FAUNA OF THE CHILKA LAKE

MAMMALS, REPTILES AND BATRACHIANS.

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MAMMALS, REPTILES AND BATRACHIANS.

By N. ANNANDALE.

Only eleven species were found in the Chilka Lake of aquatic vertebrates other than fish. A large proportion of these species are distinctly estuarine rather than marine or fluviatile, and the only limnic form is the mud turtle *Emyda granosa intermedia*. The sub-species of this Chelonian that occurs in the lake is a Peninsular rather than an Indo-Gangetic form, while the snake *Chersydrus granulatus*, though its geographical range is very extensive, does not occur, so far as I am aware, in the deltas of either the Ganges or the Indus. The sea-snake *Hydrophis obscurus* is, of course, like other members of its family, a marine animal, as is also the Cetacean *Orcaella brevirostris*; but both have established themselves in estuarine tracts, the latter, indeed, living in rivers hundreds of miles above tidal influence as well as in the sea.

MAMMALS.

The only mammals that have any claim to be included in the aquatic fauna of the Chilka Lake are, if we except the domestic buffalo,[1] the otter *Lutra macrodus* and the small Cetacean *Orcaella brevirostris*. We have to thank Mr. Oldfield Thomas[2] for confirming our identification of these species, both of which are common and have a fairly wide geographical range.

Order *CARNIVORA*.

Lutra macrodus, Gray.

1888. *Lutra ellioti*, Blanford, *Faun. Brit. Ind.*, *Mammalia* (pt. 1), p. 185, fig. 49.
1891. *Lutra macrodus*. *id.*, *ibid.* (pt. 2), p. 601.

An adult male was obtained at Barkul Point in March, 1914.

This otter is common in all parts of the lake at which rocks occur. It is presumably to it, and not to *L. vulgaris*, that McMaster's note quoted by Blanford on

[1] Herds of buffaloes, which are of less massive build and have less heavy horns than those reared in Bengal, often wade or swim far out into the lake; the island of Nalbano, which is submerged for a part of the year and lies more than a mile off the mainland, is covered in the dry season with their tracks.

[2] Mr. Thomas has also been kind enough to name a small collection of terrestrial mammals and bats made incidentally, mostly at Satpara, in the course of our survey. The following species were obtained at Satpara, *Felis viverrina*, Bennett; *Viverricula malaccensis*, Gmelin; *Mungos auropunctatus*, Hodgson, and *Lepus ruficaudatus*, Geoffroy. The bat *Scotophilus kuhli*, Leach, was found in large numbers in small caves among the rocks of the islands at the south end of the lake, while the allied species *S. wroughtoni*, Thomas, had taken possession of the bungalow on Barkuda. A pigmy shrew, *Pachyurus hodgsoni*, Blyth, was taken under dead stems of cacti and screw-pines lying at the edge of the lake at Barkul. Its stomach was full of the sandhoppers (Amphipoda Gammaridea) abundant in such positions.

p. 184 of his volume in the "Fauna" properly refers. This note describes the concerted action of six individuals in fishing. Otters were seen swimming at some distance from shore in Balugaon Bay, but they were more commonly observed among the rocks at Barkul Point. The specimen shot at this place had a number of ticks on its feet; these have been identified by Prof. G. H. F. Nuttall and Mr. C. Warburton as nymphs of a species of *Aponomma*.

The precise distribution of this otter is uncertain, but it probably occurs all over the Indian Peninsula.

Order *CETACEA*.

Orcaella brevirostris (Owen).

1878. *Orcella fluminalis* and *O. brevirostris*, Anderson, *Zool. Anat. Results Yunnan*, pp. 358-416, pls. xxv, figs. 4, 5, xxv*a*, xxvii, figs. 3, etc.

1891. *Orcella brevirostris* and *O. fluminalis*, Blanford, *Faun. Brit. Ind., Mammalia* (pt 2), pp. 578, 579, fig. 189.

1891. *Orcella brevirostris*, Oldfield Thomas, *Ann. Mus. Civ. Stor. Nat. Genova* (2) X (XXX), p. 947.

1912. *Orcella brevirostris*, Turner, *Marine Mamm. Anat. Mus. Edinburgh*, p. 109.

A large male was found in a decomposing condition on the shore of Kalidai Id. in February, 1914. There was no indication of the manner in which it had met its death and only the skeleton could be preserved.

O. brevirostris lives in the outer channel of the Chilka Lake at all times of the year, in fresh as well as in salt water. In this part of the lake-system it was usually seen in small parties of three or four. When the lake was full, these parties kept to the middle of the channel, but in March they hung round the fishermen fishing close inshore with small seine-nets, swimming within a few feet of the men and being apparently attracted by their shouts. At Satpara, individuals were frequently observed rolling over and over on a shelf of sand at the margin of the lake; the water was so shallow that it did not cover more than half their bodies, but the animals, though apparently abandoning themselves to play, slipped over into deeper water instantaneously on the slightest movement on shore. They seemed to be far more suspicious in this direction than of any danger from the water. Out in the channel they commonly follow boats, and we were told that there was a man living near Satpara who could call them up to his boat and spear them for the sake of their oil, which in Orissa, as in other parts of India, is regarded as a cure for rheumatism, applied externally.

In the main area of the lake their habits are somewhat different, probably on account of the different nature of the shore and of differences in the distribution of the food-supply. They seem to desert this area completely in the latter part of the rains and none were observed in it in August, September or October. They were seen, however, in July and November. Off Ganta Sila and Barkul Point they frequently swim up and down opposite some rock or groups of rocks and a single individual would often seem to reserve to itself, at any rate for some days at a time, a special beat. This was noted both in February and March and in July. The Cetacean

would often rush in straight towards the rocks, as if about to land upon them, and on one occasion we saw an individual strand itself on a flat shelf and remain for some seconds with its flippers and the forepart of its body practically out of the water. At other times it swam along more slowly with its mouth open and the upper part of its head exposed. In this case it was probably feeding on the shoals of small Crustacea (*Macropsis orientalis*, Tattersall) that swarm along the edge of the rocks.

Oldfield Thomas (*op. cit.*, 1891) has given good reason for regarding the Irrawaddy form of this genus (*O. fluminalis*, Anderson) as identical with the marine one and Anderson's statement that it does not occur in the lower reaches of the river seems to be based on insufficient evidence. The species is found in the Bay of Bengal, the Straits of Malacca, Borneo and the Gulf of Siam. It ascends the Irrawaddy for hundreds of miles and occurs in the Gangetic delta with *Platanista gangetica*, though it apparently does not penetrate very far inland on the west side of the Bay of Bengal.

REPTILES AND BATRACHIANS.

The following is a list of the reptiles and batrachians found in the Chilka Lake:—

REPTILIA.

OPHIDIA.
- *Chersydrus granulatus.*
- *Cerberus rhynchops.*
- *Hydrophis obscurus.*

EMYDOSAURIA.
- *Crocodilus palustris.*
- *Gavialis gangeticus.*

CHELONIA.
- *Chelone imbricata.*
- *Chelone mydas.*
- *Emyda granosa intermedia.*

BATRACHIA.

Rana cyanophlyctis.

The three snakes all belong to the family Colubridae, but to three different groups of that great assemblage: *Chersydrus granulatus* to the Aglypha, *Cerberus rhynchops* to the Opisthoglypha and *Hydrophis obscurus* to the Proteroglypha. As all three are modified to a greater or less extent—*Cerberus* less than the others—for an aquatic existence, and as the modifications are the same or tend in the same direction, the species afford an interesting instance of convergence.

From a geographical point of view the three snakes have some interest. *Chersydrus granulatus*, which is a true estuarine species sometimes found out at sea, is widely distributed in the Malay Archipelago, but in Indian waters is apparently restricted to the east coast of the Peninsular Area and the southern part of the Malabar Zone. *Cerberus rhynchops*, which ascends rivers far higher than the limits of their estuaries, has a similar general distribution, but is found in the Gangetic and other Indian river-systems beyond the range of *Chersydrus*. *Hydrophis obscurus* is, so far

as we know, an exclusively Indian and Burmese snake, occurring on both sides of the Peninsula and on the coast of Tenasserim. It particularly affects brackish water and occurs in the Gangetic delta.

Thus we may say that the snakes of the Chilka Lake represent an essentially estuarine element in its fauna and one of wide, or fairly wide, dispersion in the Oriental Region.

Crocodilus palustris has a range similar to but even wider than that of *Cerberus rhynchops*, and is more of an up-country animal. *Gavialis gangeticus*, on the other hand, is entirely confined on the east coast of India to river-systems that open into the upper part of the Bay of Bengal; it is probably not found, even on this coast, further south than the Chilka Lake. On the western side of India it occurs, like *Orcaella brevirostris*, in the Indus.

Of the Chelonia of the lake the two Chelonidae are widely-distributed marine species, while the Trionychid is an essentially limnic form somewhat restricted in range —a local race, confined to the river-systems of the Mahanaddi and the Godavari and a few adjacent valleys, of a species that occurs all over Peninsular India, the Indo-Gangetic plain, the greater part of Burma and the plains of Ceylon. Its genus, which is monotypic, is not found, except in Ceylon, beyond the limits of the Indian Empire.

Rana cyanophlyctis, the only frog or toad found in the lake, occurs over an area extending from Arabia to the Malay Peninsula, and is known to avoid brackish water less than most of its congeners.

Considered as a whole, the herpetological fauna of the Chilka Lake may therefore be regarded as an essentially estuarine one, in which most of the species are of wide distribution; there is no endemic element. In so far as it is peculiarly Indian, it is, as might be expected, Peninsular as opposed to Indo-Gangetic.[1]

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[1] A word may be said as to the terrestrial reptiles and frogs that haunt the margins of the Chilka Lake. The most conspicuous is the Indian Monitor (*Varanus bengalensis*), which was seen on several occasions on the stony beach of Barkuda Island, but is much more often to be observed, in Orissa and Ganjam, in holes in the walls of wells or among the trunks of fallen trees. It does not wander over the mud-flats, as *V. salvator* and *V. nebulosus* do in some parts of the Malay Peninsula, and probably obtains little if any of its food from the lake. A small skink (*Lygosoma punctatum*) was found under dead Pandanus-leaves at the edge of the lake near Barkul. Its stomach contained amphipodous crustacea of the group Gammaridea. The same animals are eaten by two species of Gecko (*Hemidactylus brookei* and *H. frenatus*) that are abundant among stones and rocks just above the water-level and occur even on the smallest islands in the lake. They also feed largely on the Saldid bug *Leptopus assuanensis*, which, without being exactly aquatic or even amphibious, is extremely abundant round the lake among rocks and stones in the immediate neighbourhood of water. The four lizards all have a wide range in the plains of India.

Two burrowing frogs (*Rana breviceps* and *Microhyla ornata*) live commonly in holes near the edge of the lake and breed in the rainy season in small pools of rain-water close to the margin; but we have never seen them enter the lake itself. At Barkul, one night in September, we saw a young Chunam Frog (*Rhacophorus maculatus*) seated on dead weed at the margin. All these are common frogs in the plains of Peninsular India and the Indo-Gangetic tract.

OPHIDIA.

Family COLUBRIDAE.

Subfamily *ACROCHORDINAE.*

Genus **Chersydrus**, Cuvier.

1890. *Chersydrus*, Boulenger, *Faun. Brit. Ind., Rept.*, p. 355.
1912. ,, Barbour, *Mem. Mus. Comp. Zool. Harvard*, XLIV, No. 1, p. 106.

Barbour (1912) doubts whether this genus is really distinct from the type-genus of the subfamily *Acrochordus*, Hornstedt. His doubts are probably well founded, but I have no specimens of *Acrochordus* for comparison; the only species (*A. javanicus*) occurs in fresh water in the Malay Peninsula and Archipelago.

Chersydrus granulatus (Schneider).

1890. *Chersydrus granulatus*, Boulenger, *Faun. Brit. Ind., Rept.*, p. 355, fig. 104.
1912. ,, ,, *id., Faun. Malay Peninsula, Rept.*, p. 116, fig. 38.
1912. ,, ,, Barbour, *Mem. Mus. Comp. Zool. Harvard*, XLIV, No. 1, p. 106.
1914. ,, ,, Wall, *Journ. Bombay Nat. Hist. Soc.* XXIII, p. 372.

Barbour (1912) has noted the more conspicuous colouration in the young of this snake, a common feature of young reptiles,[1] and also the increased stoutness of the adult. Wall has recently (1914) put on record a Siamese specimen 4 ft. 4 inches long and with a maximum girth of $7\frac{1}{4}$ inches, presumably in spirit.

The range of the species extends from the Malabar coast to New Guinea, but apparently omits the Gangetic delta and fails to extend far up the west coast of the Indian Peninsula. It is common in estuaries and backwaters on the east coast and is sometimes found at sea. In the Chilka Lake it is not restricted to any particular locality.

C. granulatus may often be seen thrusting its head from the surface of the lake, where it is usually found some little distance from shore. On land it is sluggish and unable to progress rapidly; probably it never leaves the water unless forced to do so. Barbour found it abundant in the fish-market at Macassar, under platforms on which the fish were sold, but thought it probable that it had been introduced accidentally into such positions. It was taken in our trawl on several occasions and probably often rests on the mud at the bottom. Fishermen frequently brought it to us at Rambha, Barkul and elsewhere. Some of them distinguished it from *Hydrophis* as not being poisonous. No large specimens were obtained.

Subfamily *HOMALOPSINAE.*

Genus **Cerberus**, Cuvier.

1890. *Cerberus*, Boulenger, *Faun. Brit. Ind., Rept.*, p. 374.
1907. *Hurria*, Stejneger, *Bull. U.S. Nat. Mus.* LVIII, p. 307.

Stejneger has revived the long obsolete name *Hurria* for this genus. In the strict letter of the law of priority he may be right, but the change is not adopted by Boulenger in his volume on the Fauna of the Malay Peninsula (1912).

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[1] See Annandale in Boulenger's "Report on the Batrachians and Reptiles", *Fasciculi Malayenses (Zool.)* I, p. 156.

Cerberus rhynchops (Schneider).

1912. *Hurria rhynchops*, Barbour, *Mem. Mus. Comp. Zool. Harvard*, XLIV, No. 1, p. 123.

This species has an even wider range than *Chersydrus granulatus*, for it occurs in all the Indian rivers and estuaries and throughout the Malay Archipelago as far as New Guinea. In the extreme east of its range it is, however, scarce.

Less exclusively aquatic in its habits than *Chersydrus*, it probably never goes far from water. In estuarine tracts it is particularly abundant, but it also makes its way far up rivers. In the Gangetic delta it is one of the commonest snakes in suitable localities, that is to say in ditches, creeks and swamps of brackish water, in which it either lies at the bottom or remains concealed among vegetation at the edge. It also frequents the deep cracks formed in mud exposed to the heat of the sun at low tide. I have watched it, from a stranded boat, emerging from those cracks below water as the tide covered them. Round the Chilka Lake it lies under the felted algae left at the edge as the water-level sinks in the dry season, and also conceals itself among submerged stones on islands such as Kalidai and Barkuda. Its habits render it less liable to be caught in fishermens' nets than either of the other snakes of the lake, for it rarely swims in the open. On land it is less awkward than *Chersydrus*.

The type-specimen of Schneider's *Hydrus rhynchops* was from the Ganjam district.

Subfamily *HYDROPHIDINAE*.

Genus **Hydrophis**, Daudin.

1890. *Hydrophis* and *Distira*, Boulenger, *Faun. Brit. Ind., Rept.*, pp. 398, 407.
1909. *Distira*, Wall, *Mem. Asiat. Soc. Bengal*, II, p. 193.
1912. *Hydrophis*, Boulenger, *Faun. Malay Peninsula, Rept.*, p. 181.

Boulenger has recently accepted the view that the two genera *Distira* and *Hydrophis* cannot be separated. The former was described one year later than the latter.

Hydrophis obscurus, Daudin.

1890. *Hydrophis coronatus*, Boulenger, *Faun. Brit. Ind., Rept.*, p. 402.
1909. *Distira obscura*, Wall, *Mem. Asiat. Soc. Bengal*, II, p. 201.
1912. *Hydrophis obscurus*, Boulenger, *Faun. Malay Peninsula, Rept.*, p. 188.
1914. *Hydrophis coronatus*, Wall, *Journ. Bombay Nat. Hist. Soc.* XXII, p. 374.

There has been considerable confusion in the synonomy of this species. Wall set the matter right, so far as the specific name was concerned, in 1909 and is followed in this respect by Boulenger. Unfortunately the former author has revived the name *coronatus* in a recent note (1914), but without giving reasons. This name was applied by Günther in his *Reptiles of British India* (1864) to the young snake, of which he gives an excellent figure (pl. xxv, fig. M., *op. cit.*), and is more than half a century younger than Daudin's "*obscurus*", which is wrongly applied by Boulenger, as he himself has pointed out (1912), in the "Fauna" and the British Museum *Catalogue of Snakes*.

In scaling and proportions *H obscurus* is more constant than most sea-snakes, but, like many other reptiles, it is more conspicuously coloured when young than when fully mature. In the young the pale bands and the markings on the head are bright yellow, which contrasts brilliantly with the blue-black of the ground-colour. In older individuals the contrast is much less striking, for the yellow fades to dirty white and the black to grey. On the hinder parts, indeed, all markings completely disappear. The largest specimen I have seen, a male killed at Satpara, was (when fresh) 122 cm. long.

This snake is mainly but not exclusively an inhabitant of brackish water. It occurs at least up to the limits of tidal influence in the Gangetic delta and is common all over the Chilka Lake. It has also been recorded from the coasts of Madras and Tenasserim and from Karwar in the Bombay Presidency. The last seems to be the only locality outside the Bay of Bengal whence it has been reported.

In the Chilka Lake it frequents both open water and the margin, where the latter is low and weedy. We saw it on several occasions thrusting its head and the forepart of its body vertically upwards out of the water, and specimens captured in seine-nets, sometimes with *Chersydrus granulatus*, were brought to us at Rambha, Barkul and Satpara. Like other true sea-snakes, and also like *Chersydrus* and *Cerberus*, it feeds on fish. It does not hesitate to swallow even *Triacanthus brevirostris*, which has a pair of long and stout spines that can be thrust out from the sides of the belly and firmly locked in position in such a way that they cannot be bent back without being broken. It sometimes happens that when the snake has swallowed a fish of this kind, the spines of the latter become locked in its stomach and pierce both the walls of the alimentary canal and those of the body. I have seen, both in Orissa and on the coast of the Malay Peninsula, sea-snakes with these spines protruding through the skin. Apparently digestion proceeds normally in these abnormal circumstances and the fish is disintegrated in the process. The spines are then set free and fall out from the body of the snake, which seems to be little the worse for the perforation.

H. obscurus, probably because of its frequenting brackish water, is apparently free from the hydroids and barnacles (*Dichelaspis grayi* and other species) that often attach themselves to other sea-snakes of the same and other genera; we did not find any parasites in its internal organs

EMYDOSAURIA.

Genus **Crocodilus**, Laur.

Only the smaller of the two Indian crocodiles was seen in the lake in circumstances that made identification possible, and we obtained no evidence as to the occurrence of *C. porosus*.

Crocodilus palustris, Lesson.

The short-nosed crocodile is common near Barkuda and Cherriakuda, on the sandy parts of the shores of which we occasionally saw it. Our *serang* told us that

he had seen young on the latter island. The individuals that frequent these places are, however, extraordinarily timid and rarely leave the water for more than short periods. As a rule they lie in it at the edge. The fishermen do not seem to be much afraid of them. At Satpara we saw men, women and children bathing in a tank within a few yards of a couple of crocodiles which were floating on the surface, the larger being 6 to 8 ft. long. They said that the crocodiles only eat fish. Generally speaking, these animals, though they do not avoid village tanks, seem to be confined in the lake to those parts that are low and have sloping shores and are at the same time remote from human habitations. Possibly they fear the formidable fish-spears carried in the fishing boats.

Genus **Gavialis**, Günther.

1864. *Gavialis*, Günther, *Rept. Brit. Ind.*, p. 63.
1876. *Gharialis*, Theobald, *Cat. Rept. Ind.*, p. 37.

The name *Gavialis* is a latinized form of a misreading of the Hindustani "gharial", just as the name *dugong* is a misreading of the Malay *duyong*; but Theobald's emendation has not been accepted by most recent herpetologists.

Gavialis gangeticus (Gmelin).

We were informed on good authority that this species occurs in the lake in the neighbourhood of Satpara, and on less good authority that one is known to the fishermen to frequent Kalidai Id. If the information is correct, this must be practically the southern limit of the range of the species and genus, which is not known further down the coast of India than the Mahanaddi river-system. It is found in all the rivers that flow into the head of the Bay of Bengal, including the Koladyne in Arrakan, but not in the Irrawaddy. Like the mud-turtle *Trionyx gangeticus* and the porpoise *Platanista gangetica*, it occurs in the Indus as well as in the east coast systems.

CHELONIA.

Family CHELONIDAE.

The two species of this family here recorded from the outer channel of the Chilka Lake are probably mere casual visitors. Very possibly the third Indian species, *Thalassochelys caretta*, also enters the sea-mouth occasionally. We obtained no evidence as to any turtle breeding on the shores of either the outer channel or the main area of the lake, and it is only those of the former that would be at all suitable for the purpose.

Genus **Chelone**, Brougniart.

Chelone imbricata (Linn.)

A large shell of the Tortoiseshell Turtle was seen on the shore of Barhampur Id. in the outer channel in March, 1914.

[1] An interesting account of the nest of this crocodile has recently been published by W. Schultze in the *Philippine Journ. Sci.* (D) IX, pp. 313-315, pl. i (1914).

Chelone mydas (Linn.).

A male of this species was taken in the otter-trawl in fresh water in the inner part of the outer channel (Sept., 1914). Its carapace was 102 cm. long. The stomach and the entire intestinal tract were tightly packed with weed. No external or internal parasites were found on or in the specimen.

Family TRIONYCHIDAE.

Genus **Emyda**, Gray.

This genus is monotypic but the single species is divided into five subspecies or local races:—the *forma typica*, which occupies the Indo-Gangetic plain and ranges eastwards to Arrakan; *scutata*, which occurs in the Irrawaddy and Salween systems; *intermedia*, practically confined to the Mahanaddi and Godavari systems; *vittata*, widely distributed over the remainder of Peninsular India and in Katch; *ceylonensis*, only found in the plains of Ceylon.

Emyda granosa (Schoepff) subsp. **intermedia**, Annandale.

1912. *Emyda granosa intermedia*, Annandale, *Rec. Ind. Mus.*, VII, p. 172, pl. vi, fig. 2.

The races of *E. granosa* as a rule occur only in fresh water, but the typical form has been taken on a small island off the coast of Arrakan. The Mahanaddi Pond Turtle, as the race *intermedia* may be called, is common in ponds all over the Mahanaddi system and at any rate on the lower reaches of the Godavari. It also occurs in the valleys of some of the smaller rivers that make their way from the south or south-west into the estuary of the Hughli, although in the Hughli itself the subspecies is the *forma typica*. In the neighbourhood of the Chilka Lake *intermedia* is common in ponds and rice-fields. A specimen was brought to us at Barkul in September that had been found under a stone in the jungle some distance from water. In the thickets of submerged weeds in the lake near Balugaon it is not uncommon. Specimens were obtained both in September, when the water was quite fresh, and in March, when its specific gravity (at 15° C.) was 1·008. It is somewhat remarkable to find a soft-skinned Chelonian living in brackish water, but the sole species of an allied Indian and Malayan genus (*Pelochelys cantoris* [1]) is exclusively estuarine and marine.

A leech was found infesting the soft parts of the pond-turtle in the lake in March. It has been identified by Mr. W A. Harding as a new species of *Placobdella*.

BATRACHIA.

The only batrachian that we saw in the lake was the common and widely distributed frog *Rana cyanophlyctis*, Schneider. In the rainy season and for as long thereafter as the water remains fairly fresh, this frog sits in large numbers at the edge both of the outer channel and of the northern part of the main area, at places where the margin is swampy, and skips over the surface of the water in its characteristic fashion

[1] See Boulenger, *Faun. Malay Peninsula, Rept.*, p. 12 (1912.)

when alarmed.[1] We obtained no evidence, however, that it ever breeds in the lake. Its tadpoles were observed, with those of *R. breviceps* and *Microhyla ornata*, in pools of rain-water on the banks in September.

[1] *Ibid.*, p. 229 (1912).