

**NOTES ON THE FISHES OF WESTERN NEW GUINEA II
LOPHICHTHYS BOSCHMAI, A NEW GENUS
AND SPECIES FROM THE ARAFOERA SEA**

by

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During my visit to western New Guinea (1954-1955), a rich collection of marine animals was presented to the Leiden Museum by the Fisheries Department of the Netherlands New Guinea Government. The specimens, mostly fishes, had been captured during previous trips of the Government fishing vessel "De Goede Hoop", and were preserved on the initiative of Mr. D. C. Zwollo, at the time Director of the Fisheries Department there, to whom we are especially indebted. One of the most intriguing specimens of this fish collection, evidently representing a new genus and probably even new higher categories of fish taxonomy, is discussed here.

It is a pleasure to dedicate the present species to Prof. Dr. H. Boschma, who has expertly guided the first steps of so many zoological taxonomists, including the present author's. Furthermore, it is a most welcome coincidence that the species was collected approximately in the area of his own principal field activities during the Snellius Expedition (1929-1930) and the Wissel Lakes Expedition (1939).

Lophichthys nov. gen.

The new genus being for the moment known only from the single specimen at hand, it is difficult to distinguish and delimit diagnostic characters. However, by comparison with those used for related genera, the following diagnosis may be given:

Body covered with small spines and, especially on the head and along the lateral line, with skinny flaps. Head very large, subcuboid or slightly depressed, without median groove. Mouth subvertical, wide, with well developed slender teeth on jaws, vomer, palatines, endopterygoid, and tongue. Gill apertures small, at the end of a short tube, above pectorals slightly before "elbow". Spinous dorsal with three separate spines, the first a well developed slender illicium with a distal lure consisting of several irregular flaps. Soft dorsal fin considerably longer than anal. Pectorals with two radials, limblike with free "elbow". Ventrals short with hidden small spine. Caudal pointed,

elongate, with simple rays only. Caudal peduncle free. Gill filaments only on 2nd to 4th arch, first arch with very small and sharp rakers only. Pseudobranchiae none. Abdomen apparently distensible. Vertebrae 18 or 19. Frontal bones mostly connected?? (see discussion of X-rays further down).

Type species: *Lophichthys boschmai* nov. spec.

Lophichthys boschmai nov. spec. (pl. I figs. 1-3, pl. II fig. 1)

1 ex., 51 (71) mm, Arafoera Sea near Merauke, western New Guinea, 1954, leg. Government fishing vessel "De Goede Hoop" (Mr. D. C. Zwollo), don. Fisheries Department Netherlands New Guinea, 49 (71) mm, reg. no. RMNH 24606.

Description. — D^1 I + I + I + 0; D^2 13; A 9; P. I.7; V I.5; C 9.

General shape intermediate between the strongly depressed Lophiidae and the compressed Antennariidae, approaching *Chaunax*. Maximum height (18 mm) 2.7, width between pectoral bases (22 mm) 2.2, width between proximal pectoral radials (20 mm) 2.5, length of head with lower jaw (26 mm) 1.9 in standard length. Eye indistinct, hidden by skin, elliptical (length about 2.5, width about 2 mm), horizontal (= maximum) diameter 10 in head; snout (5.2 mm) 5, interorbital width (6 mm) 4.33, width of mouth (12 mm) 2.17 in total head length. The interorbital space is almost flat, with a slight median longitudinal ridge separating very shallow concave lateral parts; the eyes are situated at the transition between the flattish interorbital and the steep lateral parts of the head, and are directed obliquely upwards. The almost vertical maxillary (9.5 mm) does not reach to below front of eyes, the two maxillaries when seen from above are situated almost in a straight line beyond which the curved lower jaw projects considerably.

The cardiform teeth are rather long and slender, on the jaws directed backwards. The upper jaw bears 2 or 3 series of teeth, separated by a rather wide toothless area at the symphysis, with the inner series by far the longer, and with only the outer series continued laterally. The lower jaw is almost wholly covered with two slightly irregular series of long teeth, the inner series longest, the very narrow interspace at the symphysis bearing a small frenulum. Two series of smaller teeth are found in two patches on the vomer and in a single patch on each palatine, on each side the patches on vomer and palatine being subcontinuous. Two series in a V-shaped pattern diverging backward are found on the tongue. All teeth are depressible. Judging by the X-ray (pl. II fig. 1), another patch of teeth, apparently consisting of two series, is found on the entopterygoid.

The gill aperture is small, situated at the end of a short tube above pectoral radials, slightly before the "elbow". The first gill arch bears a series of very small sharp rakers, but filaments are found only on the 2nd to 4th arch. Pseudobranchiae were not found.

The spinous dorsal fin is reduced to three separate spines, the first a well developed (9 mm, 3 in head) slender illicium with as a bait about a dozen irregular slender flaps of up to about 1.5 mm length. The dorsal surface of the head shows no groove or pit to include the illicium when bent backwards, as is found in related species. The second spine is weak and rather flexible, its length 5 mm, curved backward, with a narrow hind membrane only, and situated between the front margins of the eyes. The third spine is about identical, flexible and curved backward, but with a distinctly wider hind membrane, and is situated about halfway between second spine and origin of soft dorsal fin.

The soft dorsal fin originates slightly before the base of the tubular gill aperture, and consists of simple rays with filamentous tips increasing in length from the first (6.4 mm) to the ninth (14.5 mm), the subsequent rays rapidly diminishing in length. As a consequence, the whole fin has a characteristic angular shape. The anal fin is considerably shorter but also with simple filamentous rays (longest, 6th ray 17 mm) and of the same shape. The pectoral fins have two radials, a free arm and elbow, the small hidden spine and the rays covered by skin, the rays simple and ending free beyond the membranes. The ventral fins are rather small, the 4th ray longest (10.5 mm), the small spine hidden, the simple rays covered by skin, the tips of the rays more or less free on account of the increasing emargination of the membranes. The caudal fin has the simple rays increasing in length from the outer (15.5 mm) towards the 5th ray (24 mm), the tips being slightly filamentous, the general shape elongate with a median point.

Excepting the lower surface, head, body, and tail are covered with small simple spines, mostly covered by skinny jackets, and skinny flaps especially on the head and along the lateral line system. The lower surface is smooth with only numerous slender skinny flaps. The abdomen is inflatable.

The lateral line system (fig. 1) is indistinct but, as indicated by much



Fig. 1. *Lophichthys boschmai* nov. spec., approximate lateral line system. $\times 1.5$.

more developed skinny flaps, seems to be represented below the mandible, continuing backward from mouth angle, increasingly curving upward beyond the eye to meet a second canal running horizontally halfway between the lower canal and the eye at a point situated slightly before the third dorsal spine. Subsequently, after apparently running slightly upward, the lateral line continues towards the mid-caudal base approximately following the dorsal outline.

In spite of the X-rays reproduced here, the osteological characters are still far from clear. I found no indications of a separation between the frontal bones. The number of vertebrae seems to be 18 or 19. The precaudal parapophyses are directed obliquely backward, the ultimate parapophyses overlapping largely the solid triangular hypural plate. The otolith seems to agree more with those in Lophiidae than with those in the Antennariidae or (possibly) in the Chaunacidae (Frost, 1930, p. 624, pl. 23 figs. 10-12).

The colour, after having been preserved in alcohol for about nine years, is pinkish white, slightly more pinkish on upper and lateral parts, almost white on belly, on most of the fin rays, on the whole caudal fin, and on the tubular gill apertures. Below the soft dorsal fin and extending backward to a narrow basal area on the caudal fin, there is a darker brownish reticulate pattern, extending forward on the brachial part of the pectorals, but lacking on the belly. The illicium is yellowish white, the fin membranes, including those of the 2nd and 3rd dorsal spines, are dark blackish brown, with the same colour also forming more or less distinct annulae around most of the whitish rays, the caudal fin being an exception.

Remarks. — The present specimen seems to have been captured during an experimental trawling trip in the Arafoera Sea near Merauke. As I stated before (Boeseman, 1963, p. 236), the sea near Merauke is very shallow; while the depth of the Arafoera Sea seldom exceeds 100 meters, the depth near Merauke can be estimated as usually not more than 40 meters. Therefore, it seems likely that the specimen has been captured at a depth not exceeding 40 meters, possibly even less. Its characteristics make it evident that it is a bottom dweller.

Relationship. — The combination of characters shown by the present species does not fit into any of the hitherto known Pediculate genera. To facilitate comparison of the principal characters in order to establish the possible relationship of *Lophichthys* with either the Lophiidae, the Antennariidae, or the Chaunacidae, I prepared the accompanying table giving the principal characters used in the diagnoses of these groups by the following authors: Arambourg & Bertin (1958), de Beaufort (1962), Berg (1947),

Goode & Bean (1895), Günther (1861), Jordan & Evermann (1898), Lowe (1846), Norman (1957), Regan (1912), Schultz (1957). A few data were found elsewhere or have been taken from material at hand; only the normal characters and variational ranges are given, but exceptions may occur.

TABLE I

	<i>Lophichthys</i>	Lophiidae	Antennariidae	Chaunacidae
D ¹ , cephalic + postcephalic	III + 0	III + III (normally)	III + 0 (normally)	I + 0 or III + 0 (2nd + 3rd hidden)
D ² , s(imple) or d(ivided)	13, s	7-13, s or d	10-18, s or d	11-12, s
A, idem	9, s	5-11, s or d	6-12, s or d	(5-)7, s
P, idem	1.7, s	13-28	8-11	11-14, s
V, idem	1.5, s	1.5 (5-6)	5-6	3-4, (+ 2 rudiments?), s
C, idem	9, s, elongate, pointed	8 (<i>L. pisc.</i>), s or d, trunc.	9, d, rounded	6(8), d, truncate
skin, sp(ines) or dermal fl(aps)	sp + fl	smooth, fl	smooth or sp, + fl	sp
head shape	cuboid, slightly depressed	broad, strongly depressed	compressed	cuboid or slightly depressed
mouth	subvertical, wide	horizontal, very wide	subvert. or steep, moderate	subvertical, wide
teeth rows upper jaw	(3)2, 1 laterally	(1)2 - a few	(1)2 - several	(5)4 or villiform bands
idem, lower jaw	2	2-a few	(1)2 - several	4-5 or villiform bands
idem, vomer	2, in two patches	1, a few at lat. ends only	3 - several	2
idem, palatine	2	1	3 - several	2
idem, entopterygoids	2	2 irregular or 4 (<i>L. pisc.</i>)	2 (<i>H. histrio</i>)	?
idem, tongue	2 in double V	2 in double V	2-3 (<i>H. histrio</i>), 2 patches	none
gill aperture	above pect., before elbow	below and behind pect.	below pect. near elbow	above pect. behind elbow
pectoral radials	2	2	(2)3	3
gill filaments on arches	0 + 3	3 + 0	½ + 2½	0 + 2½
pseudobranchiae	absent	present	vestigial or absent	absent
vertebrae frontals	18 or 19 united?	19 (trop. spp.)-32 united	19 shortly united post.	19-20 shortly united posteriorly

To these data the following may be added: the shape of the illicium by far best agrees with those found in most Antennariidae, less with that in *Chaunax*, and not at all with the illicium in the Lophiidae. On the other hand, the 2nd and 3rd dorsal spines are rather reduced, which does not

agree with the normal Antennariids, though reduction is found within that group in some atypical forms. Possibly the reduction of the dorsal spines indicates a tendency pointing to *Chaunax* as the almost extreme example.

Another interesting feature is the shape of the vertebral column, with the anterior part rather steeply descending backward (pl. I fig. 3), a character also reported to occur in *Histrio* (Antennariidae) (Gregory, 1933, p. 392) and in *Chanax* (Garman, 1899, pl. 16), but apparently not in the Lophiidae, at least not in *Lophius piscatorius* L.

Finally, as already stated in the description of the present species, the shape of the otolith, as far as discernable on the X-ray, most closely resembles that found in the Lophiidae.

Though the various characters used in the table are certainly not all of the same taxonomic importance, a comparison of the numbers of apparent indications of relationship with any of the three considered families, as provided by these characters, must give a reasonably trustworthy indication. Giving points for any such indication, the score for each family proved to vary only between 7 and 9, depending on the interpretation of the data, but with a very slight majority for the Lophiidae. On the other hand, an apparent relationship with the Lophiidae may also be the result of a parallel or converging development, the habitats and habits, as far as can be deduced from the physical aspects of the locality and the morphological details of the specimen, being essentially the same.

Summarizing, there seems to be no distinct indication of a more close relationship with any of the considered families than with the other two. However, accepting the few osteological indications as preponderant, a slightly closer relationship with the Lophiidae seems likely. To facilitate comparison, I therefore add a reproduction of an X-ray of *Lophius piscatorius* L. (pl. II fig. 2). In my opinion, just as the present data seem to confirm that *Chaunax* should be put in a family of its own (Chaunacidae), there is little doubt that *Lophichthys boschmai* also merits its own separate family, the Lophichthyidae.

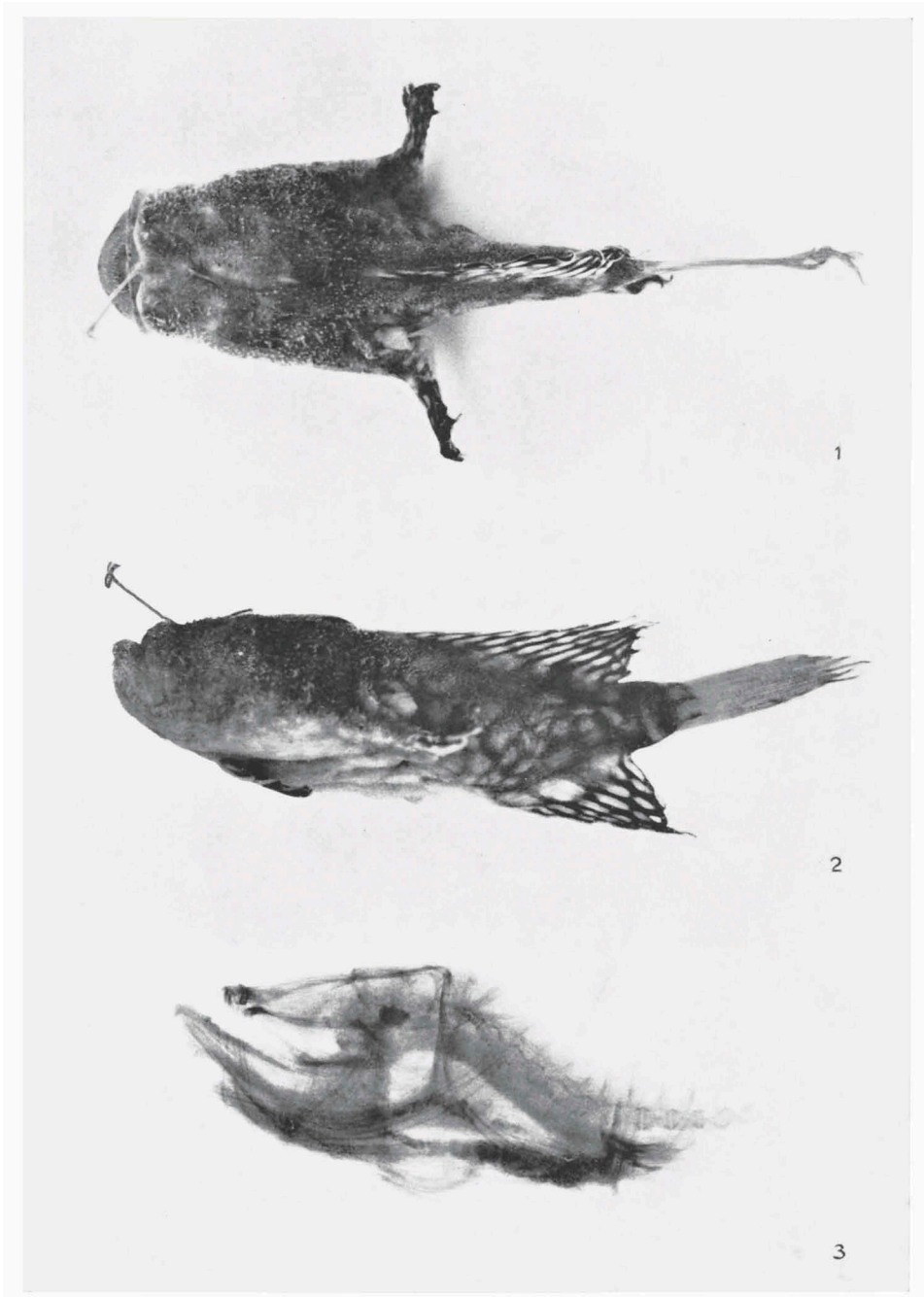
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The accompanying plates have been made after photographs by Mr. H. F. Roman, and after X-rays expertly made by Mr. J. Simons of the Leiden Zoological Laboratory.

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Lophichthys boschmai nov. spec.

Fig. 1, holotype in dorsal view; 2, holotype in lateral view; 3, X-ray of holotype in lateral view. 1, 2, $\times 1.5$

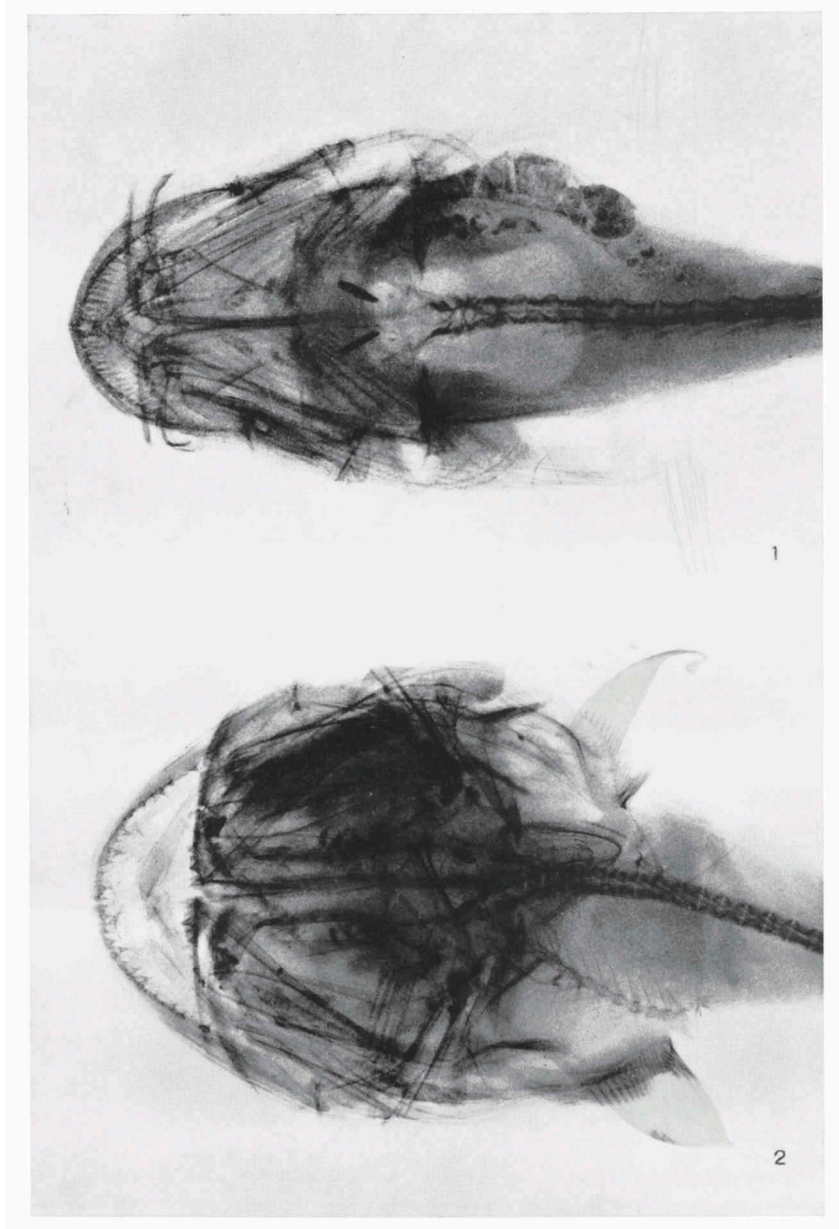


Fig. 1, *Lophichthys boschmai* nov. spec., X-ray of holotype in dorsal view.
Fig. 2, *Lophius piscatorius* L., specimen no. R.M.N.H. 20953, total length 142 mm,
X-ray in dorsal view.