon**: Cretaceous.

Genus *Pseudoguembelina* Brönimann & Brown

42. *Pseudoguembelina excolata*  
(Cushman 1926)

**Diagnosis:** Test biserial in adult, rarely with microspheric coil in early stage; chambers subglobular; surface generally with longitudinal striae or costae; aperture an interiomarginal arch, extending laterally, secondary sutural apertures may occur near zigzag suture between pairs of chambers.

**Locality:** Manipur, Ukhrul District, Ukhrul limestone, Kangkhui, Hundung.

**Geological horizon:** Late Cretaceous (Maastrichtian).

43. *Pseudoguembelina* sp.

**Diagnosis:** Test biserial in adult, rarely with microspheric coil in early stage; chambers subglobular; surface with longitudinal striae or costae; aperture an interiomarginal arch, extending laterally, secondary sutural apertures often occur near zigzag suture between pairs of chambers.

**Locality:** Manipur, Ukhrul District, Kangkhui, Hundung and Mova limestones.

**Geological horizon:** Upper Cretaceous.

**Genus** *Pseudotextularia* Rzechak  

44. *Pseudotextularia elegans* Rzechak  

**Diagnosis:** This species has a biserial test with the chambers increasing gradually in size as added, rapidly becoming greater in thickness than in height. Surface covered with distinct continuous costae with small pores and sutures slightly depressed. The aperture is low, wide arc bordering the crest of the second last chamber, chambers inflated.

**Locality:** Manipur, Ukhrul District, Ukhrul limestone, Kangkhui, Hundung.

**Geological horizon:** Late Cretaceous (Maastrichtian).

45. *Pseudotextularia intermedia* De Klasz  

**Diagnosis:** This species differs from other *Pseudotextularia* in having a set of multiserial chamberlets present as a terminal stage.

**Locality:** Manipur, Ukhrul District, Ukhrul limestone, Kangkhui, Hundung.

**Geological horizon:** Late Cretaceous (Maastrichtian).

46. *Pseudotextularia nuttali* (Voorwijk, 1937)

**Diagnosis:** This species differs from other *Pseudotextularia* in having the last three chambers which increase rapidly in size as added.

**Locality:** Manipur, Ukhrul District, Ukhrul limestone, Kangkhui, Hundung.

**Geological horizon:** Late Cretaceous (Maastrichtian).

**Genus** *Racemiguembelina* Montanaro Gallitelli  

47. *Racemiguembelina fructicosa* (Egger)  


**Diagnosis:** Test subconical, early stage often planispiral in microspheric forms, later biserial with globular chambers increasing regularly in size and with proliferation at crown perpendicular to previous axis of growth; surface generally ornamented by longitudinal striae or costae; aperture on interiomarginal arch on one or many of terminal chambers.

**Locality:** Manipur, Ukhrul District, Mova limestones.

**Geological horizon:** Upper Cretaceous.

**Genus** *Gublerina* Kikoine  
48. **Gublerina** sp.

*Diagnosis*: Test compressed, flabelliform, increasing rapidly in breadth: early stage planispiral, later biserial, with two series of chambers diverging widely, leaving broad nonseptate or incompletely divided central region; final stage generally with chamber proliferation; sutures commonly thickened, nodose and elevated; wall calcareous, perforate, radial in structure, bilamellar, with double septa and septal peristomial canal; aperture arched.

*Locality*: Manipur, Ukhrul District, Kangkhui, Hundung and Mova limestones.

*Geological horizon*: Upper Cretaceous.

**Genus Heterohelix** Ehrenberg


49. **Heterohelix** sp.

*Diagnosis*: Early stage biserial, later develop chamber proliferation; aperture simple and interiomarginal.

*Locality*: Manipur, Ukhrul District, Kangkhui, Hundung and Mova limestones.

*Geological horizon*: Late Cretaceous.

**Family NUMMULITIDAE**

**Genus Nummulites** Lamarck


50. **Nummulites** sp.

*Diagnosis*: Test involute to evolute; median chambers numerous, simple; without distinct lateral chambers, spiral sheet with or without vacuoles

*Locality*: Manipur, Ukhrul District, Paoyi.

*Geological horizon*: Paleocene to Recent.

**Family DISCOCYCLINIDAE**

**Genus Discocyclina** Gümbel


51. **Discocyclina** sp.

*Diagnosis*: Test circular in plan, discoidal or lenticular, with or without radiating ribs; annular stolon proximally situated; radial chamber walls of equatorial chambers in adjacent annuli usually alternating in position.

*Locality*: Manipur, Ukhrul District, Paoyi.

*Geological horizon*: Paleocene to Recent.

**Family BOLIVINITIDAE**

**Genus Bolivina** d' Orbigny


52. **Bolivina** sp.

*Diagnosis*: Test elongate, rather compressed; chambers broad, low, biserially arranged throughout, basal margins of chambers with retral process or backwardly directed chamber overlaps; wall calcareous perforate, radial in structure, smooth striate, or costate with marginal keel; aperture a narrow, elongate loop up chamber face, one margin ending blindly or bent upward as collar, opposite border attached to one side of doubly folded internal tooth plate (U-shaped in section), attached half of tooth plate projecting through aperture at one extremity and bisecting it, narrowing rapidly inward, tooth plate eventually trough-shaped structure with concave portion alternately turning from one side to opposite in successive chambers.

*Locality*: Manipur, Ukhrul District, Paoyi.

*Geological horizon*: Cretaceous to Recent.

**Family TEXTULARIIDAE**

**Genus Vulvulina** d'Orbigny


53. **Vulvulina** sp.

*Diagnosis*: Test free, flaring or elongate, lozenge-shaped or rhomboidal in section, lateral margins acutely angled; chambers increasing
rapidly in size, early portion coiled at least in microspheric generation, later chambers biserially arranged, broad and low, somewhat arched over early coil, recurved laterally, final chambers uniserial and some show biserial development; sutures distinct, commonly thickened and elevated in early portion, later moderately depressed; wall agglutinated, but very finely grained and smoothly finished, of calcareous, arenaceous or other mineral grains; aperture in early stage broad, low, interiomarginal arch, in uniserial stage becoming elongate, narrow terminal slit.

**Locality**: Manipur, Ukhrul District, Paoyi.

**Geological horizon**: Upper Cretaceous to Recent.

Genus *Textularia* Defrance in De Blainville


54. *Textularia* sp.

**Diagnosis**: Test free, elongate, biserial, generally more or less compressed in plane of biseriality or rarely oval to circular in cross section; chambers numerous, generally closely appressed; wall agglutinated, simple; aperture single low arch at base of last chamber.

**Locality**: Manipur, Ukhrul District, Paoyi, Sangshak, West of Yentem.

**Geological horizon**: Pennsylvanian to Recent.

Family **GLOBOROTALIIDAE**

Genus *Globorotalia* Cushman


55. *Globorotalia* sp.

**Diagnosis**: Test free, trochospiral, periphery carinate, chambers rhomboid or angular-conical, sutures generally thickened and elevated; wall calcareous, finely perforate, but with nonporous keel or peripheral band, surface smooth or hispid; aperture interiomarginal, an extraumbilical-umbilical arch bordered by lip, varying from narrow rim to broad spatulate.

**Locality**: Manipur, Ukhrul District, West of Mapum, Near Kamjong, SE of Shangshak, Yarshokha, Paoyi.

**Geological horizon**: Palaeocene to Recent.

Family **BULIMINIDAE**

Genus *Bulimina* d'Orbigny


56. *Bulimina* sp.

**Diagnosis**: Test triserial in early stage, may tend to reduce to uniserial in later portion; wall calcareous, finely to coarsely perforate, radial in structure; aperture extending up from base of apertural face, with free border that may have elevated rim and fixed border attached to internal folded tooth plate, which with fixed shank is attached to internal chamber wall below aperture, with free shank that may be dentate or smooth, flaring or enrolled and subtubular.

**Locality**: Manipur, Ukhrul District, Ukhrul limestone, Yarshoka, West of Gamnom.

**Geological horizon**: Paleocene to Recent.

Family **NONIONIDAE**

Genus *Nonion* de Montfort


57. *Nonion* sp.

**Diagnosis**: Test free, planispiral and involute, slightly compressed, biumbonate, periphery rounded, peripheral outline lobulate; chambers numerous, increasing gradually in size as added; sutures distinct, depressed, radial, slightly curved; wall calcareous, finely perforate, granular in structure, surface smooth, umbonal region filled with secondarily deposited calcite, either as granules or solid boss; aperture an arched, equatorial, interiomarginal slit; filled umbilicus, thinner and more finely perforate and monolamellar walls.
Locality: Manipur, Ukhrul District, South of Chingai, West of Gamnom, nr. Sanka Lok, North of Shokpau, Ukhrul limestone.

Geological horizon: Paleocene to Recent.

Family NODOSARIIDAE

58. Dentalina sp.

Diagnosis: Test elongate, arcuate, uniserial; sutures commonly oblique; aperture radiate, terminal, nearly central or eccentric; asymmetrical.

Locality: Manipur, Ukhrul District, South of Leiston.

Geological horizon: Permian to Recent.


59. Lagena sp.

Diagnosis: Test unilocular, rarely two or more chambers; surface variously ornamented; aperture on elongate neck, with phialine lip, not radiate.

Locality: Manipur, Ukhrul District, Ukhrul, Shangshak, Phungyr-Lambe-Singkap Section, South of Leiston, nr. Molvailup Vill., nr. Sanka Lok, nr. Shokpau, North of Singkap, nr. Samkhong track.

Geological horizon: Jurassic to Recent.

Family CIBICIDIDAE
Genus Cibicides de Montfort 1808. Cibicides de Montfort, Conchylologie systematique et classification methodique des coquilles, 1 : 122.

60. Cibicides sp.

Diagnosis: Test attached, plano-convex, trochospiral, spiral side flat to excavated, evolute, umbilical side strongly convex, involute, apertural face sharply angled, distinct from umbilical side, periphery angular, with nonporous keel; wall calcareous, radial in microstructure, bilamellar, coarsely perforate on spiral side, large pores of earlier chambers generally closed by lamellar thickening of wall, finely perforate on umbilical side, apertural face nonporous, aperture a low interiomarginal opening with narrow lip, extend along spiral suture on spiral side.

Locality: Manipur, Ukhrul District, Ukhrul, South of Chingai, North of Singkap.

Geological horizon: Cretaceous to Recent.

Family HANTKENINIDAE

61. Globanolomalina sp.

Diagnosis: Test free, planispiral to slightly asymmetrical, biumbilicate, chambers inflated, sutures curved and depressed; wall calcareous, finely perforate, radially built, and bilamellar, surface smooth; aperture an equatorial arch, with narrow lip, sometimes lip touching previous whorl at its periphery so as to form two lateral apertural openings.


Geological horizon: Paleocene to Oligocene.


62. Hastigerina sp.

Diagnosis: Test free, early stage generally slightly trochospiral, adult planspiral, ranging from involute to loosely coiled, biumbilicate, periphery broadly rounded; chambers spherical to ovate; sutures deeply depressed, radial; wall finely to
coarsely perforate, radial in structure, surface smooth, hispid, or spinose; aperture interiomarginal, board, equatorial arch.

**Locality**: Manipur, Ukhrul District, Sangshak, and Phungyr-Lambui-Singkap section.

**Geological horizon**: Lower Miocene to Recent.

**Remarks**: Mishra (1991) recorded *Globigerinella* sp. from the olistostromal limestones of Ukhrul District; *Globigerinella* Cushman is a junior synonym of *Hastigerina* Thomson.

**Family PLEUROSTOMELLIDAE**

**Genus Nodosarella** Rzehak


63. *Nodosarella* sp.

**Diagnosis**: Test free, uniserial; chambers inflated; sutures horizontal and constricted; wall calcareous; very finely perforate; aperture terminal, slit-like or faintly arcuate, bordered on each side by faint lip, or slightly overlapping hood on one side.

**Locality**: Manipur, Ukhrul District, nr. Kamjong; nr. Huimine, South west of Marao.

**Geological horizon**: Paleocene to Recent.

**Family MILIOLIDAE**

**Genus Quinqueloculina** d' Orbigny,


64. *Quinqueloculina* sp.

**Diagnosis**: Test free, chambers one-half coil in length, with longitudinal planes of successive chambers added 120° apart, test rounded to triangular in section; sutures distinct, depressed; wall calcareous, imperforate, smooth or faintly striate; aperture complex, varying in shape from triradiate in young to cruciform in matured form, bordered by narrow lip, without distinct teeth.

**Locality**: Manipur, Ukhrul District, Shangshak.

**Geological horizon**: Pliocene to Recent.

**Family ALVEOLINIDAE**

**Genus Borelis** de Montfort


65. *Borelis* sp.

**Diagnosis**: Test minute, spheroidal to fusiform, with septula in continuous arrangement; in some tests, chamberlets of some chambers alternately large and small, with latter displaced towards exterior, septula therefore become y-shape; without post-septal passage, first whorls irregularly coiled.

**Locality**: Manipur, Ukhrul District, nr. Litan.

**Geological horizon**: Eocene to Recent.

**Remarks**: Mishra (1990) recorded *Alveolina* sp. from Upper Disang Formation in Ukhrul District; *Alveolina* is a junior synonym of *Borelis*.

**Family ROTALIIDAE**

**Genus Rotalia** Lamarck


66. *Rotalia trochidiformis* Lamarck

**Diagnosis**: Test free, trochospiral, lenticular to plano-convex, about 1-4 mm. in diameter, all whorls visible from spiral side multilocular and single, direction of coiling random; chambers simple, 8-17 whorl; septa primarily double, formed by upward bending of chamber floor; wall calcareous, coarsely perforate, of radiating fibrous calcite; spiral side smooth, umbilical side with plug slit by anastomosing fissures into numerous tubercles and pillars that crowd central portion of test, pillars not continuous from one whorl to next but limited to each whorl, although they may fuse laterally to close fissures and form
solid central mass, with umbilical canal beneath cortical chamber layer receiving tributary canals from umbilical slit-like apertures at inner side of chambers.

**Locality**: Manipur: Ukhrul District, North of Yangphau, Shangshak, Phungyr-Lambui-Singkap Section.

**Geological horizon**: Mid Eocene.

**Family** ASTRORHIZIDAE

**Genus** Bathysiphon M. Sars 1872.


67. **Bathysiphon** sp.

**Diagnosis**: Test free, large, to about 50mm. in length, elongate, narrow, more or less flexible tube, which may have annular constrictions; wall agglutinated, commonly of siliceous sponge spicules and fine sand or other mineral matter in calcareous cement; aperture at one open end; multinucleate protoplasm pseudopodia protruding only from one end of test where growth occurs, opposite end may be secondarily closed by secreted disc and contain intensely dark matters consisting of waste rejected by protoplasm and packed into arboreal end of test, additional disc secreted periodically to seal of such debris, filled sections of test eventually becoming detached

**Locality**: Manipur, Ukhrul District, Shangshak, and Phungyr-Lambui-Singkap Section.

**Geological horizon**: Lower Cambrian to Recent.

**Family** LITUOLIDAE

**Genus** Haplophragmoides Cushman 1910.


68. **Haplophragmoides** sp.

**Diagnosis**: Test planispirally coiled, involute; wall agglutinated, aperture an equatorial interiomarginal slit; epidermal layer imperforate.

**Locality**: Manipur, Ukhrul District, nr. 26 km. Post (Ukhrul- Jessami Road).

**Geological horizon**: Carboniferous to Recent.

**Class** ACTINOPODA

**Subclass** RADIALARIA

**Order** PORULOSIDA

**Suborder** SPUMELLINA

**Family** LIOSPHAERIDAE

**Genus** Cenosphaera Ehrenberg

69. **Cenosphaera** sp.

**Diagnosis**: Spherical latticed or spongy shells; without spines on shell surface; pores simple.

**Locality**: Manipur, Ukhrul District, Paoyi, Hundung, Lambui, Nangshong Khong Bridge, Gammom, West of Mapum, South of Leiston, nr. Sanka Lok.

**Geological horizon**: Cambrian to Recent.

**Family** ELLIPSIDIIDAE

**Genus** Ellipsidium Haeckel 1887.


70. **Ellipsidium** sp.

**Diagnosis**: Elliptical lattice shell; commonly articulated by annular transverse strictures; numerous radial spines; without polar tubules.

**Locality**: Manipur, Ukhrul District, North of Shingla.

**Geological horizon**: Devonian to Recent.

**Genus** Lithapium Haeckel

71. *Lithapium* sp.

*Diagnosis*: Elliptical or pear-shaped shell, single spine on one pole.

*Locality*: Manipur, Ukhrul District, Gamnom area.

*Geological horizon*: Cambrian to Recent.

**Family DRUPPULIDAE**

**Genus Druppula** Haeckel


72. *Druppula* sp.

*Diagnosis*: Two elliptical lattice shells; simple double shell without polar tubules or spines.

*Locality*: Manipur, Ukhrul District, East of Litan.

*Geological horizon*: Paleocene to Recent.

**Family SPONGURIDAE**

**Genus Spongoprurnum** Haeckel


73. *Spongoprurnum* sp.

*Diagnosis*: Spongy elliptical shell without equatorial strictures; solid shell without lattice mantle; two opposite polar spines.

*Locality*: Manipur, Ukhrul District, Hundung, Nangshong khong Bridge, west of Mapum, South of Leiston, nr. Maku Village.

*Geological horizon*: Ordovician to Recent.

**Genus Spongurus** Haeckel, 1862

74. *Spongurus* sp.

*Diagnosis*: Spongy cylindrical shell without equatorial strictures; solid spongy shell without polar spines or lattice-mantle.


*Geological horizon*: Devonian to Recent.

**Family CYPHANTIDAE**

**Genus Ommatospyris** Ehrenberg, 1860

75. *Ommatospyris* sp.

*Diagnosis*: Elliptical shell with two equatorial strictures; double spherical or lenticular medullary shell.


*Geological horizon*: Eocene to Recent.

**Family CENODISCIDAE**

**Genus Cenodiscus** Haeckel


76. *Cenodiscus* sp.

*Diagnosis*: External lenticular latticed cortical shell; without medullary shell, chambered arms or equatorial girdle; margin without girdle or spines.

*Locality*: Manipur, Ukhrul District, Paoyi, Yarshoka, Hundung, Lambui, Shangshak, South of Chingai, Gamnom, Pusing, West of Mapum, Yarshoka, North of Shingla.

*Geological horizon*: Cambrian to Recent.

**Family PHACODISCIDAE**

**Genus Sethodiscinus** Haeckel

77. *Sethodiscinus* sp.

*Diagnosis*: Single lenticular latticed cortical shell, simple medullary shell; neither girdle nor spines.

*Locality*: Manipur, Ukhrul District, Lambui.

*Geological horizon*: Eocene to Recent.

Genus *Periphaena* Ehrenberg, 1873

78. *Periphaena* sp.

*Diagnosis*: Single lenticular latticed cortical shell; simple medullary shell; without chambered equatorial girdles; margin with hyaline girdle.

*Locality*: Manipur, Ukhrul District, Lambui, nr. Awa khang.

*Geological horizon*: Cretaceous.

Genus *Triactis* Haeckel, 1882

79. *Triactis* sp.

*Diagnosis*: Single lenticular latticed cortical shell; without chambered equatorial girdles; three marginal spines; simple medullary shell.

*Locality*: Manipur, Ukhrul District, East of Marao, South East of Shangshak, East of Sakok, Phungyr-Lambui-Singkap Section

*Geological horizon*: Jurassic to Recent.

Family *Spongodiscidae*

Genus *Spongodiscus* Ehrenberg, 1845

80. *Spongodiscus* sp.

*Diagnosis*: Simple central chamber surrounded by spongy framework, without porous sieve plate; circular disc without equatorial girdle.

*Locality*: Manipur, Ukhrul District, Gamnom; Chandel District, Moreh.

*Geological horizon*: Cambrian to Recent.

Genus *Spongophacus* Haeckel, 1882

81. *Spongophacus* sp.

*Diagnosis*: Simple central chamber surrounded by spongy framework; spongy disc with solid or porous equatorial girdle.

*Locality*: Manipur, Ukhrul District, nr. Kamjong, northern slope of Peak 1613; Chandel District, Sugnu.

*Geological horizon*: Triassic to Recent.

Genus *Dictyocoryne* Ehrenberg, 1860

82. *Dictyocoryne* sp.

*Diagnosis*: Simple central chamber surrounded by spongy framework; spongy disc with three spongy radial arms; with patagium.

*Locality*: Manipur, Ukhrul District, East of Litan.

*Geological horizon*: Jurassic to Recent.

*Order* *Oculosida*

*Suborder* *Nassellina*

*Family* *Archiocorythidae*

Genus *Archiochorys* Haeckel, 1882

83. *Archiochorys* sp.

*Diagnosis*: Shell lacking joints or strictures; basal shell mouth open; ovate or urn-shaped shell with simple lattice; constricted mouth; with apical hom.

*Locality*: Manipur, Ukhrul District, Gamnom, Chandel District, Moreh.

*Geological horizon*: Jurassic to Recent.
**Locality**: Manipur, Ukhrul District, Chingai, Gamnom.

**Geological horizon**: Cambrian to Recent.

**Genus** *Archicapsa* Haeckel, 1882

86. *Archicapsa* sp.

**Diagnosis**: Shell lacking joints or strictures; basal shell mouth fenestrated; without apical horn.

**Locality**: Manipur, Ukhrul District, Gamnom.

**Geological horizon**: Permian to Recent.

**Family** LOPHOPHAENIDAE

**Genus** *Sethocyrtis* Haeckel


87. *Sethocyrtis* sp.

**Diagnosis**: Shell divided by transverse stricture into cephalis and thorax; without radial apophyses; thorax ovate; constricted mouth without collar; single apical horn.

**Locality**: Manipur, Ukhrul District, North of Shingla, Chandel District, Moreh.

**Geological horizon**: Jurassic to Recent.

**Genus** *Lithocampana* Clarke & Campbell


88. *Lithocampana* sp.

**Diagnosis**: Shell divided by transverse stricture into cephalis and thorax; without radial apophyses; bell-shaped, without apical horn or lateral appendages.

**Locality**: Manipur, Ukhrul District, Phungyr-Lambui-Siangkap Section, North of Nampisha, North of Shokpau, East of Marao, South of Hundung Goda; Chandel District, Sugnu

**Geological horizon**: Eocene.

**Genus** *Adelocyrtis* Pantanelli, 1880

89. *Adelocyrtis* sp.

**Diagnosis**: Shell divided by transverse stricture into cephalis and thorax; without radial apophyses; basal shell mouth fenestrated; greatly inflated thorax; single apical horn.

**Locality**: Manipur, Ukhrul District, Hundung, Nangshong Khong Bridge.

**Geological horizon**: Cambrian to Recent.

**Genus** *Cryptocapsa* Haeckel, 1882

90. *Cryptocapsa* sp.

**Diagnosis**: Shell divided by transverse stricture into cephalis and thorax; without radial apophyses; basal shell mouth fenestrated; cephalis hidden within thorax; without apical horn.

**Locality**: Manipur, Ukhrul District, Yarshoka, Hundung, Shangshak, Nangshong Khong Bridge, West of Gamnom, Phungyr-Lambui-Singkap Section, East of Mapum, nr. Movailup Village.

**Geological horizon**: Jurassic to Recent.

**Genus** *Dicanthocapsa* Haeckel, 1882

91. *Dicanthocapsa* sp.

**Diagnosis**: Shell divided by transverse stricture into cephalis and thorax; without radial apophyses; basal shell mouth fenestrated; cephalis with two horns.

**Locality**: Manipur, Ukhrul District, West of Mapum, South of Leiston, nr. Maku Village.

**Geological horizon**: Cretaceous.

**Family** THEOCORYTHIDAE

**Genus** *Theocyrtis* Haeckel


92. *Theocyrtis* sp.

**Diagnosis**: Shell divided by two transverse strictures into cephalis, thorax and abdomen;
without basal apophyses; cylindrical abdomen; thorax and abdomen nearly equal width; with single apical horn.

*Locality*: Manipur, Chandel District, Moreh.
*Geological horizon*: Cretaceous to Recent.

**Genus** *Theocapsa* Haeckel, 1882

93. *Theocapsa* sp.

*Diagnosis*: Shell divided by two transverse strictures into cephalis, thorax and abdomen, without basal apophyses; basal shell mouth fenestrated; without latticed septum between thorax and abdomen; with single apical horn.

*Locality*: Manipur, Ukhrul District, Shangshak, Phungyr-Lambui-Sengkap Section, East of Mapum.
*Geological horizon*: Devonian to Recent.

**Genus** *Tricolocapsa* Haeckel


94. *Tricolocapsa* sp.

*Diagnosis*: Shell divided by two transverse strictures into cephalis, thorax and abdomen, without basal apophyses; basal shell mouth fenestrated; without latticed septum between thorax and abdomen; without apical horn.

*Geological horizon*: Jurassic to Recent.

**Family** ARTOPHORMIDIDAE

**Genus** *Kassina* Chabakov, 1937

95. *Kassina* sp.

*Diagnosis*: Shell divided by at least three strictures into cephalis, thorax, abdomen and post-abdominal segments; basal shell mouth fenestrated; tower-shaped shell, with more than three chambers.

*Geological horizon*: Cretaceous.

**Family** STICHOCORYTHIDAE

**Genus** *Diplostrobus* Squinabol


96. *Diplostrobus* sp.

*Diagnosis*: Shell divided by at least three strictures into cephalis, thorax, abdomen and post-abdominal segments; with radial apophyses; basal shell mouth open; tubular post-abdomen with narrow mouth; five chambers from upper conical part of shell; with apical horn.

*Locality*: Manipur, Ukhrul District, nr. Awakhang Nala; Chandel District, Sugnu.
*Geological horizon*: Cretaceous.

**Genus** *Lithocampe* Ehrenberg, 1883

97. *Lithocampe* sp.

*Diagnosis*: Shell divided by at least three strictures into cephalis, thorax, abdomen and post-abdominal segments; with radial apophyses; basal shell mouth open; ovate or spindle-shaped shell; with constricted but not tubular mouth; cephalis without apical horn.

*Geological horizon*: Ordovician to Recent.

**Genus** *Lithomitra* Bütchli, 1882

98. *Lithomitra* sp.

*Diagnosis*: Shell divided by at least three strictures into cephalis, thorax, abdomen and post-
abdominal segments; with radial apophyses; basal shell mouth open; cylindrical shell; rounded cephalis without apical horn.

**Locality**: Manipur, Ukhrul District, Hundung, nr. Movailup Village, nr. Kamjong, nr. Huimine, Northern slope of Peak 1613, South East of Shangshak, Between Hundung and Lambui.

**Geological horizon**: Triassic to Recent.

Genus **Lithostrobus** Büttschli, 1882

99. **Lithostrobus** sp.

**Diagnosis**: Shell divided by at least three strictures into cephalis, thorax, abdomen and post-abdominal segments, with radial apophyses; basal shell mouth open; shell conical; with apical horn.

**Locality**: Manipur, Ukhrul District, Yarshoka, Hundung, Lambui, Shangshak, Nangshong Kongh Bridge, West of Mapum, nr. Awakhang Nala, East North-east of Sakok.

**Geological horizon**: Permian to Recent.

Genus **Stichocapsa** Haeckel, 1882

100. **Stichocapsa** sp.

**Diagnosis**: Shell divided by at least three strictures into cephalis, thorax, abdomen and post-abdominal segments; with radial apophyses; basal shell mouth fenestrated; last joint rounded but without basal spine or apical horn.

**Locality**: Manipur, Ukhrul District, Chingai, Gamnom.

**Geological horizon**: Devonian to Recent.

Family **GLYCOBOTRYIDIDAE**

Genus **Glycobotrys** Campbell, 1951

101. **Glycobotrys** sp.

**Diagnosis**: Shell formed of cephalis and thorax; cephalis lobulated and has tubules; thorax fenestrated.

**Locality**: Manipur, Ukhrul District, nr. Nampisha, North of Shokpau, East North East of Shangla, Shangshak, Phungyr-Lambui-Singkap Section.

**Geological horizon**: Eocene to Recent.

Family **PYLOBOTRYIDIDAE**

Genus **Pylobotrys** Haeckel, 1882

102. **Pylobotrys** sp.

**Diagnosis**: Shell formed of cephalis, thorax and abdomen; basal shell mouth fenestrated; cephalis lobulated and devoid of cephalic tubules.

**Locality**: Manipur, Ukhrul District, Hundung.

**Geological horizon**: Eocene to Recent.

Genus **Botryocampae** Haeckel, 1882

103. **Botryocampae** sp.

**Diagnosis**: Shell formed of cephalis, thorax and abdomen; basal shell mouth fenestrated; cephalis lobulated and has cephalic tubules.

**Locality**: Manipur, Ukhrul District, South of Leiston, Toward Movailup, nr. Kamjong, North of Yangphau, South of Hundung Goda, East of Litan, Phungyr-Lambui-Singkap Section.

**Geological horizon**: Eocene to Recent.

Phylum **COELENTERATA**

Subphylum **ANTHOZOA**

Class **ZOANTHARIA**

Order **SCLERACTINIA**

Family **MUSSIDAE**


104. **Circophyllia** sp.

**Diagnosis**: Solitary, turbinate or trochoid, fixed or free, colony formation by intratentacular budding; septothecate, costate; septa with one broad peripheral fan system and several smaller inner ones; columella well developed.

**Locality**: Manipur, Ukhrul District, South of Fumi.

**Geological horizon**: Eocene.
Family CARYOPHYLLIDAE
Genus *Oxysmilia* Duchassaing, 1870

105. *Oxysmilia* sp.

*Diagnosis*: Solitary, colonial; colony formation by extratentacular budding; turbinate to subcylindrical, fixed or free; Pali opposite third cycle in one crown; Septothecate, with strong costae; columella fused in solid elongate mass.

*Locality*: Manipur, Churachandpur District, nr. Churachandpur.

*Geological horizon*: Late Cretaceous to Recent.


106. *Trochocyathus* sp.

*Diagnosis*: Solitary, turbinate to ceratoid fixed or free; pali opposite all but last cycle in two crowns; columella fascicular, spongy or crispate.

*Locality*: Manipur, Chandel District, nr. Sugnu; Ukhrul District, nr. Litan.

*Geological horizon*: Middle Jurassic to Recent.


107. *Tethocyathus* sp.

*Diagnosis*: Solitary, turbinate to ceratoid, fixed or free; pali opposite all but last cycle in two crowns; columella fascicular; edge zone narrow; epitheca extensive; spongy or crispate.

*Locality*: Manipur, Chandel District, nr. Sugnu; Churachandpur District, nr. Churachandpur; Ukhrul District, South of Lower Phaibung.

*Geological horizon*: Eocene to Recent.

Genus *Hincksina* Norman, 1903

108. *Hincksina* sp.

*Diagnosis*: Zoaria generally incrusting, with endozooecial ovicells; membranous area entire, mural rim with numerous spines, ovicell small; avicularia interzooecial.

*Locality*: Manipur – Nagaland Ophioite belt.

*Geological horizon*: Eocene to Recent.


109. *Aplousina* sp.

*Diagnosis*: Simple incrusting zooecia with small but prominent ovicells; no spines.

*Locality*: Manipur-Nagaland Ophioite belt.

*Geological horizon*: Cretaceous to Recent.

Family CALLOPORIDAE
Genus *Alderina* Norman, 1903

110. *Alderina* sp.

*Diagnosis*: Incrusting, with zooecia generally bearing small gymnocyst, cryptocyst confined to descending part; membranous front with crenulated walls; no lateral spines or avicularia; dietellae present; hypostomal ovicell, with rib or depressed area.

*Locality*: Manipur-Nagaland Ophioite belt.

*Geological horizon*: Cretaceous to Recent.

Phylum ARTHROPODA
Class CRUSTACEA
Order PODOCAPIDA
Family BAIRDIIDAE

111. *Bairdia* sp.

*Diagnosis*: Carapace often elongate fusiform in lateral view, with broadly arched dorsum that
becomes concave terminally. Venter centrally straight but curved upward terminally so that extremities are nearly at mid-height, anterior end generally higher and better rounded than the posterior, which generally is acuminate. LV larger than RV, mostly overreaching it around entire margin and overlapping it. Contact margin complex with wide duplicature, vestibule and associated structures.

**Locality:** Manipur, Ukhrul District, Limestone blocks of Ukhrul, Hundung, Lambui and Chingai.

**Geological horizon:** Ordovician to Recent.

**Family** LEGUMINOCYTHERIDAE


112. *Leguminocythereis* sp.

**Diagnosis:** Carapace bean shaped, with dorsum and venter subparallel, ends rounded, anterior broadest, greatest thickness behind middle; surface reticulate, with vertical element in upper half. Hinge holamphidont, with sharp anterior tooth in right valve behind which is a triangular socket, furrow, and oblique rounded posterior tooth, marginal areas regular, with small anterior vestibule; adductor muscle scars a vertical row of 4, with two antennal scars in front and 2 rounded mandibular scars just above ventral inner margin; normal canals rather large and moderately scattered.

**Locality:** Manipur, Ukhrul District, Limestone blocks of Ukhrul, Hundung, Lambui and Chingai.

**Geological horizon:** Eocene to Miocene.

**Family** ACUTICYTHERIDAE

**Genus** Acuticythereis Edwards, 1944.

113. *Acuticythereis* sp.

**Diagnosis:** Carapace bean shaped, with dorsum and venter subparallel, ends rounded, anterior broadest, greatest thickness behind middle; surface reticulate, with vertical element in upper half. Hinge holamphidont, with sharp anterior tooth in right valve behind which is a triangular socket, furrow, and oblique rounded posterior tooth, marginal areas regular, with small anterior vestibule; adductor muscle scars a vertical row of 4, with two antennal scars in front and 2 rounded mandibular scars just above ventral inner margin; normal canals large; widely spaced.

**Locality:** Manipur, Ukhrul District, Limestone blocks of Ukhrul, Hundung, Lambui and Chingai.

**Geological horizon:** Eocene to Miocene.

**Genus** Portunus Weber, 1795

114. *Portunus* sp.

**Diagnosis:** Carapace broad, front with 3-6 teeth, antero-lateral margin mostly with 9 teeth, basal antennal segment very short, Chelipeds with dentate merus, carpus and propodus and costate palms; all segments of 5th pereiopods flattened.

**Locality:** Manipur, Bishenpur District, nr. Limatak.

**Geological horizon:** Eocene to Miocene.

**Remarks:** Mishra (1991) recorded *Portunus* sp. and *Neptunus* sp. from the Upper Disang Formation near Limatak; *Neptunus* is regarded as a junior synonym of *Portunus*.

**Superfamily** XANTHOIDEA

**Family** GONEPLACIDAE


115. *Galenopsis* sp.

**Diagnosis:** Carapace transversely oval, smooth, moderately convex, front deflexed,
medially sulcate, orbits small; antero-lateral margins curved, short, with weak teeth; postero-lateral margin long, straight, posterior margin long; branchial regions inflated.

Locality: Manipur, Ukhrul District, New Haven-Ukhrul Road Section of Litan-New Ukhrul Road.

Geological horizon: Eocene to Oligocene.

Remarks: Khan et al. (1988) reported this species from the siltstones of the Upper Disang Formation.

Phylum MOLLUSCA
Class BIVALVIA
Subclass PALAEOTAXODONTA
Order NUCULOIDA
Family NUCULIDAE
Genus Nucula Lamarck


116. Nucula (Nucula) sp.

Diagnosis: Shell material nacreous; truncate posterior extremity, pallial sinus absent; beaks ophistogyrate; restilifer present; sculpture of radial ribs, inner ventral margin crenate.

Locality: Manipur, Bishenpur District, nr. Limatak; Ukhrul District, North of New Paoyi, Tulloi.

Geological horizon: Upper Cretaceous to Recent.

Family NUCULANIDAE
Genus Nuculana Link


117. Nuculana sp.

Diagnosis: Shell elongate posteriorly, small, corbuloid, strongly inflated, rostrum blunt; pallial sinus present, shallow, restilifer present; ligament partially internal, ligament pit narrow, oblique, posterior end produced; with concentric sculpture.

Locality: Manipur: Chandel District, nr. Sugnu; Ukhrul District, nr. Sundal.

Geological horizon: Jurassic to Recent.

Family GLYCYMERIDIDAE
Genus Glycymeris da Costa


119. Glycymeris sp.

Diagnosis: Subcircular, subequilateral, with small umbones and beaks; teeth relatively short, transverse, becoming obsolescent medially; surface smooth or costate, ventral margins internally fluted.

Locality: Manipur: Churachandpur District, nr. Churachandpur (Upper Disang Formation); Ukhrul District, West of Nungbi, South of Fumi.

Geological horizon: Lower Cretaceous to Recent.
Order MYTILOIDA
Family MYTILIDAE
Genus Brachiodontes Swainson

120. Brachiodontes sp.

*Diagnosis*: Equivalve, inequilateral, typically mytiliform; anterior beaks terminal or nearly so; anterior margin twisted, with interlocking folds, radially sculptured with bifurcating ribs, ligament relatively short, hinge with dysodont teeth before and after ligament.

*Locality*: Manipur, Ukhrul District, North of New Paoyi

*Geological horizon*: Jurassic to Recent.

Genus Mytilus Linnaeus

121. Mytilus sp.

*Diagnosis*: Shell wedge-shaped, elongate, beaks terminal, lunule with radiating folds forming dysodont teeth on anterior margin, anterior retractor scar elongate, behind umbo; anterior adductor small but distinct; margins not crenulated, surface smooth or with radial ribs which are not bent dorsalward.

*Locality*: Manipur, Ukhrul District, nr. Ukhrul (Upper Disang rocks).

*Geological horizon*: Upper Jurassic to Recent.

Remarks: Presence of *Mytilus* sp. in the Upper Disang rocks of Manipur is recorded for the first time.

Genus Pinna Linnaeus

122. Pinna sp.

*Diagnosis*: Equivalve, wedge-shaped, ventral margin straight to concave; umbones at extreme anterior end; valves carinate medially, median ridge well defined; sculpture of radial ribs or rows of scales.


*Geological horizon*: Carboniferous to Recent.

Order PTERIOIDA
Family PECTINIDAE
Genus Euberneopecten Conrad

123. Euberneopecten sp.

*Diagnosis*: Small, thin; valves not gaping, nearly smooth except for minute radial striae, often with fine concentric grooves; anterior auricle larger, with radial sculpture; hinge with cardinal crura, auricular crura present or absent; interior without radial riblets.

*Locality*: Manipur, Chandel District, nr. Sugnu.

*Geological horizon*: Upper Cretaceous to Oligocene.

Genus Chlamys Roeding

124. Chlamys (Chlamys) sp.

*Diagnosis*: Differs from *Chlamys* (Chlamys) in more rounded outline, nearly equal auricles, smaller byssal notch, fewer, usually not bifurcating...
radial ribs, and flattened, marginally pointed internal riblets near margin; pair of cardinal crura and auricular denticles.

**Locality**: Manipur, Ukhrul District, West of Nungbi, South of New Paoyi.

**Geological horizon**: Cretaceous to Recent.

Genus *Pecten* Müller, 1776

126. *Pecten* (*Pecten*) sp.

**Diagnosis**: Right valve clearly convex, left valve gently convex or nearly flat; auricles nearly equal; radial ribs well developed, generally flat-topped radially striated, grooved; hinge with cardinal crura extending from each side of ligament pit.

**Locality**: Manipur, Ukhrul District, nr. Chingai, West of Nungbi.

**Geological horizon**: Eocene to Recent.

Family **Spondylidae**

Genus *Spondylus* Linnaeus


127. *Spondylus* (*Spondylus*) sp.

**Diagnosis**: Orbicular or oval, gibbous, inequivalve, right valve more convex; well inflated, mostly with strong radial sculpture; cardinal area of right valve large, triangular; crural teeth short, heavy, smooth or with weakly crenulated edges; ligament alivincular, resilium deeply sunk in triangular pit.

**Locality**: Manipur, Ukhrul District, Chingai.

**Geological horizon**: Jurassic to Recent.

Subclass **Palaeoheterodonta**

Order **Unionoida**

Family **Unionidae**

Genus *Potomida* Swainson


128. *Potomida* sp.

**Diagnosis**: Rounded rhomboid, moderately heavy, subinflated, round and short in front, wide and roundly truncate behind; beaks high, full with numerous, fine subparallel wavy ridges which may extend over disc as rows of knobs or nodules; cardinals moderately massive, lamellar teeth commonly curved slightly; beak cavity rather deep.

**Locality**: Manipur, Churachandpur District, nr. Churachandpur; Ukhrul District, South of Fumi.

**Geological horizon**: Oligocene to Recent.

Order **Trigonioida**

Family **Trigoniidae**

Genus *Trigonia* Bruguière, 1789

129. *Trigonia* sp.

**Diagnosis**: Trigonal, umbones prominent; marginal carina prominent, serrated, escutecheon carina obtuse; area wide, bipartite, radially costate; flank with continuous concentric costae, ends of costae commonly separated from marginal carinae in left valve or in both valves by smooth radial space.

**Locality**: Manipur, Ukhrul District, nr. Chingai.

**Geological horizon**: Mid-Triassic to Upper Cretaceous.

Subclass **Heterodonta**

Order **Veneroida**

Family **Lucinidae**

Genus *Lucina* Bruguière


130. *Lucina* sp.

**Diagnosis**: Subtrapezoidal, more or less flattened, with well marked dorsal areas; sculpture of somewhat evenly spaced concentric lamellae, stronger posteriorly; dorsal areas clearly marked, lunule asymmetrical, elongate, narrow. Cardinals
two, oblique, somewhat weakened; anterior scars elongate, distant from pallial line; inner shell margin feebly crenulate.

**Locality**: Manipur, Ukhrul District, Chingai.

**Geological horizon**: Upper Cretaceous to Recent.

**Family UNGULINIDAE**


131. *Diplodonta* sp.

**Diagnosis**: Suborbicular, convex, inequilateral, beaks prosogyrous; ligament on medium-sized flattened nymph with narrow resilium on its anterior extremity; hinge with two well developed oblique cardinals in each valve, with somewhat narrow short teeth; anterior muscles scars sinuate, narrower than posterior scars.

**Locality**: Manipur, Ukhrul District, West of Nungbi.

**Geological horizon**: Paleocene to Recent.

**Remarks**: Mitra *et al.* (1986) recorded *Taras* sp. from West of Nungbi in Ukhrul District; *Taras* Risso is regarded as a junior synonym of *Diplodonta*.

**Family CARDITIDAE**

**Genus Cardiocardita** Anton, 1839

132. *Cardiocardita* sp.

**Diagnosis**: Inequilateral, subtrapezoidal, rounded in front, obliquely truncate at rear; with strong nodular ribs, ribs generally well spaced and sharply defined; lunule slightly depressed; beaks low. Hinge with trihedral cardinals; anterior laterals minute.

**Locality**: Manipur, Chandel District, nr. Sugnu; Ukhrul District, Tulloi, North of Paoyi, South of New Paoyi, West of Nungbi.

**Geological horizon**: Eocene to Miocene.

**Genus* Loxocardium* Cossmann, 1886

134. *Loxocardium* sp.

**Diagnosis**: Nearly equilateral, posterior margin slightly truncate; posterior ribs notched; rib sculpture of fine looped cross-threads or A-shaped nodes; hinge relatively short.

**Locality**: Manipur, Churachandpur District, nr. Churachandpur; Ukhrul District, nr. Litan, Tulloi, South of Fumi.

**Geological horizon**: Eocene to Miocene.

**Genus* Vepricardium* Iredale

135. *Vepricardium* sp.

**Diagnosis**: Semicircular in outline, posterior ribs not digitate; dorsal margins with smooth areas; ribs interspace linear.

**Locality**: Manipur, Chandel District, nr. Sugnu.

**Geological horizon**: Upper Cretaceous to Recent.

**Genus* Trachycardium* Moerch


136. *Trachycardium* sp.

**Diagnosis**: Ovate but not oblique, rib ornamentation of imbricating scales along
posterior sides of ribs; hinge relatively short, heavy, nearly straight; cardinal teeth unequal in size.

**Locality**: Manipur, Ukhrul District, South of New Paoyi.

**Geological horizon**: Oligocene to Recent.

**Family** TELLINIDAE


137. *Tellina* sp.

**Diagnosis**: Shell elongate, ligament internal, valves more or less unequal, cardinal hinge teeth either in two valves.

**Locality**: Manipur, Ukhrul District, Chingai.

**Geological horizon**: Cretaceous to Recent.

**Family** PSAMMOBIIDAE


138. *Gari* (Garum) sp.

**Diagnosis**: Elongate-ovate, posterior end wider than anterior; sculpture of fine concentric grooves; pallial sinus short.

**Locality**: Manipur, Ukhrul District, Tulloi.

**Geological horizon**: Eocene.

**Family** ARCTICIDAE


139. *Arctica* sp.

**Diagnosis**: Equivalve, inequilateral, closed, solid, smooth, ovate, periostracum well developed; no lunule or escutcheon; valve margin almost smooth; adductor muscle scars subequal.

**Locality**: Manipur, Bishenpur District, nr. Limatak; Ukhrul District, Tulloi; Chandel District, nr. Sugnu.

**Geological horizon**: Lower Cretaceous to Recent.

**Family** KELLIELLIDAE


140. *Allopagus* sp.

**Diagnosis**: Small, equivalve, suborbicular or ovate, inequilateral, tumid, beaks small; hinge of right valve with one cardinal in front of beak, left valve with one cardinal in front of beak; pallial line entire.

**Locality**: Manipur, Ukhrul District, West of Nungbi.

**Geological horizon**: Mid-Eocene.

**Family** GLOSSIDAE

**Genus** Glossus Poli, 1795

141. *Glossus* (Cytherocardia) sp.

**Diagnosis**: Cordiform, not gaping, beaks less twisted, hinge thin, with two lamellar cardinals in either valve; no lunular groove; ligament and resilium in deep groove; adductor scars equal; internal margin smooth; pallial line entire.

**Locality**: Manipur, Ukhrul District, Tulloi.

**Geological horizon**: Eocene to Miocene.

**Family** CORBICULIDAE

**Genus** Corbicula Mergele von Mühlfeld, 1811

142. *Corbicula* sp.

**Diagnosis**: Shell material dense, rounded-trigonal, with well developed periostracum; concentric sculpture present; hinge with posterior and anterior lateral teeth, lateral teeth serrate.

**Locality**: Manipur, Ukhrul District, nr. Sundal, South of New Paoyi.

**Geological horizon**: Lower Cretaceous to Recent.
Family VENERIDAE
Genus *Pītar* Römer, 1857
143. *Pītar* sp.

*Diagnosis*: Shell inequilateral, subtrigonal, smooth or finely striate, pallial sinus deep and pointed; beaks anterior; cardinal teeth not tending to radiate, anterior laterals well developed, lunule superficial, escutcheon not distinct.

*Locality*: Manipur, Ukhrul District, Tulloi.

*Geological horizon*: Eocene to Recent.

Genus *Mercenaria* Schummacher

*Diagnosis*: Form cordate, inequilateral, sculpture concentric, but radial sculpture nearly obsolete; lunule and escutcheon well defined; ligamental nymphs rugose.

*Locality*: Manipur, Churachandpur District, nr. Churachandpur; Ukhrul District, South of Fumi.

*Geological horizon*: Oligocene to Recent.

Order MYOIDA
Family CORBULIDAE
Genus *Corbula* Bruguière

144. *Corbula* sp.

*Diagnosis*: Shells sturdy, valves inequilateral, left valve slightly smaller than right valve, without projecting chondrophore, moderately inflated, concentrically ribbed; posterior end somewhat rostrate.

*Locality*: Manipur, Ukhrul District, Tulloi.

*Geological horizon*: Cretaceous to Recent.

Genus *Caestocorbula* Vincent, 1910
145. *Caestocorbula* (*Parmicorbula*) sp.

*Diagnosis*: Shell valves discrepant in shape, left valve more equilateral and less rostrate than right valve; siphonal plate small, rectangular, with faint median groove; pallial sinus well developed, broad and round.

*Locality*: Manipur, Ukhrul District, Tulloi, nr. Litan; Churachandpur District, nr. Churachandpur.

*Geological horizon*: Upper Cretaceous to Eocene.

Family PHOLADIDAE
Genus *Scobinopholas* Grant & Gayle

146. *Scobinopholas* sp.

*Diagnosis*: Shell rounded anteriorly with slitlike pedal gape.

*Locality*: Manipur, Ukhrul District, Tulloi.

*Geological horizon*: Miocene to Recent.

*Remarks*: Mitra et al. (1986) recorded *Scobina* sp. from the Olistostromal deposits of Manipur; *Scobina* Bayle is now regarded as a synonym of *Scobinopholas*.

Family HIATELLIDAE
Genus *Panopea* Menard, 1807
147. *Panopea* sp.

*Diagnosis*: Shells somewhat rectangular, moderately large, gaping, beaks subcentral; ligamental nymph large, high; pallial sinus wide.

*Locality*: Manipur-Nagaland Ophiolite belt.

*Geological horizon*: Triassic to Recent.

Order HIPPURITOIDA
Family MONOPLEURIDAE
Genus *Paramonopleura* Korobkov, 1967
148. *Paramonopleura* sp.

*Diagnosis*: Shell small, inequivalve; right valve attached and exogyroid, with cuneiform
tooth, 1' circular, 3' divided by low ridge; left valve free, with two unequal teeth, operculiform, tooth 1 high and curved, tooth 3 marginal, biapical, socket deep.

**Locality**: Manipur, Ukhrul District, South of Fumi.

**Geological horizon**: Paleocene.

Subclass **ANOMALODESMATA**
Order **PHOLADOMYOIDA**
Family **CUSPIDARIIDAE**

149. **Cuspidaria** sp.

**Diagnosis**: Shell ovate, posterior end of shell strongly rostrate, inequivale, left valve more convex, hinge with resilifer and one or more teeth.

**Locality**: Manipur, Ukhrul District, Tullo.

**Geological horizon**: Upper Cretaceous to Recent.

Order **MYTILOIDA**
Suborder **OSTREINA**
Family **OSTREIDAE**

150. **Ostrea** sp.

**Diagnosis**: Shells moderate to large sized, variable outline but often roughly orbicular with hardly prominent umbones pointed and flanked by small to large auricles, posterior auricle larger than anterior one; width about one-fourth of height. Right valve flat or gently convex, covered by many fragile flattish conchiolinous growth squamae, peripheral conchiolin fringe extensive, calcareous part of right valve much smaller than corresponding left valve. Concentric undulations distinct or indistinct. Left valve slightly convex, covered by many long unequal, rounded radial ribs interrupted by free-standing frilled delicate growth squamae less abundant than those on right valve; some concentric undulations present. No hyote spines on radial ribs. Ligamental areas longer than high. Chomata present. Adductor muscle imprint reniform, both ends rounded with length about four times of height, more centrally located. Left valve without umbonal cavity.

**Locality**: Manipur, Chandel District, nr. Sugnu; Ukhrul District, Chingai, Sundal, South of New Paoyi.

**Geological horizon**: Cretaceous to Recent.

Class **GASTROPODA**
Subclass **PROSOBRANCIDA**
Order **ARCHAEOGASTROPODA**
Family **TROCHIDAE**
Genus **Margarites** Gray, 1847

151. **Margarites** sp.

**Diagnosis**: Small, thin shells; turbiniform; peristome interrupted and columellar and outer lips unthickened; outer lip not strongly prosocline; spire low, whorls nearly smooth, last whorl large; macre conspicuous.

**Locality**: Manipur, Ukhrul District, Tullo.

**Geological horizon**: Upper Cretaceous to Recent.

Genus **Solariella** Wood, 1842

152. **Solariella** sp.

**Diagnosis**: Shell conical with open umbilicus; aperture more or less circular; last whorl rounded.

**Locality**: Manipur, Churachandpur District, nr. Churachandpur; Ukhrul District, Tullo.

**Geological horizon**: Miocene to Recent.
Family TURBINIDAE
Genus Collonia Gray, 1850

153. Collonia sp.

Diagnosis: Strong solid shell, few-whorled, globose, operculum paucispiral, with a central pit nearly smooth, inflated, umbilicate; outer lip thickened, peristome generally entire.

Locality: Manipur, Churachandpur District, nr. Churachandpur.

Geological horizon: Upper Cretaceous to Recent.

Suborder NERITOPSINA
Family NERITIDAE
Genus Nerita Linnaeus


154. Nerita sp.

Diagnosis: Sturdy shells, globose; no umbilicus; smooth to spirally ribbed; inner lip septum well developed, its surface pustulose or irregular ribbed.

Locality: Manipur-Nagaland Ophiolite belt.

Geological horizon: Upper Cretaceous to Recent.

Family PATELLIDAE
Genus Helcion Montfort

1810. Helcion Montfort, Conchylologie Systematique et Classification Methodiques des Coquilles, 2 : 62, 63.

155. Helcion sp.

Diagnosis: Shell cap-shaped, high arched, with the incurved apex almost at the anterior end; sculpture consists of radial scaly ribs.

Locality: Manipur, Ukhrul District, nr. Ukhrul (Upper Disang rock.)

Geological horizon: Cretaceous to Recent.

Remarks: Helcion sp. is recorded first time from the Disang Series in Manipur.

Order MESOGASTROPODA
Family LITTORINIDAE
Genus Littorina Ferussac


156. Littorina sp.

Diagnosis: Shell large, sculptured with spiral striae; spire more than half the length of body whorl.

Locality: Manipur, Ukhrul District, Tulloi.

Geological horizon: Cretaceous to Recent.

Family EPITONIDAE
Genus Cirsotrema Mörch


157. Cirsotrema sp.

Diagnosis: With thickened varices and spiral ribs; basal disc well marked.

Locality: Manipur, Ukhrul District, Tulloi.

Geological horizon: Cretaceous to Recent.

Family TURRITELLIDAE
Genus Turritella Lamarck


158. Turritella sp.

Diagnosis: Shell high-spired, with number of whorls; whorls convex, spiral ornament conspicuous, neanic spirals starting in the order abapical-medial-apical; outer lip arcuate, lateral sinus shallow, oblique; no basal sinus.

Locality: Manipur, Churachandpur, nr. Churachandpur; Chandel District, nr. Sugnu; Ukhrul District, Chingai, nr. Sundal, nr. Ukhrul (Upper Disang rocks).

Geological horizon: Oligocene to Recent.
Family CERITHIIDAE
Genus *Cerithium* Bruguière, 1789

159. *Cerithium* sp.

*Diagnosis*: Shell small to moderately large, narrowly elongate and turreted with many whorls, heavy, sculptured with swollen nodules and spiral threads which become prominently nodulose towards base, aperture ovate and often lirate.

*Locality*: Manipur; Ukhrul District, nr. Jessami

*Geological horizon*: Cretaceous to Recent.

*Remarks*: *Cerithium* sp. is recorded first time from the Disang Series in Manipur.

Family NATICIDAE
Genus *Natica* Scopoli


160. *Natica* sp.

*Diagnosis*: Shell thick, solid, rounded; faint radial striae below suture; operculum calcareous.

*Locality*: Manipur, Chandel District, nr. Sugnu.

*Geological horizon*: Cretaceous to Recent.

Family FICIDAE
Genus *Ficus* Roeding


161. *Ficus* sp.

*Diagnosis*: Spire high, canal short, axial and spiral cords present.

*Locality*: Manipur, Ukhrul District, Tulloi.

*Geological horizon*: Cretaceous to Recent.

Order NEOGASTROPODA
Superfamily MURICOIDAE
Family BUCCINIDAE
Genus *Neptunea* Roeding, 1798


162. *Neptunea* sp.

*Diagnosis*: Shell fusiform, ventricolous, anterior convex, spire elevated, aperture ovate, anterior canal broad, columella simple.

*Locality*: Manipur, Ukhrul District, nr. Ukhrul (Upper Disang rock).

*Geological horizon*: Cretaceous to Recent.

*Remarks*: *Neptunea* sp. is recorded first time from the Disang Series in Manipur.

Family FASCIOLARIIDAE
Genus *Mazzalina* Conrad


163. *Mazzalina* sp.

*Diagnosis*: Shell pyriform, globulose, smooth, columella bearing several folds at its base; canal arched.

*Locality*: Manipur, Churachandpur District, nr. Churachandpur

*Geological horizon*: Cretaceous to Recent.

Subclass HETEROBRANCHIA
Superorder ALLOGASTROPODA
Family ARCHITECTONICIDAE
Genus *Architectonica* Roeding


164. *Architectonica* sp.

*Diagnosis*: Spire gently convex, sutures hardly apparent; umbilicus bounded by a beaded ridge and the operculum flat; few whorled, horny.

*Locality*: Manipur, Chandel District, nr. Sugnu.

*Geological horizon*: Cretaceous to Recent.

Order OPISTHOBRANCHIA
Suborder NUDIBRANCHIA
Family DORIDIDAE
Genus *Cadlina* Bengli, 1878

165. *Cadlina* sp.

*Diagnosis*: Body elliptical, more or less
flattened, dorsal plates large covering the head and width of foot of the body, buccal tentacles less developed;

**Locality**: Manipur, Ukhrul District, South of Fumi.

**Geological horizon**: Cretaceous to Recent.

**Remarks**: Mitra *et al.* (1986) recorded *Ectinochila* sp. from South of Fumi which is at present regarded as a synonym of *Cadлина*.

**Class**: CEPHALOPODA

**Superfamily**: BOLITAENOIDEA

**Family**: BOLITAENIDAE


**166. Japetella** sp.

**Diagnosis**: Hectocotylus with several enlarged suckers.

**Locality**: Manipur, Ukhrul District, Tulloi.

**Geological horizon**: Cretaceous to Recent.

**Remarks**: Mitra *et al.* (1986) recorded *Bolitaenella* from Tulloi which is now regarded as a synonym of *Japetella*.

**TRACE FOSSILS**


**Diagnosis**: ‘Free meanders’ of extraordinarily regular form in two size orders; windings not close to each other; form reminiscent of some spawn-strings of Gastropods.

**Locality**: Manipur, Ukhrul District, South of Paoyi.

**Geological horizon**: Cretaceous to Lower Tertiary.

**Ophiomorpha** Lundgren, 1891

**Diagnosis**: Tunnel trails with tubercle-like or wart-like ornamentation of outer wall but smooth inside; width 1-2 cm.; sometimes branched with place of ramification widened in blistered or pear-shaped way.

**Locality**: Manipur, Bishenpur District, nr. Limatak.

**Geological horizon**: Upper Cretaceous to Tertiary.

**CALCAREOUS NANNOFOSSELS**

A rich assemblage of Coccoliths is also noticed in the ophiolite belt in Ukhrul District. Chungham & Jafar (1998) recorded the following calcareous nannofossils from the pelagic limestones of Manipur ophiolite belt:

- Arkhangelskiella cymbiformis Vekshina
- Aspidolithus parcus constrictus (Hattner *et al.*)
- Ceratalolithoides aculeus (Stradner)
- Cretarhabdus crenulatus Bramlette & Martini
- Cribrorcorona gallica (Stradner)
- Cribrorphaerella ehrenbergii (Arkhangelsky)
- Eiffellithus eximius (Stover)
- Eiffellithus turriseifellii (Deflandre & Fert)
- Lithraphidites carniolensis serratus Shumenko
- Manivitella pemmatoidea (Deflandre)
- Micula murs (Martini)
- Micula praemurus (Burky)
- Micula swastika Stradner & Steinmetz
- Micula sp.
- Parhabdolithus embergeri (Noël)
- Prediscosphaera cretacea (Arkhangelsky)
- Prediscosphaera sp.
- Quadrum gothicum (Deflandre)
- Quadrum tridum (Stradner)
- Reinhardtites anthophorus (Deflandre)
- Watznaueria barnesae (Black)
- Zygodiscus diplogrammus (Deflandre & Fert)
- Zygodiscus spiralis Bramlette & Martini
DISCUSSION

The rock types observed in the eastern hills of the Manipur State consist mainly of sandstone and shale siltstone geosynclinal flysches with minor bands of greywacke. These flysches showed the presence of irregular blocks of limestone, conglomerate, calcareous sandstone, greywacke, serpentinite and chert. These sediments to the east were further tectonically overlain by a host of gabbro-ultrabasics to basics ranging from serpentinite peridotite, basic volcanics and diorite. The limestones etc. were referred to as Cretaceous bed by the earlier workers (Oldham, 1883; Pascoe, 1912; Raina, 1959) or Ukhrul bed (Nandy & Sriram, 1970; Ghosal, 1972). The slightly metamorphosed sandstone and shale-siltstone flysches were classified by the earlier workers as the 'Disang Series' (Oldham, 1883; Pascoe, 1912; Raina, 1959; Nandy & Sriram, 1970; Ghosal, 1973). The basics-ultrabasics were clubbed under 'Serpentine beds' by the previous workers who considered these rocks as intrusives (Oldham, 1883; Pascoe, 1912; Raina, 1959; Nandy et al., 1970; Ghosal, 1972). Observations made by Bhattacharya & Bhattacharya (1984) revealed that the 'Disang Group' (noted earlier as 'Series') exhibited considerable variation in rock assemblage from west to east and could be compartmented into a sandstone flysch (Lamlang Formation) overlain by a shale-siltstone flysch (Ukhrul Formation). The contact between these two flysches was perhaps tectonic one. It was also noted by them that the irregular exposures of limestone, conglomerate, calcareous sandstone, greywacke and basic ultrabasic etc., located in this area within the sandstone and shale siltstone flysches were rootless exotic blocks. Presence of the exotic blocks were more widespread within the shale-siltstone flysch (Ukhrul Formation) than the sandstone flysch (Lamlang Formation). It was also observed by them (loc. cit.) that the ultrabasic-basics (Sirohi Formation), exposed to the east overlying the Ukhrul Formation, was tectonically emplaced body.

Bhattacharya & Bhattacharya (1984) opined that the limestone occurrences of Manipur East were of Cretaceous (Maestrichtian) age. This opinion was strengthened by the perusal of the palaeontological data. Besides, the limestone exotics, other rock types occurring as rootless floaters were conglomerate, greywacke, calcareous sandstone, serpentinite, radiolarite etc. Their study indicated that the limestone of Manipur, part of the Indo-Myanmar orogene were like those of the contiguous Chin Hills, Arakan-Yoma and coastal Myanmar.

The 'Disang Formation' restricted to the east of the 'Haflong-Disang Thrust' may be correlated with their homotaxial equivalents viz., Sylhet limestone - Kopili beds. (Mitra et al., 1986). There is a general agreement of opinions (Evans, 1932; Mathur & Evans, 1964) that the age limit of the base of the 'Disang Formation' may be extended down to Cretaceous. Ranga Rao (1983) allocated the limestone bearing rocks of Disangs a Lower Disang status with Maestrichtian age. The Olistostromal deposits were confined to upper part of the Disang Formation.

Prithiraj et al. (1992) referred a Late Campanian age for the Hundung North limestones and a Late Maestrichtian age for the Mova samples on the basis of their study of planktonic microfossils. They indicated a deep water oceanic depositional condition and a slow rate of net sediment accumulation.

Prithiraj & Jafar (1998) suggested that the initial rifting and creation of the Indo-Myanmar Ocean took place before Late Santonian time. The initiation of the suturing process (subduction/obduction) leading to the disruption of the ocean floor took place by Latest Maestrichtian.

On the basis of study of fossil planktonic foraminiferal association of two distant parts of the Tethys Ocean (viz., Semsales wilddflysch zone, Switzerland and Ukhrul Melange zone, India). Prithiraj & Caron (1996) stated that, at the very end of the Maestrichtian age these two distant parts of the Tethys Ocean had a similar environment. They suggested a stable, and
homogenous global oceanic conditions prevailed just before the onset of the strong perturbations at the Cretaceous/Tertiary boundary.

**SUMMARY**

The State of Manipur, situated in the northeastern part of India and covering an area of about 22,329 sq. km., forms a part of the Naga-Arakan Yoma highland. This region was a part of the Tethys Sea in the Archaean period. During the Palaeozoic and much of the Mesozoic eras, the sea continued to receive sediments of conglomerates, shales, sandstones and limestones of the Archaean rocks. Repeated orogenic movements accompanied by extensive igneous intrusions occurred in the successive periods that influenced the geologic and tectonic alignments of the region. The rock formations occurring in Manipur comprise the Cretaceous limestones, the Disang with serpentinites (Lower and Middle Eocene – Upper Cretaceous), the Barails (Upper Eocene and Oligocene), the Surmas and the Tipams (Miocene). A number of fossil beds are exposed especially, along the eastern part of the State. The exploration and updating of records of animal fossils of this area were conducted as a part of the programme of preparation of exhaustive faunal account of the State of Manipur by the ZSI.

Altogether 167 species of animal fossils, 2 trace fossils and 23 species of calcareous nannofossils have been recorded, viz., 68 species of Protozoa : Foraminifera, 34 species of Protozoa : Radiolaria, 4 species of Coelenteratæ, 3 species of Bryozoa, 5 species of Arthropoda : Crustacea, 37 species of Mollusca : Bivalvia and 16 species of Mollusca : Gastropoda. The assemblage of microfauna of ophiolite belt of Ukhrul area was referred to a Late Cretaceous age, while the fauna associated with the exotic blocks were of varying age from Palaeocene to Upper Eocene.

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