NOTES ON FISHES IN THE INDIAN MUSEUM.

VII. On a New Genus of "Globe-fishes" (Fam. Tetraodontidae).

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Plate XXXIV.

The fish described in this note was collected by Capt. A. W Michie of the pilot vessel S.S. "Lady Fraser" at the mouth of the river Hughli in a depth of 15 fathoms on a bottom of sand and mud. It is a highly modified representative of the family Tetraodontidae, but its characters are so distinct that a new genus must be set up for it. I propose for it the name :—

Kanduka[1], gen. nov.

The new genus may be defined as follows :—

A genus of Tetraodontidae consisting of almost spherical, ball-like fishes of moderate size, with spine-like outgrowths covering the whole of the head and body except the lips and the bases of the fins, *without a dorsal fin*, with the anal fin vestigial and with the caudal peduncle much reduced and somewhat retractile, as also the pectoral and the vestigial anal; eyes small; nostrils forming imperforate, incompletely bifid tentacles.

Kanduka michiei, sp. nov.

(Pl. XXXIV, figs. 1–7.)

The general form of the species is that described for the genus. The back is somewhat flattened and the depth and the breadth are considerably greater than the length. The length of the head is two-fifths of the total length without the caudal. The eyes are situated somewhat in the posterior half of the head; the greatest diameter of the eye is contained 5 times in the length of the head. The interorbital distance is one and a half times the length of the snout and 3·5 times the diameter of the eye. The nostril is situated much nearer to the eye than to the tip of the snout. It consists of two broad flaps, which are joined at the base and are imperforate in the centre. The mouth is small and transverse, both the upper and the lower jaws possess well-marked, median sutures. The lips are fleshy, papillated and continuous at the angles of the mouth. The gill-openings are very small and are situated in definite pouches at the bases of the pectorals, which are small and about one-third the length of the head; they are somewhat spiral in their horizontal axes and can be retracted into pouches. There is a slight ridge along the back but no trace of the dorsal. The anal

[1] *Kanduk* in Sanskrit means a small ball.

fin is vestigial and is situated in a pouch into which the anus also opens; the horizontal axis of this fin is also somewhat spiral. The fin itself has the appearance of a white papilla in which the degenerate rays can be detected with difficulty. The caudal fin is very small; it is subtruncate at its extremity. In spite of its small size it is very much larger than the caudal peduncle which seems to be completely withdrawn into a pouch situated immediately above that which contains the anal fin and the anus. The entire fish is covered with long, pointed, needle-like spines, which are absent on the lips and near the bases of the fins. Each spine is tetraradiate at the base but all the radii are situated on one side of the spine only.

The colour in spirit is black with numerous, irregular, oblique, white stripes, which are narrow on the upper part of the body and much broader below. On the dorsal surface these stripes form a dendritic pattern. The lateral fins are white, the caudal fin is provided with numerous black blotches arranged in rows.

The total length of the specimen without the caudal is 54 mm., that of the head 21·8 mm., that of the snout 10 mm. The diameter of the eye is 4·2 mm., and the interorbital width is 15 mm.

Kanduka michiei possesses a superficial resemblance to certain species of *Tetraodon* such as *T lineatus* as figured by Bleeker[1] and *T nigropunctatus* as figured in Day's *Fishes of India*.[2]

Locality :—Sandheads off the mouth of the river Hughli at a depth of 15 fathoms.

The type-specimen is preserved in the collection of the Zoological Survey of India.

So far as can be judged from a single specimen in spirit the animal is not able to deflate itself but retains its ball-like appearance constantly. Capt. Michie thus describes the form of the specimen, " when first caught it was exactly the shape of a hard ball and only crumpled up a little after being in spirit for five or six days." *Kanduka* is thus, so to speak, the culmination of a series of Gymnodontes, a large number of which are able to assume a subspherical shape by taking water or air into their bodies and thus to cause the spines with which their integument is usually armed to stand out rigidly all over their surface.

Unfortunately we know little or nothing of the habits of *Kanduka michiei*. The only specimen was taken on a soft bottom in the muddy water of the mouth of the Ganges. Sciagraphs show a small Gastropod shell in its alimentary canal, but we have no further information as to its food.

Skeleton[3] :—The skeleton of the Tetraodontidae, as in the other Plectognathi, is not completely ossified. Owing to this fact the sciagraphs, on which the following description is based, do not show all the bones and even in those which are indicated the precise limits are not clearly marked. In spite of this, however, it is clear that the skeleton is similar in all essential respects to that of the fishes of the family

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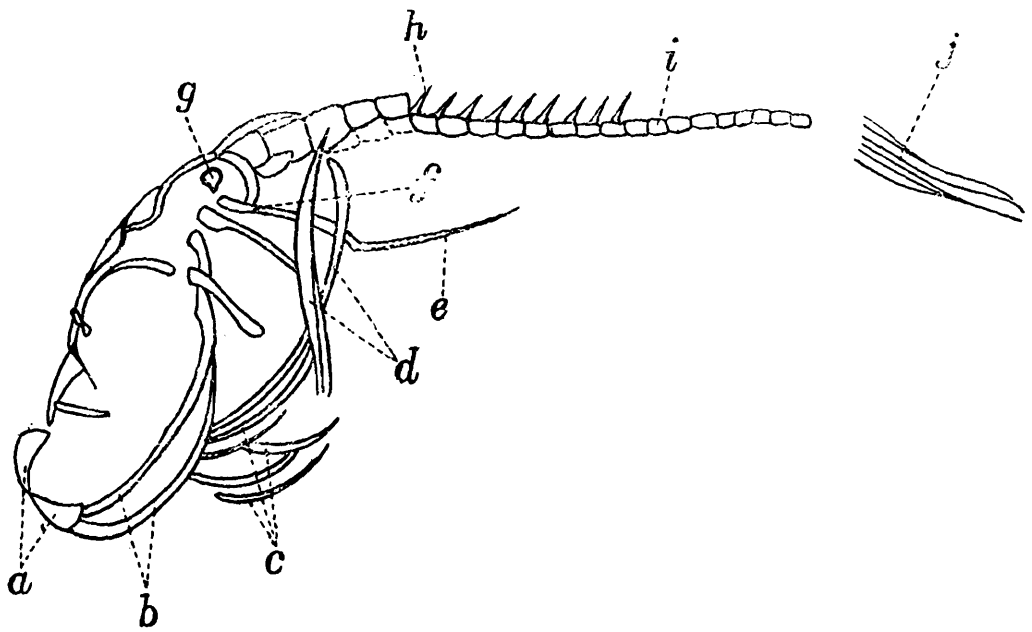
[1] Bleeker, *Atlas Ichthyol.* V, p. 70, pl. ccxii, fig. 1 (1865).

[2] Day, *Fishes of India*, p. 704, pl. clxxx, fig. 4 (1878).

[3] For an account of the skeleton of the Plectognathous fishes see Regan, *Proc. Zool. Soc. London* II, pp. 284-297 (1902), and other references contained in his paper.

Tetraodontidae, but exhibits marked peculiarities in correlation with the shape of the fish. On account of its subspherical form the skull and the vertebral column are not in the same plane, the skull being bent downwards and forwards at an angle of 140° The change in the axis thus brought about has resulted in a considerable change in the direction and position of the various bones of the skull. The nasal region has been greatly reduced, the orbital region is as well marked as usual, but the otic region is greatly increased probably at the expense of other sensory organs associated with the skull. Anteriorly the vertebral column is also slightly bent.



Kanduka michiei, sp. nov.

Lateral view of the skeleton as seen in a sciagraph × 2 (from a photograph). *a*=jaw bones; *b*=suspensorium; *c*=branchiostegal rays, etc.; *d*=clavicle; *e*=postclavicle; *f*=supraclavicle; *g*=otocyst; *h*=neural spine; *i*=centrum; *j*=caudal fin.

With the exception of the caudal there is no trace of any fin in the sciagraphs.

There is nothing peculiar in the structure of the vertebrae. The anterior vertebrae (4 or 5) have, as usual in the family, well-marked, bifid, divergent neural spines and are somewhat flattened on their under surface. There are about 21 to 22 vertebrae. The structure of the vertebral column near the base of the caudal fin is not well defined in the sciagraphs and, therefore, it is difficult to say with certainty whether the tail-fin, which apparently appears to be retractile, is retractile or not.

In the region of the skull all the important bones are clearly shown in the sciagraphs. The "teeth" appear to be better calcified along their inner border than along the outer border. The suspensorium of the jaws is almost vertical in its upper half and is only slightly bent forwards in the lower. Another bone is clearly indicated forming the side of the roof of the mouth and running from the nasal region of the skull to a point half way to the suspensorium. The branchiostegal rays and probably the bones of the hyoid apparatus are also indicated.

The clavicle is almost vertical with its upper end reaching as far upwards as the vertebral column. There is an indication of a bone, probably the supraclavicle, which is horizontal in position and appears to suspend the spectoral arch from the otic region of the skull. The postclavicle is a thin, elongate bone directed horizontally backwards, probably to give support to the abdominal viscera. There are two other bones indicated in the sciagraphs; one is directed downwards and backwards from just below the posterior extremity of the supraorbital ring, while the second, which is situated almost parallel to it, runs backwards from the otic region. These may possibly represent certain ossified portions of the opercular bones.

Relationships of the genus Kanduka:—It is quite obvious from the structure of the skeleton and of the teeth that the genus *Kanduka* belongs to the family Tetraodontidae. It is, however, analogous in some respects to *Hyosphaera* Evermann and Kendall[1] among the Diodontidae, but the fins are still more degenerate. Its nearest allies are probably to be found in the genus *Tetraodon* (*s.s.*), from which it is probably derived; but it is distinguished from all other Tetraodontidae by the absence of the dorsal fin, by the very small size of the caudal peduncle, by the vestigial character of the anal and by the fact that all the fins are situated in little pouches, into which they can be more or less completely retracted, thus giving the fish a completely spherical form practically without protuberances of any kind. The skeletal peculiarities referred to above are in themselves quite sufficient to distinguish *Kanduka* generically from the other genera of the Tetraodontidae.

I have to express my great indebtedness to Major J. A. Shorten, I.M.S., of the Calcutta Medical College for the pains he has taken in making sciagraphs of the fish in different positions for me.

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[1] Evermann and Kendall, *Bull. U. S. Fish. Comm.* XVII, p.131, pl. ix, figs. 11, 12 (1897).