

AMERICAN MUSEUM NOVITATES

PUBLISHED BY THE AMERICAN MUSEUM OF NATURAL HISTORY
CITY OF NEW YORK JULY 24, 1951 NUMBER 1531

PRELIMINARY REVISION OF THE ALEPO- CEPHALIDAE, WITH THE INTRODUCTION OF A NEW FAMILY, SEARSIDAE¹

BY A. E. PARR

At the invitation of Dr. A. Vedel Taaning, of Marinbiologisk Laboratorium in Denmark, to study the collections accumulated over a long period by the Dana expeditions the writer has, for the past six years, been engaged upon the preparation of a monographic account of the alepocephalids, which has necessitated an extensive and often radical revision of the identities and the classification of genera and species. Since it may still take several years before the complete account will actually appear in print, it has been considered advisable to make the general features of the proposed reclassification available at this time, in order to facilitate the integration of the final manuscript with the work of others dealing with these fishes in the meantime.

In the course of this investigation the author has enjoyed the hospitality and the privilege of examining the collections of many institutions, including the British Museum, the museums of Amsterdam, Bergen, Göteborg, Monaco, and Paris, the Museum of Comparative Zoölogy, the United States National Museum, and the Bingham Oceanographic Collection. He has also benefited by the loan of specimens from the Carnegie Museum, the Indian Museum, the University Collections of Tokyo, the Australian Museum, and the South African Museum. A more adequate acknowledgment of the generous help of all these institutions and their staffs will be made in the final report, but the author also wishes to express his great gratitude here.

In his studies of the family Alepocephalidae, as now under-

¹ Papers from the "Dana" Oceanographical Collections, Number 37.

stood, the author has been strongly impressed by the apparent systematic significance as well as the practical usefulness of the "shoulder organ" in determining probable relationships within the family, and in identifying the genera.

The shoulder organ consists of a quite large sac underneath the skin, often extending forward partly underneath the upper posterior portion of the cleithrum, and an external tube. The sac is lined with black integument and traversed from outer to inner wall by irregular strands or columns of soft tissues. There can be no doubt that this represents a secretory organ, and it seems quite likely that its function may be to secrete a luminous mucus. The sac discharges through a tube, also lined with black tissue, which extends backward and projects freely on the outside of the skin over a considerable part of its length, with a, usually, simple opening at its tip. It is this externally projecting tube that is so useful in the sorting of the material.

This free tube is darkly pigmented and therefore conspicuous and easily observed at first glance. It is apparently quite strong, since it seems to withstand considerable abrasion and the loss of all scales. The writer has not seen a single specimen on which it was not easily found, unless the skin itself had been lost. It also, as a rule, seems to withstand fading better than the skin in general, tending to make it more, rather than less, conspicuous after long preservation. In case of doubt, due to the condition of the specimen, the sac itself should be looked for, but the author has not seen a single instance in which it was necessary to do so for loss of the external tube, except in the presence of a general disintegration of the soft tissues of the shoulder region.

Finally the external tube always occupies exactly the same position on the body regardless of the great range of variations both in general shape and proportions among the genera in which this organ is present. This would seem to lend additional support to the assumption that the shoulder organ must be a feature of basic systematic significance. The external tube is always found some distance behind the upper portion of the cleithrum and always much closer to the lateral line than to the bases of the ventrals. It also invariably points slightly upward as well as backward, towards the lateral line. The only variation would seem to be in the length of both the internal and the external portions of the tube, which may place the freely projecting part slightly farther forward or backward with reference to the shoulder girdle

and the bases of the pectoral fins.

By the use of the shoulder organ it is thus possible to divide the whole family into two easily segregated groups, as follows:

- A. Shoulder organ present.....Searsidae, new family
- B. Shoulder organ absent.....Family Alepocephalidae

The segregation of the Searsidae from the Alepocephalidae is not, however, primarily based upon the unique shoulder organ, but upon a great number of converging series of morphological variations, pointing quite independently towards a close relationship within the new family. Among such features are: a tendency towards thickening of the ventral wall of the abdominal cavity, already pronounced in *Searsia* and reaching an extreme in *Platytroctes*; a tendency for the premaxillaries to develop horizontal, forward-directed tusks at their anterior end, above the actual margin of the mouth; a tendency towards the development of more highly differentiated luminous organs in very definite locations, more reminiscent of the Myctophidae than of the minute, irregularly scattered organs found in some Alepocephalidae (as here restricted); and a tendency towards small pectoral fins with numerous rays, and short pyloric caeca of moderate basic numbers but often branching repeatedly.

Any one of these (and other) tendencies may not have found sufficient expression in a particular genus or species to be relied upon as universal diagnostic characters for the new family, which would thus have required a rather complex diagnosis if it were not for the presence of the unique shoulder organ, to facilitate rather than dictate the segregation of the Searsidae.

In regard to the relationship between maxillaries and premaxillaries, which has been a basic consideration in the customary subdivision of the Alepocephalidae, *sensu lato*, the maxillaries in the Searsidae always form the greater portion of the free margin of the upper jaws.

NOTES ON THE KEYS

The letter "L" stands for the "standard length" or length without caudal fin.

The functions used to relate relative proportions to absolute standard length (L) are those previously introduced and explained by the writer (Parr, 1949).

FAMILY ALEPOCEPHALIDAE

KEY TO THE GENERA

- I. Two supramaxillaries.
 - A. Free edge of premaxillaries discontinuous. Anterior lateral edge sweeping backward into the mouth and crossing underneath the posterior free edge, which arises as a ridge from the upper anterior surface of the premaxillary and continues to a tapered point under the lower edge of the maxillary. Interoperculum a large triangular shield, almost entirely exposed beyond the preopercle, with its apex directed downward and backward. Dorsal and anal fins subequal and opposite. Pectorals rudimentary. Lower jaw prominent, with the symphyseal knob continuing the profile of the snout downward and forward. Scaleless at 66.5 mm. L. Larger specimens possibly scaly. *Mirognathus*, new genus
Mirognathus normanii, new species
 - B. Premaxillaries normal, with continuous free edge. Interoperculum normal, elongate, directed more or less upward and backward, and to a considerable extent covered by the preopercle.
 1. Body scaleless, apart from rudimentary, ring-like scales in the lateral line. Anterior supramaxillary greatly reduced, scale-like, without definitely fixed form. Premaxillaries normal. Dentition of the maxillaries approximately equal to, or more extensive than, that of the premaxillaries. Teeth in single series. Origin of dorsal fin approximately opposite or slightly anterior to origin of anal fin. Pectoral and caudal fins without produced rays. *Rouleina* sp.
 2. Body completely scaly (in adults). Anterior supramaxillary not rudimentary.
 - a. Dentition of maxillaries absent or relatively insignificant in comparison with premaxillary dentition. Teeth in jaws in single series. Both supramaxillaries usually strong, thick, well ossified, and often sculptured. Origins of dorsal and anal fins approximately opposite, distance from snout to anal fin never exceeds distance to dorsal fin by more than 8 per cent of L, and only very rarely by more than 5 per cent. Pectorals without produced rays. A, 16-32. Pyloric caeca, 7-24. Genus *Alepocephalus* Risso, 1820¹
 - b. Dentition of maxillaries approximately equal to, or more extensive and stronger than, that of the premaxillaries. Anterior supramaxillary below and anterior to posterior supramaxillary, which cannot be depressed behind it.
 - x. Each pectoral fin with a greatly produced strong ray. Dorsal and anal fins subequal, with 20 to 23 rays. Caudal fin with produced, pointed lobes equal to 25 per cent of L, or more. Distance from snout to anal fin only

¹ Including *Normania* Parr, 1937 (= *Proditor* Whitley, 1940a = *Noriona* Strand, 1942), and *Halisauriceps* Fowler, 1933.

- exceeds snout to dorsal by 2 to 5 per cent of L. P, 11.
About 10 pyloric caeca. Genus *Nemabathytroctes* Fowler, 1934
- xx. Pectorals and caudal fin without produced rays. Caudal lobes less than 20 per cent of L.
- z. Dorsal and anal fins approximately equal and opposite, with distance from snout to anal fin from 2 per cent of L less to 3 per cent of L more than distance from snout to dorsal fin, and anal fin base only 0 to 2 per cent of L longer than dorsal fin base. D, 18-22. A, 21-23. P, 11-16.
- y. Head very large, 35 per cent of L, corresponding to $(43 - .03 L)$ per cent of L at 160 mm. L. Jaws very long, upper jaws about 15.4, corresponding to $(18 - .016 L)$, lower jaw about 17.4, corresponding to $(20.6 - .02 L)$ or $(22.2 - .03 L)$ per cent of L. Premaxillaries with a separate, external, lateral series of teeth above the regular dentition. Genus *Talismania* Goode and Bean, 1896
- yy. Heads moderate, less than $(36 - .03 L)$ per cent of L. Jaws moderate, upper jaws less than $(14 - .016 L)$, lower jaws less than $(17 - .02 L)$ or $(18 - .03 L)$, per cent of L. Premaxillaries without external series of teeth. Genus *Binghamichthys* Whitley, 1941
- zz. Origin of dorsal fin well in advance of origin of anal. Distance from snout to anal fin exceeds distance from snout to dorsal by 6 to 14 per cent of L. A, 11-17. D, 13-21.
- y. Scales present on cheeks and opercles. *Lepogenys*, new genus
Genotype: *Bathytroctes squamosus* Alcock, 1889
- yy. Scales entirely absent from head.
- v. Teeth in jaws in single series. Six to 21 pyloric caeca. P, 10-18. Genus *Bathytroctes* Gunther, 1878¹
- vv. Teeth in jaws pluriserial. Pyloric arm joins ventricle of stomach near its middle (stomach caecal), eight to 10 simply pyloric caeca. P, 6-12. Base of anal fin 3 to 6 per cent of L shorter than base of dorsal. Genus *Narcetes* Alcock, 1890

II. Only one single supramaxillary.²

¹ Including *Bajacalifornia* Townsend and Nichols, 1925.

² Irregularly formed, rudimentary, anterior supramaxillaries may be present in some species of *Rouleina* (e.g., *R. tanakae* and *R. guntheri*). Although these bear little resemblance to the well-developed anterior supramaxillaries of the genera under the first section of this key, *Rouleina* is included and differentiated under both sections in order to avoid confusion.

- A. Origin of dorsal fin much closer to the vertical from the bases of the ventrals than to the origin of anal fin, the distance from snout to anal being more than 7 per cent of L longer than snout to dorsal. Vertical fins short, anal fin slightly shorter than dorsal, with one to four fewer rays, and 2 to 5 per cent of L shorter base. Anal fin with only 11 to 16 rays, its base only 7 to 11 per cent of L. Heads large, not less than $(40 - .02 L)$ per cent of L.
1. Upper jaws with teeth, ending approximately below the posterior rim of the orbit. Premaxillaries of normal form, with two series of teeth and a tapering, tooth-bearing, backward extension. Supramaxillary strongly ossified, not tightly applied to maxillary. Origin of anal fin behind the vertical from the end of the base of dorsal, about 15 per cent of L farther from the snout than is the origin of dorsal fin. Body completely scaly. Anus about midway between insertion of ventrals and origin of anal fin..... *Bellocia*, new genus
Bellocia vaillanti, new species
 2. Upper jaws toothless but strong, extending far behind the posterior rim of the orbit. Premaxillaries as vertical lamellae, truncated posteriorly at the maxillary knob. Supramaxillary only a thin, scale-like lamella, tightly applied to the upper posterior end of the maxillary. Snout to anal fin 8 to 12 per cent of L longer than snout to dorsal fin. Eight to 12 pyloric caeca. Anus in last one-fifth of distance between insertion of ventrals and origin of anal fin.
 - a. Lateral line on body absent or very indistinct. Only about seven branchiostegals. Scaleless at 50 mm. L. Origin of anal fin under the base of dorsal fin.....
..... Genus *Anomalopteroichthys* Whitley, 1940b
Syn. *Anomalopterus* Vaillant, 1888
 - b. Lateral line very distinct. Thirteen branchiostegal rays. Body completely covered with scales (at 250 mm. L). Origin of anal fin approximately below or slightly behind the end of dorsal fin base.....
..... Genus *Leptochilichthys* Garman, 1899
- B. Origin of dorsal fin much closer to the vertical from the origin of anal fin than to the bases of the ventrals, or even far behind the origin of anal fin, the distance from snout to anal fin usually shorter, and always less than 5 per cent of L longer than snout to dorsal fin. Anal fin with 15 to 85 rays, its base 12 to 62 per cent of L. Mouth small to rather large, but maxillary never extends far beyond posterior rim of orbit.
1. Small, scaleless, black forms with very small heads measuring less than $(24 - .05 L)$ ¹ per cent of L. Vertical fins very posterior, their origins approximately opposite, or with anal fin slightly in advance, and the distance from the snout to the origins of both dorsal and anal fins more than 75 (75-80) per cent of L. Pec-

¹ Actually measured heads are less than $(24 - .06 L)$ per cent of L.

toral fins short and broad, with 18 to 20 rays. Anal fin with fewer than 20 rays, but distinctly longer than dorsal fin, with three to five more rays, and 4 to 6 per cent of L longer at the base. Only three small, simple pyloric caeca. Slender, depth only 12 to 17 per cent of L. Anus nearer to the insertion of the ventrals than to the origin of anal fin.

..... Genus *Photostylus* Beebe, 1933

2. Moderate to large forms, with or without scales, with heads always longer than $(25 - .05 L)$ per cent of L. Distance from snout to origin of dorsal fin less than 73 (51-73) per cent of L.
 - a. Dorsal and anal fins subequal and opposite, or with the anal shorter and beginning behind the dorsal. Snout to dorsal fin not more than 1 per cent of L longer than the distance from the snout to origin of anal fin. Anal with not over one ray more than dorsal fin, and anal fin base not more than 1 per cent of L longer than dorsal fin base.
 - x. Rudimentary scales may be present in the lateral line, but otherwise completely scaleless, with a firm black skin. Six to 11 simple pyloric caeca. Anus nearer to the origin of anal fin than to the insertion of the ventrals.
 - z. Dorsal and anal fins short, D, 18-22; A, 15-21. Anal base less than 20 per cent of L, about equal $(4/5 - 6/5)$ to distance from base of last anal ray to base of middle caudal ray. Heads moderate to large, $(28 - .03 L)$ to $(50 - .03 L)$ per cent of L.
..... Genus *Rouleina* Jordan, 1923
 - zz. Dorsal and anal fins long, D, 27-33; A, 26-32. Anal base more than 23 per cent of L, two to three times the distance from the base of last anal to the base of middle caudal ray. Heads small, less than $(32 - .03 L)$ per cent of L.
..... Genus *Xenodermichthys* Gunther, 1878
 - xx. Body entirely covered with scales. Heads large, more than $(43 - .03 L)$ per cent of L, up to 50 per cent of L, or more. Anal fin with only 15 to 20 rays, its base less than 20 per cent of L.
 - z. Pectoral fins very wide, with 14 to 19 rays, width at base of rays more than 4 per cent of L, inserted under the gill cover, which completely covers their bases and the proximal portions of the fins themselves. Distance from snout to pectorals more than 2 per cent of L shorter than head. Only four to 10 simple pyloric caeca. Frontals without rough tubercles. No scales before pectoral fins. Anus about midway between the insertion of ventrals and origin of anal fin, or somewhat nearer to the anal.
..... Genus *Asquamiceps* Zugmayer, 1911
 - zz. Pectoral fins narrow, with only seven to 11 rays, width at base of rays less than 4 per cent of L. Numerous

(17) long, simple, pyloric caeca, the longest 10 to 12 per cent of L. Frontal ridges with rough tubercles. Scales before pectorals. Pectoral bases free from gill cover, which reaches its most posterior point in a dermal flap below the pectorals. Anus in the last one-fifth of the distance between insertion of ventrals and origin of anal fin.....

.....*Brunichthys*, new genus

Genotype: *Alepocephalus asperifrons* Garman, 1899

- b. Anal fin distinctly longer than, and its origin distinctly in advance of, the dorsal fin, the distance from snout to dorsal fin being 3 to 17 per cent of L longer than the distance from snout to anal fin. Anal fin with 24 to 85 rays, or four to 25 rays more than in dorsal fin, its base 4 to 23 per cent of L longer than dorsal fin base. Only six to 12 rays in pectoral fins.
- x. Body attenuate, scaleless, depth less than 10 per cent of L. Dorsal and anal fins nearly or entirely confluent with the caudal. Depth of tail before caudal fin base only about 1 to 1.5 per cent of L. Head small, less than $(30 - .05 L)$ per cent of L, but more than $(25 - .05 L)$ per cent. Vertical fins very long, more than 50 rays in dorsal, more than 70 rays in anal, fin. Anal fin base 58 to 62 per cent of L, its origin far in advance of the origin of dorsal fin. Snout to anal fin only 38 to 42 per cent of L. Snout and supramaxillaries as in *Conocara*. Only two small pyloric caeca, arranged as an opposite pair. Anus about midway between insertion of ventrals and origin of anal fin, or somewhat nearer to the anal.
..... Genus *Leptoderma* Vaillant, 1888
- xx. Body normal, completely covered with scales. A well-defined free caudal peduncle with a least depth of about 5 (4.9) to 10 per cent of L. Least distance from base of middle rays in caudal fin to base of nearest ray in dorsal or anal from 7 to 13 per cent of L. Heads not less than $(32.5 - .025 L)$ per cent of L. Dorsal fin with fewer than 35, anal with fewer than 45, rays. Anal fin base less than 35 per cent of L. Snout to anal fin 57 to 75 per cent of L. Anus in the third to fourth one-fifth of the distance between the insertion of ventrals and origin of anal fin.
- z. Bases of pectoral fins well behind posterior edge of gill cover. Distance from snout to pectorals equal to, or greater than, maximum distance from snout to edge of gill cover (length of head).¹ Scales before

¹ In many alepocephalids the length of the head is somewhat greater than the distance from snout to pectorals, but this still leaves the pectorals free because the maximum distance to the edge of the gill cover is found above or below the pectoral bases.

- pectoral bases, but squamation interrupted immediately above the pectorals by a narrow naked band extending from the gill cavity to the pectoral axil.¹
- y. Snout distinctly longer than lower jaw, which is more than twice as long as the very short upper jaws, whose length is less than 6 per cent of L, thus creating a long, tubular, oral cavity with a small anterior mouth. Four small pyloric caeca. . . . Genus *Aulastomatomorpha* Alcock, 1890
 - yy. Lower jaw considerably (more than 20 per cent) longer than the snout, but less than 70 per cent longer than the upper jaws, which are more than 8 per cent of L.
 - v. Snout blunt, subvertical in both lateral and anterior views. Premaxillaries normal, uniformly covered by smooth, unbroken skin. Heads small, less than (40 — .025 L) per cent of L. Four to eight short pyloric caeca. Genus *Conocara* Goode and Bean, 1895
 - vv. Anterior portion of premaxillaries form a strong, expanded plate with a hard upper edge which penetrates the skin and is sometimes (perhaps always in perfect specimens) furnished with a series of broad, semicircular or semielliptic, horizontal teeth. The expanded portion of the premaxillaries extends upward, outward, and forward from the mouth, making the snout slightly but conspicuously prominent both in lateral and in anterior views. Heads moderate to large. Two to eight short pyloric caeca. Genus *Ericara* Gill and Townsend, 1897
 - zz. Gill cover extends beyond bases of pectorals, covering part of the fins. Distance from snout to pectoral bases less than length of head by more than 2 per cent of L. Pectoral bases completely surrounded by scales both in front and above, without scaleless band crossing from gill cavity to axil. Anal fin with 27 to 35 rays, its base 27 to 31 per cent of L. Origin of dorsal fin well behind origin of anal. Five to six pyloric caeca.
 - y. Snout prominent, premaxillaries and supramaxillary as in *Ericara* (see above). Maxillary normal, its posterior outer surface subvertical.

¹ This scaleless band is plainly indicated in Alcock's figure of *Aulastomatomorpha phosphorops*, but this genus has not been seen by the writer.

Head more than $(40 - .025 L)$ per cent of L ...

..... *Einar*, new genus

Genotype: *Alepocephalus macrolepis* Koefoed, 1927

yy. Snout not as in *Ericara*, not, or only slightly, prominent, its dorsal profile slanting backward from the anterior part of the normally oriented premaxillary, which is provided with a narrow, vizor-like lateral and anterior shelf on the side of its forward portion: Expanded posterior portion of maxillary twisted almost 90 degrees, so that its main surface is subhorizontal, exposing only a narrow lateral edge below a thin, oval, probably immobile supramaxillary. Head less than $(37 - .025 L)$ per cent of L

..... *Torictus*, new genus

Genotype: *Alepocephalus edentulus* Alcock, 1892

NOTES ON GENERA AND SPECIES

..... **MIROGNATHUS**, NEW GENUS

Mirognathus normani, new species

TYPE SPECIMEN: In British Museum, from Discovery Station 395, latitude $48^{\circ} 26' S$., longitude $22^{\circ} 10' W$., May 13, 1930, 1500 to 1600 meters.

Length without caudal fin, 66.5 mm. Proportions in per cent of length without caudal: length of head, 23.5; snout, 9.2; orbit, 4.5; interorbital width, 5.2; combined length of upper jaws, 12.2; premaxillary, 5.6; posterior supramaxillary, 3.7; lower jaw, 15.0; snout to ventrals, 43.6; snout to dorsal, 60.8; snout to anal, 61.7; greatest depth of body, 13.2; least depth of caudal peduncle, 5.3.

D, $18\frac{1}{2}$; A, $16\frac{1}{2}$; V, 5; Br, 7.

Pectorals rudimentary, one minute fin base present on one side only. Two very dissimilar pyloric caeca, one large sac anteriorly and one small, bulb-like caecum on the side of the intestine.

Other characters are as shown in the key.

GENUS **NEMABATHYTROCTES** FOWLER, 1934

Nemabathytroctes bifurcatus, new species

TYPE SPECIMEN: In Dana Collection, Station 1203^x, latitude $7^{\circ} 30' N$., longitude $79^{\circ} 19' W$., January 11, 1922, 3500 meters wire.

Length without caudal fin, 202 mm. Proportions in per cent of length without caudal: length of head, 38.1; snout, 11.1; orbit, 7.0; interorbital width, 8.7; combined length of upper jaws,

19.0; posterior supramaxillary, 7.4; lower jaw, 20.5; snout to ventrals, 52.0; snout to dorsal, 62.5; snout to anal, 64.8; produced pectoral ray, 65–69; produced caudal rays, 26.5; greatest depth of body, 23.3; least depth of caudal peduncle, 7.4.

D, 22; A, 23; P, 11; V, 6; Br, 7. Pyloric caeca, 10. Gillrakers in first arch 23, 15 on lower limb. About 68 scales in longitudinal count, about 22 transversely.

Differs from *N. longifilis* (Brauer) by having much larger scales and in other features.

GENUS **TALISMANIA** GOODE AND BEAN, 1895

The genus, as here defined, is limited to the genotype, *Bathytroctes homopterus* Vaillant, 1888, of which only the type specimen is known. Other specimens subsequently referred to this species have been found to pertain either to *Normichthys operosa* or to *Holtbyrnia polycoeca*, both of the family Searsidae.

GENUS **BATHYTROCTES** GUNTHER, 1878

Bathytroctes koefoedi, new species

Bathytroctes alvifrons KOEFOED, 1927, p. 45.

TYPE SPECIMEN: Bergen Museum ex No. 3351, Michael Sars Station 53, latitude 34° 59' N., longitude 33° 01' W., June 9, 1910, 2865 meters.

Only about 40 to 43 scales in longitudinal count. Anus in the middle one-third of the distance between the insertion of anterior ventral fin ray and the origin of anal fin. Heads very large, more than $(41 - .03 L)$, sphenotic width of skull more than $(17.5 - .015 L)$, per cent of L. The symphysis of the lower jaw does not extend the profile of the head forward of the snout. Length of lower jaw distinctly greater than combined length of upper jaws. Origin of anal fin below the base of dorsal fin. Anterior supramaxillary extends forward well beyond anterior point of posterior supramaxillary.

D, $13\frac{1}{2}$ – $16\frac{1}{2}$; A, $11\frac{1}{2}$ – $13\frac{1}{2}$; P, 12; V, 7–8; Br, 7. Pyloric caeca, 6–8. Gillrakers in first arch 21, 15 on the lower limb.

The combination of the above characters distinguishes the species from any other species of *Bathytroctes* known at present. Nearest relatives are *B. alvifrons* Garman and *B. macrolepis* Gunther, from the East and West Pacific.

Length of type specimen without caudal, 314 mm.

Bathytroctes danae, new species

TYPE SPECIMEN: In Dana Collection, Station 3714^{VI}, latitude 15° 22' N., longitude 115° 20' E., May 20, 1929, 600 meters wire.

Only about 60 to 62 scales in longitudinal count, 16 in transverse count. Anus in the last one-fourth of the distance from the insertion of anterior ventral fin ray to origin of anal fin ("at anal fin"). Length of head corresponding to (33 — .03 L), width of skull to (14.5 — .015 L), per cent of L. The symphysis of the lower jaw does not extend the profile of the head forward of the snout. Caudal peduncle deep, its least depth about 10 to 10.5 per cent of L at 160 mm. L. Diameter of orbit corresponds to (13.5 — .03 L) per cent of L.

D, 16¹/₂; A, 15¹/₂; P, 12; V, 8; Br, 7. Pyloric caeca, 11. Gillrakers 33 in first arch, 23 on the lower limb.

The combination of the above characters distinguishes the species from any other species of *Bathytroctes* now known. Nearest relative is *B. zugmayeri* Fowler, from off Celebes.

Length of type specimen without caudal, 161 mm.

BELLOCIA, NEW GENUS**Bellocia vaillanti**, new species

Bathytroctes melanocephalus VAILLANT, 1888, pl. 11, fig. 3 (not *B. melanocephalus* Vaillant, 1888, description on p. 157).

Examination of the type of *B. melanocephalus* (No. 85-167, Paris Museum) and the paratype (No. 86-3, Paris Museum) has shown the two to be entirely unrelated. The same discrepancy is found between Vaillant's description, which agrees with the type, and his figure, which is in accord with the paratype.

Bathytroctes melanocephalus Vaillant, type specimen No. 85-167, belongs in the genus *Holtbyrnia* Parr and may not be distinguishable from *H. innesi* (Fowler).

Specimen No. 86-3 in the Paris Museum is hereby made the type of a new species and a new genus, *Bellocia vaillanti*, with the following characteristics:

Length without caudal, 104.5 mm. Proportions in per cent of length without caudal: length of head, 40.2; snout, 12.4; orbit, 10.3; interorbital width, 7.2; length of upper jaws combined, 23.5; premaxillary, alone, 10.5; supramaxillary, 10; lower jaw, 24.6; snout to ventrals, 65.4; snout to dorsal, 66.1; snout to anal fin, 80.9.

D, $14\frac{1}{2}$; A, $11\frac{1}{2}$; P, 10; V, 9; Br, 8.

Other characters are as shown in the key.

GENUS **ROULEINA** JORDAN, 1923

Rouleina JORDAN, 1923, p. 122.

Caudania ROULE, 1935, p. 2.

Talismania (*partim*) various authors.

Aleposomus (*partim*) various authors.

Bathytroctes (*partim*) various authors.

Xenodermichthys (*partim*) various authors.

The identification and classification of the species of *Rouleina* have been subjects of great confusion. The genus shows a very great range of variation in regard to the size of the head, but it unfortunately also shows such complete intergradations in this dominant feature, when all species are considered, that it is difficult to maintain clearly even subgeneric distinctions, much less generic separations. A full key will be given in the final monograph of the Alepocephalidae and Searsidae, now in preparation.

Among the forms with the largest heads is *Bathytroctes attritus* Vaillant, 1888, of which *Bathytroctes mollis* Koehler, 1895, the genotype of *Caudania*, is only a synonym. *Talismania aequatoris* Goode and Bean, 1895, and *Aleposomus nudus*¹ Brauer, 1906, are only slightly different from *R. attritus*. *Bathytroctes harperi* Fowler, 1934, and *Bathytroctes welshi* Fowler, 1934, cannot be reliably distinguished from each other or from *R. aequatoris* and are probably only synonyms or, at most, subspecies, of the latter.

Rouleina maderensis Maul, 1948, and *Aleposomus lividus* Brauer, 1906, are closely related species with large heads and also very large eyes and with a very distinct and salient lateral line, supported by ring-like scales. *R. danae*, one of the new species herein described, differs from these in having the lateral line almost obliterated and invisible to the naked eye.

Among the forms with smaller heads are *Xenodermichthys guntheri* Alcock, 1892, the genotype of *Rouleina*. *Xenodermichthys squamilateratus* Alcock, 1889, and *Aleposomus watasei* Tanaka, 1909, are both very closely related to *R. guntheri*, the former being particularly difficult to differentiate. *Rouleina eucla* Whitley, 1940, would appear to be synonymous with *R. squamilateratus*, and *Xenodermichthys funebris*² Fowler, 1943, cannot be differenti-

¹ Type species of the subgenus *Bathypropteron* Fowler, 1934.

² Type species of the subgenus *Auchenalepoceps* Fowler, 1943 (genus *Xenodermichthys*).

ated from *R. watasei*. The new species *R. tanakae*, described below, belongs among the forms with small heads, but differs from all the other species in this group by its long snout.

***Rouleina tanakae*, new species**

Aleposomus watasei TANAKA, 1909, p. 14 (*partim*: specimen B, paratype, only).

TYPE SPECIMEN: University Collection, Tokyo, No. 2148, from Okinose, near Misaki, Japan, February, 1908.

Length without caudal fin, 242 mm. Proportions in per cent of length without caudal: length of head, 26.2; snout, 6.3; orbit, 6.3; interorbital width, 4.8; combined length of upper jaws, 12.0; posterior supramaxillary, 4.3; lower jaw, 13; snout to ventrals, 53.3; snout to dorsal, 64.5; snout to anal, 67.7; greatest depth of body, 16.5; least depth of caudal peduncle, 7.9.

D, 20; A, 16–17; P, 7; V, 6; Br, 6. Pyloric caeca, 10. Gillrakers in first arch 23, 15 on lower limb. About 60 pores in lateral line to base of caudal fin, plus about five pores on caudal fin.

Lateral-line tube salient, supported by ring-like scales. Stomach caecal. Rudimentary, scale-like anterior supramaxillary present on both sides.

***Rouleina danae*, new species**

TYPE SPECIMEN: In Dana Collection, Station 3686^{VI}, latitude 8° 34' N., longitude 119° 55' E., April 6, 1929, 4000 meters wire.

Length without caudal, 108 mm. Proportions in per cent of length without caudal: length of head, 37; snout, 5.6; orbit, 13.4; interorbital width, 2.9; combined length of upper jaws, 17.6; supramaxillary, 7.4; lower jaw, 20.4; snout to ventrals, 53.7; snout to dorsal, 69.2; snout to anal, 67.0; greatest depth of body, 20.0; least depth of caudal peduncle, 6.8.

D, 22; A, 22; P, 7; V, 7; Br, 6. Pyloric caeca, 7. Gillrakers in first arch about 25, 17 on lower limb.

Lateral line apparent only under magnification. Pores too small for an ordinary pin to enter. No salient tube or ring-like scales. Stomach siphonal to siphon-caecal.

GENUS **ERICARA** GILL AND TOWNSEND, 1897

Ericara GILL AND TOWNSEND, 1897, p. 232 (*E. salmonea*).

Xenognathus GILBERT, 1915, p. 311 (*X. profundorum*).

Whitleyidea (subgenus of *Alepocephalus*) FOWLER, 1934, p. 247 (for *Alepocephalus niger* Gunther).

The genotypes of the monospecific genera *Ericara* and *Xenognathus* would appear to be not only generically, but also specifically, identical. *Alepocephalus niger* Gunther (1887, p. 224) also belongs in the same genus, although specifically distinct from *E. salmonea*.

SEARSIDAE, NEW FAMILY

KEY TO THE SUBFAMILIES

- I. Upper jaws form part of the interior roof of the mouth, with the single supramaxillary and the posterior and larger portion of the maxillary located inside of the ascending rami of the bones of the lower jaw.
 Mirorictinae, new subfamily
 Genus *Mirrorictus* Parr, 1947
- II. Jaws normal. Upper jaws forming the exterior rim and outer lateral shield of the mouth, with the posterior portion of the maxillary and the two supramaxillaries passing and terminating outside of the ascending portions of the lower jaw.
 - A. Deep-bodied forms, least depth of caudal peduncle substantially less than 30 per cent of greatest depth of trunk which is more than 30 per cent of L. Abdominal cavity separated from the ventral profile by a thickened ventral wall of solid tissue of a thickness approximately equal to one-fourth of the greatest depth of the trunk, and about equal to, or substantially greater than, the least depth of the caudal peduncle. Platytroctinae, new subfamily
 1. Ventral fins present. Genus *Platytroctegen* Lloyd, 1909
 2. Ventral fins absent. Genus *Platytroctes* Gunther, 1878
 - B. Elongate forms. Depth of body not over 25 per cent of standard length. Least depth of caudal peduncle more than 30 per cent of greatest depth of body. Thickness of ventral body wall between abdominal cavity and ventral outline not over one-half of the least depth of caudal peduncle. Searsinae, new subfamily

KEY TO THE GENERA AND SPECIES OF THE SUBFAMILY SEARSINAE

- I. Heads large, not less than $(40 - .0625 L)$ per cent of L. Jaws long, upper jaw reaches approximately to, or far beyond, vertical from posterior margin of orbit, its length greater than the combined length of snout and orbit and greater than $(21 - .0375 L)$ per cent of L. Lower jaw not less than $(25 - .06 L)$ per cent of L. Scales covering area between upper branch of post-temporal and skull. Scales small, 80 to 110 in a longitudinal series above the lateral line. A short, separate series of teeth on the external lateral surface of the lower jaw near the symphysis in the adults, but no lateral bony spine as in *Barbantus*.
 Genus *Holtbyrnia* Parr, 1937
- A. Heads very large, more than $(45 - .0625 L)$ per cent of L. Jaws very

long, upper jaw extends far beyond orbit, its length more than 5 per cent of L greater than the combined length of snout and orbit, and more than (26 — .0375 L) per cent of L. Lower jaw more than (32 — .06 L) per cent of L. Origin of dorsal fin much nearer to vertical from the insertion of anterior ventral fin rays than to the vertical from the origin of anal fin, which is approximately below the middle of dorsal fin base. Pyloric caeca branched, more than 20 terminal diverticles. Stomach caecal. Lateral-line scales conspicuously enlarged, only a little more than half as many as in a longitudinal series above.....*Holtbyrnia*, new subgenus

Holtbyrnia melanocephalus (Vaillant, 1888)

Holtbyrnia innesi (Fowler, 1934) syn. ?

- B. Heads less than (43 — .0625 L) per cent of L. Jaws moderate. Upper jaw reaches approximately to, or somewhat beyond, the vertical from the posterior margin of the orbit, its length .5 to 3.0 per cent of L longer than the combined length of snout and orbit, and not over (24 — .0375 L) per cent of L. Lower jaw less than (30 — .06 L) per cent of L. Origin of dorsal fin approximately midway between the insertion of anterior ventral fin rays and the origin of anal fin, which is approximately below the end of the first third of the dorsal fin base. Pyloric caeca simpler, fewer than 15 terminal diverticles. Stomach siphonal.....*Mentodus*, new subgenus
1. No dermal pit behind the shoulder girdle. No luminous organs along the ventral portions of the body. Outer side of lower jaw with a short, comb-like series of strong, horizontal teeth anteriorly, well below the normal dentition along its upper edge. Fourteen simple, straight pyloric appendages.....*Holtbyrnia* (*M.*) *rostratus* (Gunther, 1878)
 2. A large, dark-rimmed, dermal pit behind the posterior edge of the supracleithrum. Distinct luminous organs ventrally (as in *Searsia*) in the thoracic region, at bases of ventrals, at anus, at end of anal fin, and at origin of procurent caudal fin rays. Minute indications of lateral horizontal teeth in some specimens. Six to eight pyloric caeca, some branched, but fewer than 10 terminal diverticles. Only small specimens known.....*Holtbyrnia* (*M.*) *polycocca* (Parr, 1937)
- II. Heads smaller, less than (40 — .0625 L) per cent of L. Jaws shorter, upper jaw conspicuously short of the vertical from the posterior margin of orbit, its length less than the combined length of snout and orbit and less than (21 — .0375 L) per cent of L. Lower jaw not more than (24 — .06 L) per cent of L. Lateral-line scales not enlarged.
- A. No bony spine projecting laterally from the tip of the lower jaw. No longitudinal mid-ventral luminous band from shoulder girdle to ventrals. Localized luminous organs present or absent, sometimes including a transverse luminous line in thoracic region. No lateral horizontal teeth in lower jaw.
 1. Well-defined luminous organs in definite locations on ventral surface of body, including: one median, or a pair, at origin of procurent caudal rays; one on each side above posterior third

of anal fin base; one on each side immediately above anus; one on each side above ventral fin bases; a short transverse series (two to three organs) or a linear transverse organ across the ventral median in the thoracic region; one on each suboperculum and on each exposed branchiostegal; and others. No dermal pits behind shoulder girdle. About 30 (29-35) gillrakers in first arch.

- a. Dorsal and anal fins subequal and approximately opposite, with dorsal fin base less than 4 per cent of L longer than anal fin base. Distance from snout to anal fin always less than 4 per cent of L longer than distance from snout to origin of dorsal fin, which is above or behind the last one-third of the distance between the base of anterior ventral fin ray and the origin of anal fin. Area between skull and ascending limb of post-temporal bone largely without scales, almost entirely occupied by the wide and branching lateral-line canals, with numerous conspicuous pores. Dark, completely scaly, with 80 to 100 scales in a longitudinal series. Scales begin to appear about 35 mm. L; squamation complete at 55 mm. L.....Genus *Searsia* Parr, 1937
Searsia koefoedi Parr, 1937
- b. Dorsal and anal fins not subequal and opposite. Dorsal fin base 6 to 8 per cent of L longer than anal fin base. Dorsal fin origin much nearer to the vertical from the bases of anterior ventral fin rays than to the vertical from the origin of anal fin (above the anterior third of the interspace). Area between skull and ascending limb of post-temporal without pits or large pores. Pale, completely scaleless to the largest size known (about 60 mm. L).....
.....*Persparsia*, new genus
Genotype: *Persparsia taaningi*, new species
2. No luminous organs. Bodies completely scaly at less than 60 mm. L. Area between skull and ascending limb of post-temporal with normal squamation, and simple lateral-line canals, with inconspicuous pores. Dorsal and anal fins subequal and opposite, their bases not exceeding one another by more than 2 per cent of L, and the distances from the snout to their origins differing by less than 2 per cent of L.
 - a. Six large, open dermal pits under the scales above the lateral line behind the top of the cleithrum. Scales small, 80 to 90 in a longitudinal series. Gillrakers numerous, about 30 (29-31) in first arch. Bodies deep. Eyes moderate, orbits less than $(15 - .03 L)$ per cent of L. Cross section of head oval, cheeks subvertical.....*Normichthys*, new genus
Genotype: *Normichthys operosa*, new species
 - b. No dermal pits behind the shoulder girdle above the lateral line. Scales large, 40 to 45 in a longitudinal series. Only about 20 (19) gillrakers in first arch. Slender. Eyes large, orbits not less than $(16 - .03 L)$ per cent of L. Cross section

of head pointedly heart-shaped, cheeks converging sharply towards mid-ventral *Pellisolus*, new genus

Genotype: *Pellisolus facilis*, new species

- B. A bony horizontal spine projects laterally on each side from the tip of the lower jaw. No lateral horizontal teeth on the sides of lower jaw. No localized, well-defined, round, or transversely linear luminous organs, but the mid-ventral series of scales between the bottom of the shoulder girdle and the ventrals is covered by whitish opalescent skin, indicating a continuous longitudinal luminous band. Base of dorsal fin 5 to 7 per cent of L longer than base of anal fin, its origin far in advance of the origin of anal fin. Scales moderate, 50 to 60 in longitudinal series, present between post-temporals and skull. No dermal pits in shoulder region. Five to seven simple pyloric caeca. Stomach caecal. Only about 20 (19–21) gillrakers in first arch. *Barbantus*, new genus

Genotype: *Bathytroctes curvifrons* Roule and Angel, 1931

NOTES ON GENERA AND SPECIES

GENUS *HOLTBYRNIA* PARR, 1937

It seems very doubtful whether *H. innesi* (Fowler, 1934), the original genotype, can be maintained as specifically distinct from *Bathytroctes melanocephalus* Vaillant, 1888 (see also under *Belloxia vaillanti*, above). Vaillant's species may therefore have to be regarded as the actual type species of the genus and the subgenus of the same name.

Bathytroctes rostratus Gunther, 1878 (p. 227, pl. 58, fig. B), type species of the subgenus *Mentodus*, does not appear to have been recaptured since it was first discovered. All other specimens referred to this species by subsequent authors, and seen by the present writer, have been found to belong either to *Searsia koefoedi* or to *Persparsia taaningi*.

PERSPARSIA, NEW GENUS

Persparsia taaningi, new species

Bathytroctes rostratus, "adolescent" BEEBE, 1933, p. 43, figs. 8C, 8D.

TYPE SPECIMEN: In Dana Collection, from Station 3975^{II}, latitude 35° 42' S., longitude 18° 37' E., January 31, 1930, 2500 meters wire.

Length without caudal, 58.5 mm. Proportions in per cent of length without caudal: length of head, 34.2; snout, 10.2; orbit, 10.2; interorbital width, 5.5; combined length of upper jaws, 17.1; premaxillary, about 4.5; lower jaw, 20.0; posterior supra-

maxillary, 8.6; snout to ventrals, 55.6; snout to dorsal, 59.8; snout to anal, 71.0; greatest depth of body, 16.2; least depth of caudal peduncle, 6.0.

D, $20\frac{1}{2}$; A, $13\frac{1}{2}$; P, 20; V, 8; Br, 7.

Other characters are as shown in the key.

NORMICHTHYS, NEW GENUS

Normichthys operosa, new species

Bathytroctes (Talismania) homopterus NORMAN, 1930, p. 269, fig. 2.

TYPE SPECIMEN: In Dana Collection, from Station 4007^{IX}, latitude $18^{\circ} 22' N.$, longitude $18^{\circ} 14' W.$, March 15, 1930, 2500 meters wire.

Length without caudal, 111 mm. Proportions in per cent of length without caudal: length of head, 32.5; snout, 7.2; orbit, 10.5; interorbital width, 6.8; combined length of upper jaws, 15.4; premaxillary, 4.4; posterior supramaxillary, 6.3; lower jaw, 17.1; snout to ventrals, 55.6; snout to dorsal, 66.8; snout to anal, 67.1; greatest depth of body, 24; least depth of caudal peduncle, 9.3.

D, $19\frac{1}{2}$; A, $17\frac{1}{2}$; P, 19; V, 6; Br, 8. Eighty-eight to 90 scales in a longitudinal series.

Other characters are as shown in the key.

PELLISOLUS, NEW GENUS

Pellisulus facilis, new species

TYPE SPECIMEN: In Dana Collection, from Station 1208^{XIII}, latitude $6^{\circ} 48' N.$, longitude $80^{\circ} 33' W.$, January 16, 1922, 3600 meters wire.

Length without caudal, 98 mm. Proportions in per cent of length without caudal: length of head, 32.3; snout, 6.5; orbit, 13.3; interorbital width, 4.6; combined length of upper jaws, 15.0; premaxillary, 3.0; posterior supramaxillary, 7.1; lower jaw, 17.4; snout to ventrals, 52.6; snout to dorsal, 65.5; snout to anal, 67.4; greatest depth of body, 20.4; least depth of caudal peduncle, 7.1.

D, $17\frac{1}{2}$; A, $16\frac{1}{2}$; P, 20; V, 6; Br, 7. About 43 scales in a longitudinal series.

Other characters are as shown in the key.

BIBLIOGRAPHY

ALCOCK, A.

1889. Notes from the "Investigator." *Ann. Mag. Nat. Hist.*, ser. 6, vol. 4, no. 24, pp. 452-453.
1890. Natural history notes from the . . . "Investigator." *Ibid.*, ser. 6, vol. 6, no. 34, pp. 303-305.
1892. Natural history notes from the . . . "Investigator." *Ibid.*, ser. 6, vol. 10, no. 59, pp. 357-362.
1898. Natural history notes from the . . . "Investigator." *Ibid.*, ser. 7, vol. 2, no. 22, pp. 136, 148-149.

BEEBE, W.

1933. Deep-sea fishes of the Bermuda oceanographic expeditions. *Zoologica*, New York, vol. 16, nos. 1-3, pp. 15-91.

BRAUER, A.

1906. Die Tiefsee-Fische. 1. Systematischer Teil. *Wiss. Ergeb. Deutsch. Tiefsee-Exped. "Valdivia,"* vol. 15, lfg. 1, pp. 1-266.

FOWLER, H. W.

1934. Descriptions of new fishes obtained 1907 to 1910 chiefly in the Philippine Islands and adjacent seas. *Proc. Acad. Nat. Sci. Philadelphia*, vol. 85, pp. 233-367.
1943. Contributions to the biology of the Philippine archipelago and adjacent regions. Descriptions and figures of new fishes obtained in Philippine seas and adjacent waters by the . . . "Albatross." *Bull. U. S. Natl. Mus.*, vol. 14, pt. 2, no. 100, pp. 53-91.

GARMAN, S.

1899. Reports on an exploration . . . by the "Albatross," during 1891. *Mem. Mus. Comp. Zool.*, Harvard Coll., vol. 24, pp. 1-431.

GILBERT, C. H.

1915. Fishes collected by the United States Fisheries Steamer "Albatross" in southern California in 1904. *Proc. U. S. Natl. Mus.*, vol. 48, pp. 305-380.

GILL, T., AND C. H. TOWNSEND

1897. Diagnoses of new species of fishes found in the Bering Sea. *Proc. Biol. Soc. Washington*, vol. 2, pp. 231-234.

GOODE, G. B., AND T. H. BEAN

1895. Oceanic ichthyology. *Mem. Mus. Comp. Zool.*, Harvard Coll., vol. 22, pp. 1-553; *Spec. Bull. U. S. Natl. Mus.*, vol. 35, pp. 1-529.

GUNTHER, A.

1887. Report on the deep-sea fishes collected by H.M.S. "Challenger" during the years 1873-76. *Challenger Rept.*, vol. 22, pt. 57, pp. 1-268.

JORDAN, D. S.

1923. A classification of fishes. *Stanford Univ. Publ. Biol. Sci.*, vol. 3, pp. 79-243.

KOEFOED, E.

1927. Fishes from the sea-bottom. *Rept. Sci. Res. "Michael Sars" N. Atlantic Exped. 1910*, vol. 4, pt. 1, pp. 1-47.

KOEHLER, R.

1895. Poissons. Résultats scientifiques de la campagne du "Caudan" dans

- le golfe de Gascogne, Août-Septembre 1895. Ann. Univ. Lyon, vol. 26, pp. 475-526.
- LLOYD, R. E.
1909-1910. A description of the deep-sea fish caught by R.I.M.S. ship "Investigator" since the year 1900. Mem. Indian Mus., vol. 2, pp. 139-180.
- MAUL, G. E.
1948. Monografia dos Peixes do Museu Municipal do Funchal. Ordem Isospondyli. Bol. Mus. Munic. Funchal, no. 3, art. 5.
- NORMAN, J. R.
1930. Oceanic fishes and flatfishes collected in 1925-1927. Discovery Rept., vol. 2, pp. 261-370.
- PARR, A. E.
1937. Concluding report on fishes. (Fishes of the Third Oceanographic Expedition of the "Pawnee.") Bull. Bingham Oceanogr. Coll., vol. 3, art. 7, pp. 1-79.
1947. A new genus of deep-sea fish from the Gulf of Panama. Copeia, no. 1, p. 59.
1949. An approximate formula for stating taxonomically significant proportions of fishes with reference to growth changes. *Ibid.*, no. 1, pp. 47-55.
- ROULE, L.
1935. Nouvelles observations sur quelques espèces de poissons abyssaux provenant de Madère. Bull. Inst. Oceanogr. Monaco, no. 674, pp. 1-6.
- ROULE, L., AND F. ANGEL
1931. Observations et rectifications concernant divers poissons recueillis par S.A.S. le Prince Albert I^{er} de Monaco au cours des campagnes 1911 à 1914. Bull. Inst. Oceanogr. Monaco, no. 581, pp. 1-8.
- STRAND, E.
1942. Miscellanea nomenclatorica zoologica et palaentologica. X. Folia Zool. Hydrobiol. Riga, vol. 11, p. 401.
- TANAKA, S.
1909. Descriptions of a new genus and ten new species of Japanese fishes. Tokyo Jour. Coll. Sci., vol. 27, art. 8, pp. 1-27.
- TOWNSEND, C. H., AND J. T. NICHOLS
1925. Deep sea fishes of the "Albatross" Lower California expedition. Bull. Amer. Mus. Nat. Hist., vol. 52, pp. 1-20.
- VAILLANT, L. L.
1888. Expéditions scientifiques du "Travailleur" et du "Talisman" pendant les années 1880, 1881, 1882, 1883. Poissons. Paris, 406 pp., 28 pls.
- WHITLEY, G. P.
1940a. Illustrations of some Australian fishes. Australian Zool., vol. 9, pp. 397-428.
1940b. The Nomenclator Zoologicus and some new fish names. *Ibid.*, vol. 9, pp. 241-243.
1941. Ichthyological notes and illustrations. *Ibid.*, vol. 10, pt. 1, p. 4.
- ZUGMAYER, E.
1911. Diagnoses des poissons nouveaux provenant des campagnes du yacht "Princesse Alice." Bull. Inst. Oceanogr. Monaco, no. 193, pp. 1-14.

