# XXIII THE FAUNA OF AN ISLAND IN CHILKA LAKE.

## CONTENTS OF PART I.



## INTRODUCTION.


*By* N. ANNANDALE, *D.Sc., F.A.S.B., Director, Zoological Survey of India.*


I have recently published in the *Memoirs of the Asiatic Society of Bengal* [1] a paper entitled "Introduction to the study of the Fauna of an Island in the Chilka Lake." From this paper I purposely excluded all but casual references to the fauna, although, as I explained, its main object was to prepare the way for an account of the animal life. In these *Records* I propose to issue, so far as circumstances permit, a report on the fauna of the island. In so doing my intention is not to increase the number of species known to science (though of course this must occur), or even to make the taxonomic limits of those already known more precise. The question I have striven, perhaps in vain, to answer, is this: What animals are to be found in a small and somewhat isolated area with the physical characters and vegetation of Barkuda Island and situated within the geographical limits of Peninsular India? That the reply to this enquiry is far from complete is due largely to the fact that our knowledge of the Indian fauna is still in its infancy so far as many invertebrate groups are concerned, and that the services of few specialists able and willing to study the various elements in a fauna so unpromising from a taxonomic point of view are available in India or elsewhere. To accomplish my task successfully it would have been necessary to have had the help of a large staff of zoologists who were at once good field-naturalists and good taxonomists. Some say that no such persons exist. This the history of zoology in India proves to be untrue, but the number of zoologists whose help I have been able to obtain has been small.

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[1] *Mem. Asiat. Soc. Bengal.* VII, No, 4 (*in the Press.*)

My thanks are all the more due to those who have helped me. I have received much assistance from other members of the Zoological Survey of India and may mention in particular Dr. F. H. Gravely, now Superintendent of the Madras Museum, who has worked on the fauna of Barkuda as a collector, a field naturalist and a taxonomist. Mons. L. Chopard has kindly offered a report on the Orthoptera and Professor Silvestri one on the termites and the *incolae* of their nests. Lt.-Col. H. H. Godwin Austen [1] has already published notes on the land molluscs and Lt.-Col J Stephenson [2] on the Oligochaete worms, while the late Mr. C. A. Paiva [3] described the Rhynchota. Most of the identifications of Cicindelid beetles I owe to Dr. W Horn, and of butterflies to Lt.-Col. W H. Evans, R.E.; Lt.-Col. F. Wall, I.M.S , has kindly examined most of the snakes, Mr. E. Brunetti of the Diptera and Major F C Fraser, I.M.S., and Dr. F. F. Laidlaw of the dragonflies.

A few reports on separate groups are issued with this introduction and others will, I hope, be published later. I propose to preface the series with a short general account of the fauna, indicating so far as possible at present its main peculiarities and deficiencies. This account should of course be read with the paper to which I have referred in the first sentence on the preceding page.

## MAMMALIAN FAUNA.

The Mammalian Fauna of the island is, like that of most other groups, chiefly remarkable for its deficiencies. There are no carnivores except mungooses (which have perhaps disappeared lately), no ungulates except an introduced herd of Chital, no monkeys, no squirrels, no porcupines or hedgehogs and now very few bats. The only abundant terrestrial species, indeed, are a shrew of the genus *Pachyura* and a race of *Rattus rattus*. The only common bat is now the Indian Flying Fox.

## AVIFAUNA.

The Fauna of Land Birds is even more scanty, relatively, than that of mammals, only three species being abundant at all seasons, namely the two common Indian crows (*Corvus macrorhynchus* and *C. splendens*) and the Mynah (*Acridotheres tristis*). A green pigeon visits the island in large flocks in the rainy season, but all other land birds are mere casual visitors or nest in solitary pairs. Even shore birds are less abundant than at many other spots in the Chilka Lake, but several egrets and herons and a cormorant often roost upon the trees in considerable numbers.

## FAUNA OF REPTILES AND BATRACHIA.

The Fauna of Reptiles and Batrachia, comprising 17 or 18 species, is comparatively rich. There are six lizards, ten snakes,

[1] *Rec. Ind. Mus.*, XIII, pp. 349-351 (1917).
[2] *Mem. Ind. Mus.* V, pp. 139-146; 483-490 (1915).
[3] *Rec. Ind. Mus.* XV pp. 1-16 (1917).

probably two Crocodilia, and two Batrachia; but all of these, except the house-lizard *Hemidactylus frenatus* and the frog *Rana cyanophlyctis*, are scarce or rather scarce. The most remarkable form is a completely limbless skink (*Barkudia insularis*) belonging to a genus at present only known from the island, but that it does not occur also on the mainland of the Ganjam district or Orissa is most improbable. All the other species of Reptiles and Batrachia are widely distributed forms.

## FISH FAUNA.

Strictly speaking the island has no Fish Fauna as both the pond and the two wells are fish-less, but I may mention the fact that when the waters of the lake (which of course has an extensive fish-fauna[1]) have been higher and are retreating, the small Cyprinodont *Panchax panchax*, one of the most useful of indigenous Indian mosquito-eating fish, is often left in large numbers in pools isolated on the foreshore. As these dry up, however, it perishes.

## MOLLUSCAN FAUNA.

A peculiar feature of the Chilka Lake, in which it differs notably from the creeks of the Gangetic Delta, is the complete absence of amphibious molluscs from its shores. This fact greatly limits the molluscan fauna of Barkuda, which consists of five land and three aquatic species, the latter found in a small pond. It is noteworthy that each of these eight species belongs to a distinct genus, the genera being *Ennea*, *Ariophanta*, *Rachisellus*, *Opeas*, *Glessula*, *Limnaea*, *Indoplanorbis*, and *Gyraulus*, all Pulmonata. The land-snails belong to three biological categories. The *Ennea* is a terrestrial carnivorous form, preying on the *Opeas*, which is also terrestrial but feeds on algae and mosses. The *Glessula* is similar in habits to the *Opeas*, while the *Ariophanta* and the *Rachisellus* are phytophagous, the latter distinctly arboreal. Most of the species have a wide range in Peninsular India or beyond, but the *Ennea*, the *Opeas* and the *Glessula* are slightly modified insular races or species of widely distributed snails.[2]

## INSECT FAUNA.

Comparatively poor as is the Insect Fauna of Barkuda, it actually includes a large number of species and must be discussed in its separate orders.

APTERA.—Both Collembola and Thysanura are fairly common and include species interesting as habitual incolae of the nests of termites and ants. A small bluish-black collembole often occurs in such numbers on the surface of small pools of water among

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[1] Chaudhuri, *Mem. Ind. Mus.* V pp. 405, 443, 493.

[2] See Godwin-Austen, *Rec. Ind. Mus.* XIII, pp. 349-351 (1917) and Annandale and Prashad, *ibid.*, XIX, p. 189 (1920).

rocks on the shore as to form a regular scum upon them, just as *Anurida maritima* does on the English coasts. Others are abundant in dead wood. "Fish Insects" (Thysanura) of at least two species are found in the bungalow, but have probably been introduced. Representatives of this group are not very common in the jungle except in ants' and termites' nests.

NEUROPTEROID INSECTS.—Under this convenient title I propose to deal with the various groups other than dragonflies and termites at one time included in the order Neuroptera. They are not well represented on Barkuda except perhaps by the Ant-lions. In the drier parts of the island the soil is often pitted with the excavations of the larvae of the smaller species of this family and adults of two of the larger and more conspicuous kinds (*Palpares pardus* and *Acanthoclisis horridus*), which probably have different larval habits, are taken occasionally. The Hemerobiidae are represented by a species of *Sisyra* the larva of which is parasitic in the sponge *Spongilla alba* in the pond.

ODONATA.—Most of the dragonflies found on the island are common and widely distributed species, but Major Fraser has recently described a new Agrionid (*Ennallagma insula*) [1] from Barkuda. The three most abundant species are *Pantala flavescens*, clouds of which hover in the air in the rainy season, *Diplacodes trivialis*, which flies close to the ground throughout the year, and *Pseudagrion microcephalum*, which breeds in large numbers in the lake.

ISOPTERA.—Termites are abundant, the commonest species being *Termes* (*Odontotermes*) *obesus*. Several species find their food in the dead trunks of *Ficus bengalensis*, of which there are many on some parts of the island, but it is curious that no species of *Kalotermes* has been found in this situation. A *Capritermes* occurs under bricks and stones. Some large termite-mounds have been observed, but they are not very numerous, the only mound-building species being *T obesus*. The distribution of the various species on the island seems to be largely dependent on the nature of the soil in different areas. The fungi cultivated by certain forms are being studied by Prof. Bose of the Carmichael Medical College, Calcutta, while Prof. Silvestri of Portici promises a report on both the termites themselves and the other arthropods found with them.

ORTHOPTERA.—The Orthoptera are fairly well represented, the most abundant of the families (or superfamilies) being the Acridiidae and the Gryllidae. Among the former it is noteworthy that only one wingless form (a species of *Chrotogonus*) has been obtained. Among the crickets at least three myrmecophilous species have been taken, each inhabiting the nest of a different genus of ant. Tridactylinae are abundant in damp places. Cockroaches and earwigs are relatively scarce so far as species are concerned but individuals are sometimes common. Stick-insects have not

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[1] *Rec. Ind. Mus.* XIX, pp. 32-33 (1920).

been observed, and mantids are not so common as they often are in India. The commonest of the Phasgonuridae are arboreal grasshoppers of the group Pseudophyllides. One of these lays its eggs in little pockets on the edge of the leaves of *Glycosmis pentaphylla*, the most abundant shrub on the island. A remarkable ant-like form of the same family, but a different tribe, was taken on one occasion. It is probably the young of a larger, wingless species captured several times.

COLEOPTERA.—The beetles of Barkuda are mostly small and of dull and inconspicuous colouration. Highly modified forms are scarce, except minute termitophilous species. This is due mainly to the absence or scarcity of phytophagous beetles, and this again to the sclerophytic nature of the vegetation, which depends on the physical structure and climate of the island. The few Chrysomelids that occur are small and for the most part rare, while such groups as the Cetoniinae and the Rutelinae are represented mainly by occasional stragglers. The absence of many wood-boring genera is more surprising, as dead wood is abundant. Perhaps it is due partly to the fact that the wood is derived almost exclusively from the genus *Ficus*, and partly because certain families and genera of Coleoptera (*e.g.* the Lucanidae, Passalidae and many of the larger longicorns) although they are abundant in the hill-jungles of both Northern and Southern India, avoid the tropical plains of the Peninsula. On Barkuda no trace of Lucanidae or Passalidae has been found, and the few longicorns observed have been mostly small and scarce. Another class of beetles in which the fauna is deficient is the larger dung-beetles. Several of the smaller Scarabinae are common, feeding on the dung of deer (*Cervus axis*), but the absence of other ungulates doubtless accounts for that of the beetles that eat their excrement. The dominant types of Coleoptera are strictly terrestrial forms, either actively predaceous such as the Carabidae and Cicindelidae, both of which are well represented, or of vegetarian habits such as the Tenebrionidae. The only really conspicuous form at all common, however, is the Meloid *Mylabris pustulata*, which is frequently seen in flight and also on the flowers of the Sword-Bean (*Canavalia*), which are a favourite food. Some peculiar termitophilous Coleoptera have been collected, including *Termitodiscus heimii*, Wasm., a minute flattened and expanded Staphylinid which inhabits the fungus-gardens of *Termes* (*Odontotermes*) *obesus*, often in large numbers.

HYMENOPTERA.—Less care was expended on the collection of the Hymenoptera than on that of the majority of the larger groups of insects as there was very little prospect of getting them worked out. The parasitic and phytophagous families are, as might be expected, poorly represented. Ants are very abundant and belong to many species, but are almost exclusively terrestrial, the arboreal forms usually common in Indian woods being apparently absent. This is certainly so in respect to the Leaf-sewing Ant (*Oecophylla smaragdina*), which never succeeds in establishing

a colony, though I have seen solitary females attempting to do so on more than one occasion. A race of *Camponotus compressus* is abundant and cherishes in its nest a minute myrmecophilous cricket, which it apparently transports with its larvae and pupae to any convenient spot (in an instance that came under my notice a box of books) that it may find on its foraging expeditions. A curious habit was observed on the part of a small black ant (*Phidole rhombinoda*) also very common. This ant constructs burrows beneath stones or flower-pots and stores up various kinds of animal food, amongst others the remains of beetles, which the workers hurriedly remove when disturbed. A small Tenebrionid beetle is extremely abundant about the bungalow in the rainy season and crawls into any crevice. It evidently does so, to its own destruction, into the ants' nests under flower-pots, where its remains can often be found, but the curious point is that the ants store it alive by biting off its legs. When disturbed they carry off the crippled, but still living beetles, as they do the rest of their stores. The same ant has a small myrmecophilous cricket in its nest which it carries off when disturbed but apparently does not injure.

Mutillids are scarce, Pompilidae, Sphegidae, and Eumenidae common but in little variety. Apidae are fairly abundant on the flowers of *Crotolaria striata*. A solitary species (*Megachile lanata*) caused us considerable inconvenience in April by building its cartridge-like mud nests full of honey and pollen in the backs of our books. When the book was opened the nests were crushed and the sticky mass extruded. Several species of *Xylocopa* occur and I once took a specimen of *X. rufescens*, which does not appear to have been recorded previously from the plains of India. *Apis florea* is common, *A. dorsata* scarce. The social wasps are represented by the Indian Hornet (*Vespa cincta*) and by *Polistes stigma*, etc.

RHYNCHOTA.—The late Mr. Paiva enumerated 37 species as occurring on Barkuda, including 6 aquatic forms from the pond. The number of small Fulgoridae and Jassidae has increased considerably since he wrote, probably with an increase of the herbaceous Leguminosae (*Crotolaria striata* and *Taphrosia purpura*). On the evenings of October 7th to 12th, 1920, the "Green-Fly" (*Nephottetix bipunctatus* and *N apicalis*) was very troublesome on account of its vast abundance. To Mr. Paiva's list of Heteropterous species I may add the name of *Chrysocoris marginellus*, the nymphs and adults of which were found in abundance feeding on the Tree Euphorbia (*E. neriifolia*) in April, 1920. Coccidae, Aleurodidae and Aphidae are not common. The females of a species of *Monophlebus*, belonging to the first family, occur sparingly on the aerial roots of *Ficus bengalensis*, *F. obtusa* and *F. gibbosa* and I have taken an Aleurodid on leaves of the var. *parasitica* of the last species. Wooly Coccidae are by no means scarce on the young shoots of *Taphrosia purpura* and *Ficus obtusa* and on the fruit of the Custard-Apple (*Anona squamosa*). A yellow Aphid is abundant in the cold season on the creeper *Leptodenia*

*reticulata*, and a small colourless species is kept in its nests in rotten wood and deserted termite mounds by the ant *Acropyga acutiventris*, Roger.

DIPTERA.—The two-winged flies are poorly represented and the only large or conspicuous species that occur belong to the Bombylidae (including the magnificent *Exoprosopa flammea*), of which several are common from April till June. They disappear for the most part, however, with the onset of the rainy season. Many of the common species of such families as the Syrphidae are absent or very scarce. The Trypaneids and other frugivorous forms are rare, while parasitic and semi-parasitic species are rarer than might be expected. Mr. Brunetti identifies a fly that lives on *Cervus axis* with the European *Lipoptena cervi*. A termitophilous Phorid of the genus *Termitoxenia* has been found in the fungus-combs of *Termes* (*Odontotermes*) *obesus*, Ramb.

The Nemocera are in some cases very abundant in individuals, but most families are poor in species. The Chironomidae seem to be less so than others and some minute forms are sufficiently abundant to be troublesome, among others the blood-sucking *Culicoides peregrinus*, Keiffer, which, however, is more troublesome on account of its vast numbers than its bite. At the end of the rainy season in disturbed weather it swarms with other forms round lamps in the verandah of the bungalow and especially on the ceiling above. *Calyptopogon albitarsis*, Kieff. is the only larger species of the family identified. Some of the smaller Chironomidae breed in damp rotten wood. A small species of *Phlebotomus* (Psychodidae) also occurs, but is rather scarce. Mosquitos are sometimes abundant, especially at the end of the rainy season, but very few species were observed. The commonest is *Anopheles rossii* (or, or as it is now called *A. subpictus*, Grassi), which breeds in the lake. Tipulidae are scarce and small. The largest and also the least scarce is the widely distributed *Conosia irrorata*. Cecidomyid galls are very abundant on certain trees, particularly on the leaves of *Salvadora persica* and *Pongamia glabra*, both of which are found almost exclusively on the shore of the island, and several species of the flies come to light occasionally.

TRICHOPTERA.—Are rare, but a few small species breed in the pond.

LEPIDOPTERA.—The butterflies are discussed in this instalment of the report. Some species are abundant, and practically without exception the Diurna belong to widespread and common species. The moths have not been diligently collected. They seem, however, to be better represented than many groups of insects, perhaps because their caterpillars often feed on unpromising materials. Species of the largest size, such as those of *Attacus*, do not occur, and the Saturniidae generally are poorly represented. I do not remember to have seen any Sphingid except *Cephanodes hylas*. The largest moth observed was probably *Nyctipao macrops*, which flies about rapidly in a circumscribed area at night in open

spaces such as jungle paths, making a curious creaking sound. The most brilliantly coloured species of moth I have seen on the island is the Cossid *Duomitus mineus*, the cylindrical form, orange colour and bold greenish metallic markings of which give it a close superficial resemblance when the wings are closed to a large Buprestid beetle.[1] A large yellow underwing (*Ophuisa coronata*) was sometimes abundant in the rains and developed the curious habit of coming to drink out of our glasses at dinner. It was by no means teetotal in its tastes and we found that it could imbibe quite an appreciable amount of brandy without apparent confusion. One of the commonest moths in herbage is the cosmopolitan *Deiopeia pulchella*. On the whole the moths of Barkuda are inconspicuously coloured, and the exceptions I have mentioned stand out as exceptions, to which but few names could be added.

## ARACHNID FAUNA.

Dr. Gravely has discussed the spiders and scorpions of the island in this instalment of my report. The latter are scarce and only two species have been taken. Among the spiders perhaps the most remarkable are the burrowing forms of the group Mygalomorphae, several of which construct elaborate trap-door nests in the earth at the base of fig-trees. Among the web-spinners the absence of the large and conspicuous species of the genus *Nephila* is a noteworthy feature. No Pedipalpi have been found on Barkuda, notwithstanding diligent search on Dr. Gravely's part.

## FAUNA OF MYRIAPODA.

Myriapoda are not very abundant, but representatives of most of the Indian families of both centipedes and millipedes occur. Among the former a large species of *Scolopendra* is not uncommon, while specimens of *Pseudocryptops agharkari*, a small species of the same family, described by Dr. Gravely from the Bombay Ghats, have been taken. Dr. Gravely[2] tells me that they belong to the race *singbhumensis* which he described from Chota Nagpur. Geophilidae are not uncommon among dead leaves and under stones. Among the millipedes much the most abundant is a Polydesmid, a species that wanders in the open in fairly large numbers throughout the rainy season. Minute forms of the family Polyxenidae are fairly common under stones and in the galleries of ants and termites, from the nests of which other small millipedes have also been taken.

## CRUSTACEAN FAUNA.

The only strictly terrestrial Crustacea observed on Barkuda are land Isopods, and no freshwater species except small Ento-

[1] I first observed the resemblance between this moth and certain Buprestids in the Malay Peninsula, where suitable "models" occur in this group of beetles. See *Fasc. Malay., Zool.* I, p. 58 (1903).

[2] Gravely, *Rec. Ind. Mus.* VII, p. 417 (1912).

mostraca have been found in the pond or wells. Several species of wood-louse occur under stones and one is not uncommon in spiders' nests on the leaves of *Glycosmis pentaphylla*. Prof. Chas. Chilton [1] has given a detailed account of the common littoral species, *Ligia exotica*. This Isopod is seasonal in its occurrence, disappearing annually at the end of the rains. In the littoral zone of the shore two sand-hoppers occur in large numbers, but neither ever makes its way into the interior of the island. This is noteworthy, as the more abundant of the two (*Orchestia platensis*) has been found among the mountains of Hawaii as well as at the edge of many seas and lakes. The less abundant but bigger species is *Talorchestia martensii*.

## ANNELID FAUNA.

There are no land-leeches on Barkuda, the soil of which is much to dry for them. In the pond I have seen species of *Glossosiphonia*, doubtless parasitic on *Limnaea*, and a *Piscicola* which must live on frogs (*Rana cyanophlyctis*), the only aquatic vertebrate.

Several Oligochaetes have been described by Col. Stephenson from below water-level on the shore of the island, but the only terrestrial species is apparently his *Octochaetus barkudensis*, which is common in the earth between the roots of fig-trees.

## POLYZOA AND SPONGES.

One species of freshwater Polyzoa and one of freshwater sponge are found on the island. The latter is the widely distributed *Spongilla alba*, which occurs both in the pond and in one of the wells, while the Polyzoon, representing the subgenus *Hyalinella*,[2] Jullien, of the genus *Plumatella*, was until recently known only from the pond on Barkuda, but has been found within the last few months in great abundance in the Colombo waterworks in Ceylon. I have called it *Plumatella longigemmis*.[3]

The general characters of the fauna thus briefly summarized will, I hope, be discussed later, when the reports on the various groups have been considered in detail. It will be sufficient to say at present that it is in some respects almost an essence of that of the central part of Peninsular India, after most of the more highly specialized species had been eliminated in the struggle for existence, intensified by the peculiar nature of the soil, climate and vegetation.

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[1] Chilton, *Mem. Ind. Mus.* V, p. 462 (1916).
[2] Annandale, *Rec. Ind. Mus.* XVIII, p. 93 (1919).
[3] Annandale, *Rec. Ind. Mus.* XI, p. 168 (1915); *ibid.*, XVIII, p. 94 (1919).