

A Revision of the Fishes of the Genus *Plesiops* Cuvier

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IN THE COURSE of a routine examination of the plesiopids in the collections of the Chicago Natural History Museum, a specimen of *Plesiops oxycephalus* Bleeker, previously recorded only by Bleeker, and four specimens of an undescribed species mislabeled *P. nigricans* and *P. melas* were found. These discoveries and the observation made by Smith (1952) that Indo-Pacific references to *nigricans* were incorrect prompted a study of the entire genus.

Throughout this study Mr. L. P. Woods, Chicago Natural History Museum, was consulted on many points; his helpful advice and reading of the manuscript are greatly appreciated. I am grateful to Dr. L. P. Schultz, United States National Museum, for his critical reading of the manuscript and for the loan of an extensive collection of *Plesiops*. Thanks are also due to Mr. N. B. Marshall, British Museum (Natural History), for the loan of Red Sea material; to Dr. P. Kähnbauer, Naturhistorisches Museum, Vienna, for notes on the type of *Plesiops altivelis* Steindachner; to Dr. A. Zilch, Senckenbergische Naturforschende Gesellschaft, for data and photographs of Rüppell's specimens of *nigricans* and *coeruleolineatus*; and to Dr. K. H. Barnard, South African Museum, for data on Natal specimens at his disposal. The figures are the work of Miss Margaret Bradbury, Chicago Natural History Museum.

Methods of Counting and Measuring

All fin rays with separate bases were counted. Lateral line scale counts include only

tubulated scales. In the upper lateral line the count begins at the upper corner of the gill opening. The lower lateral line ends at the caudal flexure. The mid-lateral scale count starts at the gill opening just above the pectoral base and ends at the caudal flexure. A transverse series of scales was counted from the origin of the dorsal fin caudad and ventrad to the lateral line. A second transverse series was counted from the origin of the anal fin forwards and upwards to the lateral line. Neither transverse series includes the lateral line scale or fin sheath scales. Gill raker counts include all rudiments and developed rakers on the first arch. The raker at the angle is considered as part of the upper limb.

Measurements up to 120 mm. were made with vernier calipers graduated to 0.1 mm. In the few instances of larger fishes, a steel rule calibrated in half millimeters was used. All measurements are given to the nearest half millimeter. Standard length is taken as the distance from the tip of the head to the caudal flexure, head length as the distance between the forward tip and the end of the gill membrane, and body depth as the maximum depth. Head length and body depth are presented as the ratio of standard length to these dimensions and are cited as "head" and "depth." Unless specifically stated otherwise, "length" signifies standard length.

Counts of all species are summarized in Table 3.

Except where noted the descriptions are based upon many individuals.

The abbreviations CNHM and USNM refer to the Chicago Natural History Museum and the United States National Museum.

¹ Chicago Natural History Museum. Manuscript received December 1, 1954.

PLESIOPS Cuvier

Dorsal X-XIII, 6-8, usually XI, 7 or XII, 7; anal III, 8; dorsal and anal spines pungent; dorsal membrane extending beyond tips of spines, incised at least before anterior spines; anal membrane usually incised before last two spines; pelvic I, 4; the first soft ray thickened and elongated, reaching at least to anal origin; all soft pelvic rays branched.

Vomerine and palatal teeth present, in bands; no lingual teeth; lower pharyngeal teeth acute; opercle without spines; pseudo-branchiae present.

Head naked before orbit; post-orbital part of head with cycloid scales; body scales mostly ctenoid, with a sharply outlined center (Fig. 1) in adults; two lateral lines, the upper curving with the body profile and ending opposite or just behind last dorsal ray.

The peculiar scales with their distinctly outlined center, first noted by Rüppell (1828), distinguish *Plesiops* from the related genera *Paraplesiops* Bleeker and *Barrosia* Smith. *Paraplesiops* also differs from *Plesiops* in its possession of lingual teeth and obtuse lower pharyngeal teeth. The first soft pelvic ray in *Barrosia* is only feebly thickened. The dorsal membrane, scarcely notched, also distinguishes *Barrosia* from *Plesiops*.

Smith (1952) places *Plesiops altivelis* Steindachner, known only from the type specimen, in his newly defined genus *Barrosia*. Notes on the type of *altivelis* made by Dr. Kähnsbauer confirm Smith's conclusion. The first pelvic ray of *altivelis* is not thickened and the lower pectoral rays have only one branch each. The former character separates *altivelis* from all species of *Plesiops* and the latter from the larger species, with which *altivelis* corresponds in size (standard length 100 mm.).

Plesiops gigas Steindachner (type locality Australia) belongs in the genus *Paraplesiops* as is indicated by its high soft anal and dorsal counts (11-12), the large number of scales (mid-lateral series 43), and the presence of lingual teeth.

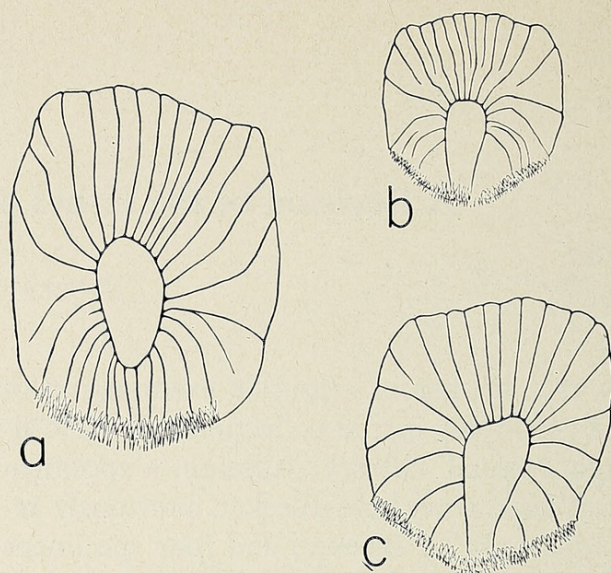


FIG. 1. Body scales of three species of *Plesiops*. a, *P. corallicola*; b, *P. cephalotaenia*; c, *P. oxycephalus*.

Assessor macneilli Whitley (type locality Queensland), described as being "superficially like a *Plesiops*," is of uncertain position because of the inadequate description given by Whitley (1935). The figure published subsequently by Whitley (1940) does indeed resemble *Plesiops* in habitus. The shape of the pelvics, the number of soft pelvic rays, the interruption of the lateral line, and the absence of lingual teeth also suggest relationship to *Plesiops*. However, the original description notes the presence of scales on the maxillary, the absence of palatal teeth, and the scarcely notched dorsal membrane, all of which characters would separate Whitley's species from *Plesiops*. Thickening of the first soft pelvic ray, diagnostic of *Plesiops*, is not mentioned by Whitley.

Notes on Ontogenetic Variation

Certain characters, such as the degree of branching in the lower pectoral rays and the development of an outlined circular or oval center on the scales, apparently change with age. Considering the latter character first, in *cephalotaenia* (Fig. 1b) an outlined center occurs only on the scales in the upper half of the middle third of the body in a fish 27.0 mm. long; in one 28.5 mm. long, scales with

this sculpturing are present in the entire upper half of the body; in an adult (48.5 mm.) all of the body scales have a delineated central area. The larger species *corallicola* (Fig. 1a) shows the same phenomenon, but with corresponding stages at greater lengths. For example, a 29.0 mm. fish has no scales with an outlined center; but such marked scales occur on the body between the axilla and the level of the soft dorsal in one 40.5 mm. long and over the entire body in one 58.0 mm. long. A young *nigricans* (34.0 mm.) has the characteristic plesiopine scales in the center of the body from the axilla to the end of the pectoral.

The division of the lower pectoral rays (Fig. 2) increases with size in two of the larger species. The type of *nigricans* (132 mm. total length) has four branches in each of the two lowest rays, five in the next ray, six in the next, and eight in each of the two next above. In Rüppell's second specimen (117 mm. total length, approx. 90 mm. standard length) the numbers of branches on the six lowest rays are 4, 6, 6, 8, 6, and 9 respectively, counting up from the ventral margin of the fin. (Data on both of these specimens are from Dr. Zilch.) The numbers of branches in a smaller individual (USNM 147530; 34.0 mm.) are 2, 4, 4, 4, 4, and 4. The same kind of variation, illustrated in Table 1, occurs in *corallicola* (Fig. 2b, c).

Plesiops multisquamata, the third large species, also has multibranching lower pectoral rays; but no information on ontogenetic changes is available.

The remaining species, which are smaller (maximum observed standard lengths in *oxycephalus* 65.5 mm.; gravid female of *cephalotaenia* 35.0 mm.; gravid female of *coeruleolineatus* 38.0 mm.), have only one or two branches in the lowest three pectoral rays and an observed maximum of four branches in the sixth ray, counting from the ventral edge (Fig. 2a). The frequency of individuals having two, three, or four branches in the sixth ray is shown in (Table 2).

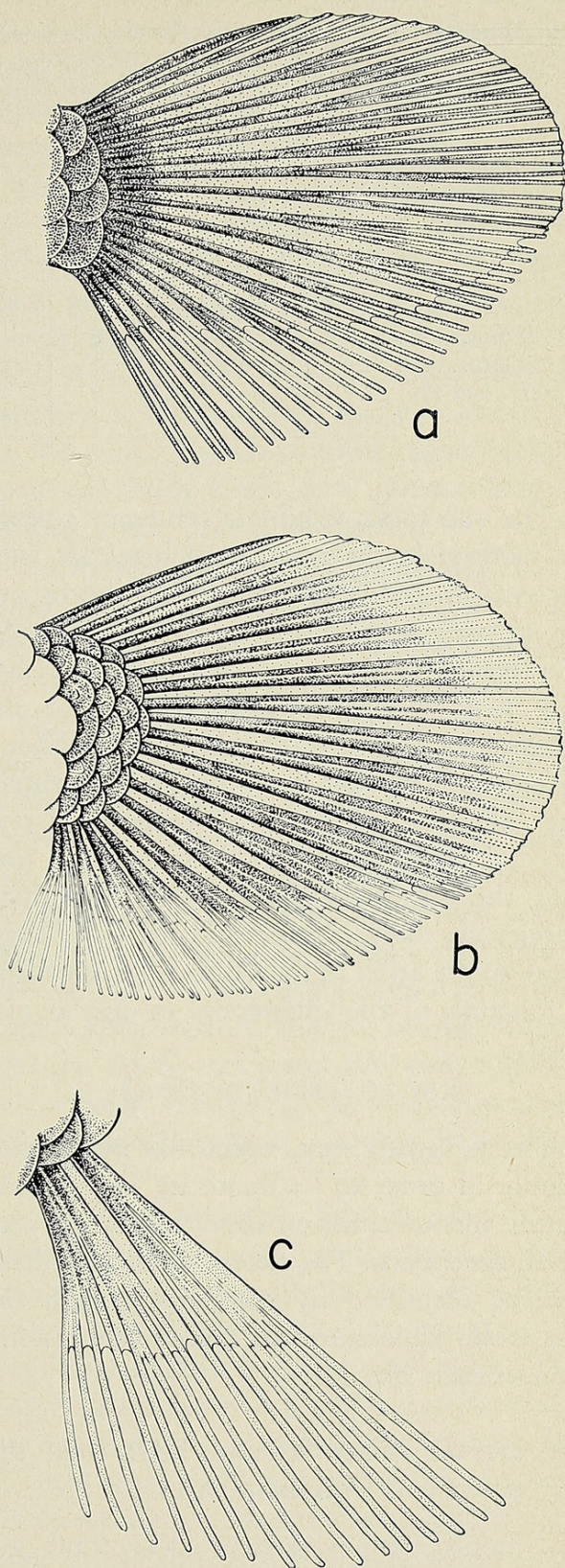


FIG. 2. Branching of rays in pectoral fins of: a, *P. coeruleolineatus* ($\times 5.3$); b, *P. corallicola* ($\times 2.6$); c, detail of lowest pectoral rays of *corallicola* (greatly enlarged).

Plesiops nigricans Rüppell, 1835, Neue Wirbelt., Fische, p. 5; Günther, 1861, Cat. Fishes Brit. Mus., 3: 363; Klunzinger, 1871, Zool.-Bot. Gesell. Wien, Abhandl. 21: 517.

Compilations of the last 75 years (e.g., Bleeker, 1875; Boulenger, 1895; Jordan and Seale, 1906; Weber and de Beaufort, 1929) have described *P. nigricans* Rüppell as a fish having a dark, light-rimmed opercular spot. However, Rüppell's figure (1828) of the type of *nigricans* does not show an opercular ocellus, nor is one mentioned in his description. Dr. Zilch has re-examined the type and another specimen collected by Rüppell and states (personal communication) that neither has such a mark.

Significantly, none of the above authors, with the exception of Rüppell, had specimens from the Red Sea or Africa. Smith (1952) suggests correctly that true *nigricans* Rüppell has never been found in the eastern Indian Ocean or in the Pacific. As far as I have been able to learn, only one specimen (USNM 147530) of *nigricans* has been recovered since Rüppell's time.

Gilchrist and Thompson (1911), Barnard

TABLE 2
NUMBER OF INDIVIDUALS OF THREE SPECIES OF *Plesiops*
WITH DIFFERENT NUMBERS OF BRANCHES IN
THE SIXTH RAY FROM THE VENTRAL EDGE
OF THE PECTORAL FIN

STANDARD LENGTH	SPECIES	NUMBER OF BRANCHES		
		2	3	4
Under 40 mm.	<i>cephalotaenia</i>	4		
	<i>coeruleolineatus</i>	4		
	<i>oxycephalus</i>		1	
Subtotal.		8	1	
40-49 mm.	<i>cephalotaenia</i>	1	2	2
	<i>coeruleolineatus</i>	9	2	
	<i>oxycephalus</i>	3		1
Subtotal.		13	4	3
50 mm. and up	<i>cephalotaenia</i>			2
	<i>coeruleolineatus</i>	1	1	
	<i>oxycephalus</i>			2
Subtotal.		1	1	4

(1927), and Smith (1949, 1952) have assigned certain fishes from southeastern Africa to this species. Their specimens, however, differ markedly from *nigricans*, and are described in this paper as *multisquamata*.

Diagnosis: Dorsal spines XII; lateral line 19-23 + 14-17; scales in mid-lateral series 23-27; scales in transverse series 3-4/1/8-9; total gill rakers on first arch 18-19; two lowest pectoral rays with at least four branches each in fishes over 45 mm.; lower pectoral rays free in distal halves; standard length up to 100 mm.; opercle without large ocellus; head and body often with minute blue or whitish spots; caudal fin black.

Description: Dorsal XII, 7; pectoral 20-22; pelvic I, 4; anal III, 8; gill rakers 6 + 12; total length to 132 mm.; standard length to 105 mm.

Body oval or oblong, compressed; dorsal profile convex, rising in feebly curved line to dorsal origin; line from snout to dorsal origin making a 30 degree angle with mid-lateral line; ventral profile convex, sloping in straight line from snout to insertion of pelvic; snout pointed in profile, shorter than eye; mouth oblique; maxilla reaching perpendicular from hind border of orbit; anterior nostril midway between tip of snout and eye, posterior just before orbit; diameter of orbit equal to greatest preopercular width, about twice inter-orbital.

Origin of dorsal slightly in advance of pectoral base; spinous portion two or three times length of soft part; fin obtusely pointed posteriorly; spines gradually increasing in length posteriorly; first spine three-fifths length of second which equals eye diameter; last spine slightly less than post-orbital part of head; longest soft rays greater than distance between orbit and base of pectoral; membrane extending beyond tips of spines, incised along leading edges of spines; notch reaching three-fourths of distance to base of second and third spines; notch decreasing in depth thereafter to last spine before which it reaches one-third distance to base.

Anal fin inserted opposite tenth dorsal spine; shape similar to dorsal; first spine half of second; third spine longest, subequal to last dorsal spine; longest soft anal ray equal to distance between orbit and base of pectoral; membrane notched behind first spine.

Pectoral rounded; inserted just below midline; lowest four to six rays free from membrane in distal halves; lowest ray with four branches in adults and sub-adults (over 50 mm.); next five rays with four to nine branches each.

Pelvics inserted before pectoral base; spine longer than third anal spine, bound to first soft ray; first ray thickened, bifid almost to base, elongated, reaching at least to anal origin; three inner rays bifid, not thickened or elongated.

Caudal rounded.

Head naked laterally and dorsally before preopercle; nape, preopercle, and opercle with cycloid scales; preopercle with ten or eleven forwardly sloping, oblique scale rows; seven scales in horizontal series across widest part of preopercle; opercle with a few large scales about three or four times size of those on preopercle; scales above upper lateral line cycloid; first thirteen scales of upper lateral line cycloid; curved line from tenth lateral line scale to third scale behind center of axilla and to third scale before vent marking posterior boundary of cycloid scales; all other body scales ctenoid; dorsal and anal sheaths cycloid; ten predorsals.

Color (in alcohol) of head, body, and fins blackish; two short postorbital bars not running on to scaled area of preopercle; many of body scales with light center; margin of dorsal membrane dusky, lighter than basal portion; caudal with narrow light margin.

This description is based primarily upon USNM 147530 (Red Sea) amplified by Rüppell's descriptions and the notes of Dr. Zilch.

Material examined: Red Sea (1).

Range: Apparently restricted to the Red Sea.

Plesiops multisquamata new species

Plesiops nigricans Gilchrist and Thompson, 1911, So. African Mus., Ann. 11: 37; 1917, Durban Mus., Ann. 1: 335; Barnard, 1927, So. African Mus., Ann. 21: 494; Smith, 1949, Sea Fishes So. Africa, p. 186, fig. 410; 1952, Ann. and Mag. Nat. Hist. XII, 5: 141, pl. 9.

[non] *Plesiops nigricans* Rüppell, 1828, Atlas Reise nördl. Afrika, Fische, p. 15.

Diagnosis: Dorsal spines XII; lateral line 25-30 + 13-19; mid-lateral scales 28-34; transverse series 5/1/10-12; total gill rakers on first arch 16-19; two lowest pectoral rays with more than two branches each; standard length of adults well beyond 100 mm.; total length commonly over 200 mm.; opercle without dark ocellus; small blue spots over head and body; fins blackish.

Description: Dorsal XII, 7; pectoral 21-23; pelvic I, 4; anal III, 8; gill rakers 4-6 + 11-13; total length 220-245 mm.

(The following is based primarily upon Smith, 1952.) Body slightly compressed; dorsal profile convex, rising gradually from snout, feebly concave over nape; ventral profile convex; snout subequal to eye; mouth somewhat oblique; maxilla reaching posterior level of orbit; posterior nostril close to orbit, anterior nostril with short tube.

Dorsal origin above pectoral base or opercle; fin obtusely pointed posteriorly; spines increasing in size posteriorly; first spine four-fifths second; second spine subequal to eye diameter; longest soft ray about twice length of longest spine; membrane extending beyond tips of spines; membrane incised along forward edge of spines almost to base of second to eighth; notch decreasing in depth beyond that spine.

Anal origin opposite ninth or tenth dorsal spine; shape similar to that of dorsal; first spine little over half length of second which is four-fifths of last; third spine slightly shorter than last dorsal spine; longest anal ray subequal to longest dorsal ray; membrane

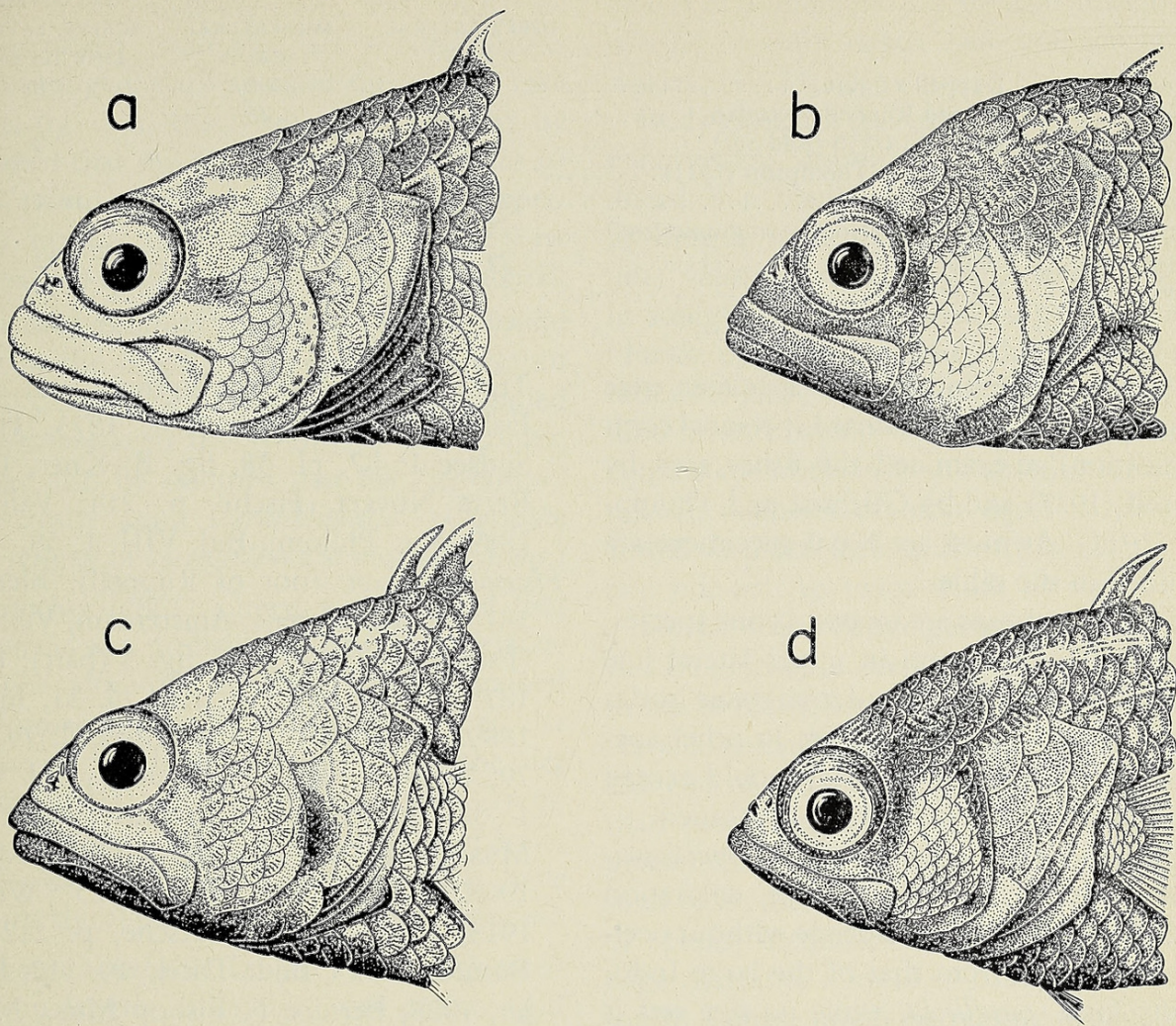


FIG. 3. Differences in head shape, scalation, and coloration in four species of *Plesiops*. a, *P. coeruleolineatus* ($\times 3$); b, *P. oxycephalus* ($\times 1.5$); c, *P. corallicola* ($\times 1.5$); d, *P. nigricans* ($\times 3$).

not (?) reaching beyond tips of spines, feebly notched.

Pectorals rounded; inserted just below mid-line of side; lowest seven to ten rays free from membrane in distal halves or three-quarters; lowest four rays with at least three branches each and usually six or more; next four rays above with eight to twelve branches.

Pelvics inserted below pectoral base; spine slightly shorter than longest dorsal spine, first ray thickened, bifid, reaching anal origin or beyond; inner rays not thickened.

Head naked laterally before preopercle and dorsally before the opercle; preopercle with 4 or 5 vertical rows of scales; 5 to 7 scales in horizontal series across widest part of pre-

opercle; anterior body scales cycloid, becoming ctenoid below fifth dorsal spine (approximately tenth lateral line scale); scales above posterior half of upper lateral line ctenoid; six or seven predorsals; dorsal and anal with low sheath of cycloid scales.

Color of body and fins blackish, slightly lighter on belly; indistinct darker area at origin of upper lateral line; small blue spots scattered over head, body, and fins.

Remarks: The specimens identified by Gilchrist and Thompson (1911, 1917), Barnard (1927), and Smith (1949, 1952) as *nigricans* are all from the Natal coast. They differ sharply from true *nigricans* in scale counts as the following comparison shows.

	UPPER LATERAL LINE	MID-LATERAL SCALES	TRANSVERSE SCALES; LATERAL LINE TO ANAL
<i>nigricans</i>Rüppell's figure.....	23	24-27	8
<i>nigricans</i>Second Rüppell specimen.....	19	23	...
<i>nigricans</i>USNM 147530 (Red Sea).....	19	...	9
<i>multisquamata</i>Gilchrist & Thompson (1911).....	27
<i>multisquamata</i>Barnard (1927).....	28-30	...	10-11
<i>multisquamata</i>Barnard (personal communication).....	25-29	30-33	...
<i>multisquamata</i>Smith (1949).....	25-28	28-30	12
<i>multisquamata</i>Smith (1952).....	27	33-34	12

Data on the second Rüppell specimen were supplied by Dr. Zilch. Barnard (personal communication) re-examined the fishes seen by himself (1927) and by Gilchrist and Thompson (1911). At most six Natal specimens are included in the table.

If the two groups are treated as one species, the ranges of variation in upper lateral line (12), mid-lateral (12), and transverse scales (4) far exceed observed ranges in other species (see Table 3). In fact they would exceed the ranges for all other species combined.

The high scale counts separate *multisquamata* from its congeners. The coloration (pectoral not bicolored; opercle without ocellus) is different from that of the large Indo-Pacific form, *corallicola*, while its size sets it off from the three small species, *coeruleolin-eatus*, *oxycephalus*, and *cephalotaenia*.

Material examined: None.

Holotype: Specimen 220 mm. total length, described by Smith (1952) from Natal and figured in Smith's plate 9.

Admittedly it is bad practice to describe a new form without actually having material at hand. Fortunately the detailed description and figure provided by Smith (1952) make identification possible and furnish a type.

Range: As yet known only from the coast of Natal.

***Plesiops corallicola* Bleeker**

Figs. 1a, 2b, c, 3c

Plesiops corallicola Bleeker, 1853, Nat. Tijds. Ned. Indië 4: 280—Priamam, Sumatra; 1857, *op. cit.*, 13: 479; 1860, Soc. Sci. Indo-Neerl., Act. 8 (Sumatra): 35; 1865, Ned.

Tijds. Dierk. 2: 279; Günther, 1861, Cat. Fishes Brit. Mus. 3: 364; 1873, Fische Südsee 1: 87, pl. 58, fig. B; Kner, 1865, Reise Novara, Fische, p. 214; Vaillant, 1889, Soc. Philom., Bul. VIII, 1: 58.

Plesiops nigricans (not of Rüppell). Bleeker, 1875, Akad. Wetens. Amsterdam, Verh. 15 (Pseudochr.): 27, pl. 3, fig. 3 (part); Day, 1878, Fishes India, p. 128, pl. 31, fig. 5; 1889, Fauna Brit. India, Fishes, 2: 79, fig. 79; Vaillant, 1889, Soc. Philom., Bul. VIII, 1: 58; Boulenger, 1895, Cat. Fishes Brit. Mus. 1: 340 (part); Jordan and Richardson, 1908, U. S. Bur. Fish., Bul. 27: 257; Weber, 1913, Siboga Exped., Fische, p. 212; de Beaufort, 1913, Bijdr. Dierk. 19: 112; Fowler, 1928, Bernice P. Bishop Mus., Mem. 10: 188; Weber and de Beaufort, 1929, Fishes Indo-Austr. Arch. 5: 375; Fowler and Bean, 1930, U. S. Natl. Mus., Bul. 100, 10: 313; Herre, 1936, Field Mus. Nat. Hist., Zool., 21: 163; Fowler, 1938, Hong Kong Nat. 9: 59, fig. 18; Schultz, 1943, U. S. Natl. Mus., Bul. 180: 112 (part).

Pharopteryx nigricans (not of Rüppell). Jordan and Seale, 1906, U. S. Bur. Fish., Bul. 25: 260.

Plesiops nakaharae Tanaka, 1917, Zool. Mag. 29: 199—Prov. Shima or Kii, Japan.

Pharopteryx nakaharae Tanaka, 1935, Fishes Japan, 2nd. ed., p. 497, pl. 137, fig. 383

Pseudochromichthys riukianus Schmidt, 1931, Pac. Comm. Acad. Sci. U. S. S. R., Trans. 2: 180—Riukiu Islands.

Although the original description of *corallicola* (Bleeker, 1853) does not mention an opercular ocellus, Bleeker subsequently stated

(1875: p. 27) that *nigricans*, with which he synonymized *corallicola*, has a conspicuous yellow-ringed, dark spot on the opercle (see pl. 3, fig. 3 in the latter work). It may be assumed that this later description applies to *corallicola* as true *nigricans*, which has no opercular ocellus, does not occur in the East Indies, the origin of all of Bleeker's material.

Bleeker thought that the ocellus, found only in the larger of his specimens, was an adult characteristic. But, since he included *coeruleolineatus* in the synonymy of *nigricans*, it may also be assumed that his "juveniles" were really adult *coeruleolineatus*. (Compare size ranges of *coeruleolineatus* and *corallicola*.)

Günther (1861) agreed with Bleeker that *corallicola* was probably identical to *nigricans* Rüppell although Günther still maintained the former (figured by him with an opercular ocellus) as a distinct species in *Fische der Südsee* (1873). All subsequent authors (e.g., Day, 1878; Boulenger, 1895; Jordan and Seale, 1906; Weber and de Beaufort, 1929) have incorrectly called the ocellated species *nigricans*.

Plesiops nakaharae Tanaka agrees with *corallicola* in length, coloration, and counts (gill rakers 14, lateral line 19+13-14, dorsal XII, 7). There appears to be no reason for recognizing *nakaharae* as a distinct form.

Diagnosis: Dorsal spines normally XII; lateral line 17-21+11-16; mid-lateral series 21-25; scales in transverse series 3-4/1/8-10; total gill rakers on first arch 13-17; lowest pectoral rays with at least three and usually four or more branches, next ray with at least four branches in all specimens over 45 mm.; standard length commonly above 70 mm.; maximum total length about 140 mm.; opercle with a dark, light-rimmed ocellus; preopercle not crossed by black bars; head and body often with minute bluish or whitish spots; caudal blackish, occasionally with a narrow light margin.

Description: Dorsal XII-XIII, 6-7; pectoral 19-22; pelvic I, 4; anal III, 8; gill rakers 4-7+8-11, total 13-17; standard length

10.0-120.0 mm.; head 2.56-2.96 (mean 2.73 \pm 0.02; N=30); depth 2.88-3.56 (mean 3.21 \pm 0.04; N=23).

Body elongate (juveniles) to oval (adults), compressed; dorsal profile convex; rostrum dorsal line rising gradually, feebly curved, forming a 30 degree angle with mid-lateral line; ventral profile weakly convex, sloping in straight line from snout to pelvics; snout bluntly pointed in profile, shorter than eye; mouth slightly oblique; maxilla reaching behind orbit; posterior nostril just before orbit, equidistant from orbit and anterior tubulated nostril; diameter of orbit equal to its horizontal distance from end of preopercle, one and one-half to twice width of interorbital.

Dorsal origin above pectoral base or opercle; fin pointed posteriorly; spines increasing in size to tenth; first spine about three-fourths second; second equals distance between orbit and end of preopercle; longest soft ray more than twice length of last spine, equal to or greater than distance between orbit and pectoral base; membrane extending beyond tips of spines; membrane incised along forward edge of spines almost to base of second to fourth spines; notch decreasing gradually in depth posteriorly but reaching halfway to base at front of last spine.

Anal origin opposite tenth or eleventh dorsal spine; shape similar to that of dorsal; first spine two-thirds of second which is two-thirds of last; third spine slightly shorter than last dorsal spine; longest soft anal subequal to longest soft dorsal ray; membrane extending beyond tips of spines and notched half to two-thirds of distance to base before second and third spines.

Pectoral rounded; inserted just below midline of side; lowest four to seven rays free in distal halves or three-quarters; lowest four rays with at least four branches each in all adults and sub-adults (over 40 mm.), next four rays with four or more branches each.

Pelvics inserted before base of pectoral; spine subequal to longest dorsal spine; first ray bifid to basal third of spine, thickened,

reaching between vent and third anal spine; inner rays bifid, not thickened.

Caudal rounded.

Head naked above and laterally anterior to preopercle; nape, preopercle, and opercle with

cycloid scales; scales of preopercle in seven to nine forwardly sloping oblique rows; five scales in horizontal series across widest part of preopercle; opercle with six large scales, each about twice depth of preopercular scales;

TABLE 3

SUMMARY OF CERTAIN COUNTS MADE ON SPECIES OF THE GENUS *Plesiops*
NUMBERS IN THE BODY OF THE TABLE REFER TO INDIVIDUALS

(Symbols (+) represent the range of variation determined from the literature in the instances in which little or no material was available)

		<i>P. nigricans</i>	<i>P. multisquamata</i>	<i>P. cephalotaenia</i>	<i>P. oxycephalus</i>	<i>P. coeruleolineatus</i>	<i>P. corallicola</i>
Dorsal fin	X					1	
	XI			1		79	
	XII	1	+	18	8	3	64
	XIII						1
	6					6	1
	7	1	+	19	8	76	64
Anal fin	III	1	+	18	8	82	59
	7			1	1	1	
	8	1	+	17	7	81	59
Pectoral fin, total rays	17				1		
	18			4	1		
	19			13	3	1	1
	20	+		2	4	6	14
	21	+	+			29	41
	22	+	+			37	9
	23		+			12	
Gill rakers, lower limb of first arch	5					1	
	6					5	
	7					42	
	8			2	2	23	11
	9			6	5	5	26
	10			5	1	1	14
	11		+	3			1
	12	1	+				
	13		+				
Total gill rakers, first arch	9					1	
	10					3	
	11					25	
	12					27	
	13			2		17	4
	14			4	3	3	12
	15			3	3	1	23
	16		+	4	2		11
	17		+	3			2
	18	1	+				
	19		+				

body scales cycloid anteriorly, ctenoid behind; all scales above upper lateral line cycloid; below lateral line scales cycloid before a line running from tenth to twelfth lateral line scale, curving forward several scales in

mid-line, then backward to base of soft anal; about eight predorsals; dorsal and anal fins with low sheath of cycloid scales.
Color (in alcohol) dark brown or blackish; head and body often with small bluish spots;

TABLE 3 (Continued)

		<i>P. nigricans</i>	<i>P. multisquamata</i>	<i>P. cephalotaenia</i>	<i>P. oxycephalus</i>	<i>P. coeruleolineatus</i>	<i>P. coralicola</i>
Upper lateral line scales	17			1			1
	18			11	5	19	18
	19	+		5	2	41	27
	20	+			1	18	15
	21	+		1		1	1
	22	+					
	23	+					
	24						
	25		+				
	26		+				
	27		+				
	28		+				
	29		+				
	30		+				
Lower lateral line scales	6			2		2	
	7			4	1	2	
	8			5	1	1	
	9			2	2	19	
	10			3		18	
	11			2	2	18	3
	12			1	2	14	6
	13		+			5	20
	14	+	+				27
	15	+	+				4
	16	+	+				3
	17	+	+				
	18		+				
	19		+				
Mid-lateral scales	21			1		4	1
	22			1	1	34	4
	23	+		4	3	20	22
	24	+		9	4	4	20
	25	+		1			4
	26	+					
	27	+					
	28		+				
	29		+				
	30		+				
	31		+				
	32		+				
	33		+				
	34		+				

a squarish black bar at upper posterior border and one just below center of posterior border of orbit, neither reaching preopercle; occasionally a narrower oblique bar from beneath eye to posterior quarter of maxilla; lower half of opercle with a round blackish or dark bluish spot, usually with a narrow light border; ventrally gill membranes blackish; fins dark; pectoral usually with a light tip (orange in life); dorsal membrane black, narrowly margined with light gray or white behind anterior fifth; anal black, soft portion with a narrow white or clear margin; caudal with narrow white margin; pelvics dark, without spots.

Material examined: Philippine Islands: Sulu Islands (1), Maculabo (2), Mindoro (2). Waigieu (1). New Hebrides (3). Fiji Islands (1). Tonga Islands: Vavau (1). Samoan Islands: Tutuila (10). Phoenix Islands: Hull (5), Canton (5). Caroline Islands: Yap (4), Angaur (4). Mariana Islands: Guam (19), Rota (5), Saipan (8). Marshall Islands: Rongelap (4), Bikini (6). East Indian Archipelago (1).

Range: From the Bay of Bengal southwards to Samoa and Tonga and northwards to southern Japan.

Plesiops coeruleolineatus Rüppell

Figs. 2a, 3a

Plesiops coeruleolineatus Rüppell, 1835, Neue Wirbelt., Fische, p. 5, pl. 2, fig. 5—Massaua, Red Sea; Bleeker, 1853, Nat. Tijds. Ned. Indië, 4: 116; Günther, 1861, Cat. Fishes Brit. Mus. 3: 363; Klunzinger, 1871, Zool.-Bot. Ges. Wien, Abh. 21: 517.

Plesiops coeruleolineatus Smith, 1952, Ann. and Mag. Nat. Hist., XII, 5: 143, pl. 10, fig B, text fig. 1.

Plesiops melas Bleeker, 1849, Batav. Genoot, Verh. 22 (Bali): 9—Boleling, Jordan and Richardson, 1908, U. S. Bur. Fish., Bul. 27: 257; Snyder, 1912, U. S. Natl. Mus., Proc. 42: 498; Weber, 1913, Siboga Exped., Fische, p. 213; Weber and de Beaufort,

1929, Fishes Indo-Austr. Arch. 5: 378, fig. 91; Herre, 1936, Field Mus. Nat. Hist., Zool., 21: 163; Smith, 1949, Sea Fishes So. Africa, p. 187; Marshall, 1950, Raffles Mus., Bul. 22: 175.

Pharopteryx melas Jordan and Seale, 1906, U. S. Bur. Fish., Bul. 25: 261; Ogilby, 1913, Queensland Mus., Mem. 2: 84.

Plesiops nigricans (not of Rüppell; part). Bleeker, 1875, Akad. Wetens. Amsterdam, Verh. 15 (Pseudochr.): 27; Day, 1878, Fishes India, p. 127; Boulenger, 1895, Cat. Fishes Brit. Mus. 1: 340; Schultz, 1943, U. S. Natl. Mus., Bul. 180: 112.

Plesiops semeion Tanaka, 1917, Zool. Mag. 29: 200—Tanabe, Kii Prov., Japan.

Pharopteryx semeion Tanaka, 1935, Fishes Japan, 2nd ed., p. 500, pl. 137, fig. 382.

Shortly after describing *melas*, Bleeker (1853) realized that it was a synonym of *coeruleolineatus* Rüppell. Later (1875) he thought that the latter was merely the juvenile of what is now known to be *corallicola*. However, Jordan and Seale (1906) clarified the distinctions between these two species and no author since 1906 has followed Bleeker. Schultz's designation (1943) is the result of a mistaken identification.

Günther (1861) agreed with Bleeker that *melas* is identical to *coeruleolineatus* Rüppell. Except for Klunzinger (1871), no subsequent author had material from the western Indian Ocean and all recognized *melas* Bleeker until Smith (1952), who reaffirmed the conclusion of Bleeker and Günther.

Plesiops semeion Tanaka agrees with *coeruleolineatus* in counts (gill rakers 11, lateral line 20 + 12, dorsal XI, 7). The coloration details of the dorsal membrane are identical to those of *coeruleolineatus*. Tanaka's fish had six broad, dark crossbands on the body. Although these are not usually found in *coeruleolineatus*, occasional individuals have obscure indications of such markings.

Diagnosis: Dorsal spines normally XI; lateral line 18–21 + 6–13; mid-lateral scales 21–24; scales in transverse series 2–3/1/8–10;

total gill rakers on first arch 9–14; two lowest pectoral rays with two branches each; standard length under 70 mm.; opercle without ocellus; head and body without bluish or whitish spots; caudal black, usually with a faint, narrow, light crescentric band submarginally.

Description: Dorsal XI, 6–7; pectoral 19–23; pelvic I, 4; anal III, 8; gill rakers 3–6 + 5–10; total length up to 79 mm.; standard length to 61 mm.; head 2.48–2.90 (mean 2.61 ± 0.02 ; $N = 27$); depth 3.02–3.67 (mean 3.26 ± 0.03 ; $N = 24$).

Body compressed, oblong; dorsal profile convex; rostro-dorsal line feebly curved, forming a 30 degree angle with mid-lateral line; ventral profile weakly convex, sloping in straight line from snout to pelvics; snout bluntly pointed in profile, shorter than eye; mouth slightly oblique; maxilla reaching behind orbit; posterior nostril just before orbit, equidistant from orbit and anterior, tabulated nostril; diameter of orbit subequal to its horizontal distance from end of preopercle, approximately twice interorbital width.

Dorsal origin above pectoral base; fin bluntly pointed posteriorly; base of spinous portion two and one-half to three times length of soft dorsal; spines increasing in length gradually to last; first spine three-fourths second; second equal to eye diameter; last spine slightly less than post-orbital part of head; longest soft ray greater than distance between orbit and base of pectoral; membrane extending beyond tips of spines; membrane incised to basal third along leading edge of second to sixth spines; the notch decreasing in depth posteriorly, finally reaching only one-fifth of distance to base before last spine.

Anal origin opposite ninth or tenth dorsal spine; shape similar to that of dorsal; first spine half length of second, the latter about five-sixths the third; last spine about five-sixths length of last dorsal spine; longest soft ray equal to longest soft dorsal ray; membrane incised to basal third of second anal spine, scarcely notched before third spine.

Pectoral rounded; inserted just below midline; lowest four to seven rays free from membrane in distal halves or three-quarters; three lowest rays each with two branches; next three to five rays with two to four branches each; largest specimens (ca. 50 mm.) sometimes with five branches on each of several middle rays.

Pelvics inserted opposite or slightly before pectoral base; spine longer than third anal spine; first ray thickened, bifid beyond level of center of spine, elongated, reaching second to fourth soft anal ray; three inner rays bifid, not thickened.

Caudal rounded.

Head naked on side to preopercle, naked above to point opposite end of preopercle or slightly before; cycloid scales covering preopercle, opercle, and nape; scales of preopercle in eight forwardly sloping oblique rows; five scales in horizontal series across widest part of preopercle; opercle with six large scales, each about twice depth of preopercular scales; scales above upper lateral line cycloid; occasionally two or three above end ctenoid; scales before line connecting fifth lateral line scale and upper end of pectoral base cycloid; scales below and anterior to line connecting lower end of pectoral base with anus cycloid; all other body scales ctenoid; anterior limit of ctenoid scalation on abdomen sometimes extending forward two or three scale rows; about seven predorsals; anal and soft dorsal with low sheath of cycloid scales.

Coloration (in alcohol) dark brown or black; some of body scales with dark tips; a squarish black bar at upper posterior corner and a second at center of posterior border of orbit, neither reaching preopercle; a narrow black stripe from below center of orbit, running above maxilla to its end; occasionally a few small black spots along border of preopercle; ventrally gill membranes black; fins blackish; anteriorly basal third of dorsal fin black followed distally by a narrow clear line, a slightly wider dusky band, and a broader

marginal light band (one-third fin depth); longitudinal pattern of dorsal slopes upward posteriorly leaving only a narrow light margin on soft dorsal; some individuals with sloping blue line in basal black zone of dorsal; juveniles with only a terminal light band on dorsal; anal and caudal usually with narrow light margins; occasionally caudal with a faint, narrow (equal to width of lowest post-orbital black streak), crescentric light band across beginning of distal third of fin; pectoral unmarked; membrane of pelvics spotted with black.

The oblique blue lines on the dorsal and anal membranes, to which the specific name refers, do not occur on all individuals. Of those examined, only fishes from southeastern Luzon and Mindoro had these stripes.

Material examined: Riu Kiu Islands: Okinawa (3). Philippine Islands: Batan (47), Bubuan (1), Busuanga (1), Luzon (35), Maculabo (24), Masongas (2), Mindanao (1), Mindoro (6), Negros (5), Pilas (3), Samar (1), Sirinao (1). Borneo: Pulo Bakkungaan Kechil (14). Karakelang Islands: Beo (1). Sanghir Islands (5). Morotai (1). Celebes: Tobea Island (1). Buru (6). Waigieu (4). New Hebrides: Malo (8). Solomon Islands: Bougainville (3). Samoan Islands: Tutuila (56). Caroline Islands: Yap (2). Mariana Islands: Guam (22), Saipan (12). Marshall Islands: Bikini (24), Eniwetok (18), Kwajalein (4), Rongelap (68). Madagascar (1). Red Sea (8).

Range: From the Red Sea and east coast of Africa through the Indo-Pacific northwards to southern Japan, and eastwards to the Marshall Islands and Samoa.

Plesiops cephalotaenia new species

Figs. 1b, 4

Diagnosis: (Counts, size, and proportions of holotype in parentheses in diagnosis and description.) Dorsal spines normally XII; lateral line 17–21 + 6–12 (19 + 12); mid-lateral scales 21–25 (23); scales in transverse series 2–3/1/8–9 (2½/1/9); two lowest pectoral rays with two branches each; lower

pectoral rays free in distal halves or at tips only; standard length under 70 mm.; black stripe from center of orbital border to end of opercle, but no opercular ocellus; caudal dark, without crescentric, light band.

Description: XI–XII, 7 (XII, 7); pectoral 18–20 (19); pelvic I, 4 (I, 4); anal III, 7–8 [Only one of the 20 seen had 7 soft anal rays.] (III, 8); gill rakers 5–6 + 8–11 (5 + 9), total 13–17; standard length 22.5–52.5 mm. (48.5 mm.); head 2.34–2.84 (2.76) (mean 2.53 ± 0.03 ; $N = 17$); depth 2.43–2.94 (2.57) (mean 2.76 ± 0.04 ; $N = 14$).

Body oval, compressed; dorsal profile rising in a curved line to dorsal origin; line from snout to dorsal making a 35 degree angle with mid-lateral line; ventral profile convex; snout-pelvic line straight, sloping slightly; snout obtuse in profile, shorter than eye; mouth almost horizontal; maxilla reaching perpendicular from posterior border of orbit; posterior nostril close to orbit, equidistant from orbit and anterior, tubulated nostril; diameter of orbit equal to distance between orbit and angle of preopercle or slightly less, more than twice interorbital.

Dorsal origin above base of pectoral; fin bluntly pointed posteriorly; base of spinous portion about three times base of soft dorsal; spines increasing in length to last; first spine about half length of second; second less than eye diameter; last spine subequal to post-orbital length of head; longest soft ray subequal to post-orbital part of head; membrane extending beyond tips of spines, incised halfway to base along leading edge of each of second to tenth spines.

Anal origin opposite tenth dorsal spine; shape similar to that of dorsal; first spine half length of second, the latter two-thirds length of last spine; third spine subequal to longest dorsal spine; longest soft anal ray equal to distance between orbit and end of pectoral base; membrane of spinous anal more deeply incised than that of dorsal.

Pectoral rounded; inserted just below mid-line; rays free near tips only or in distal halves;

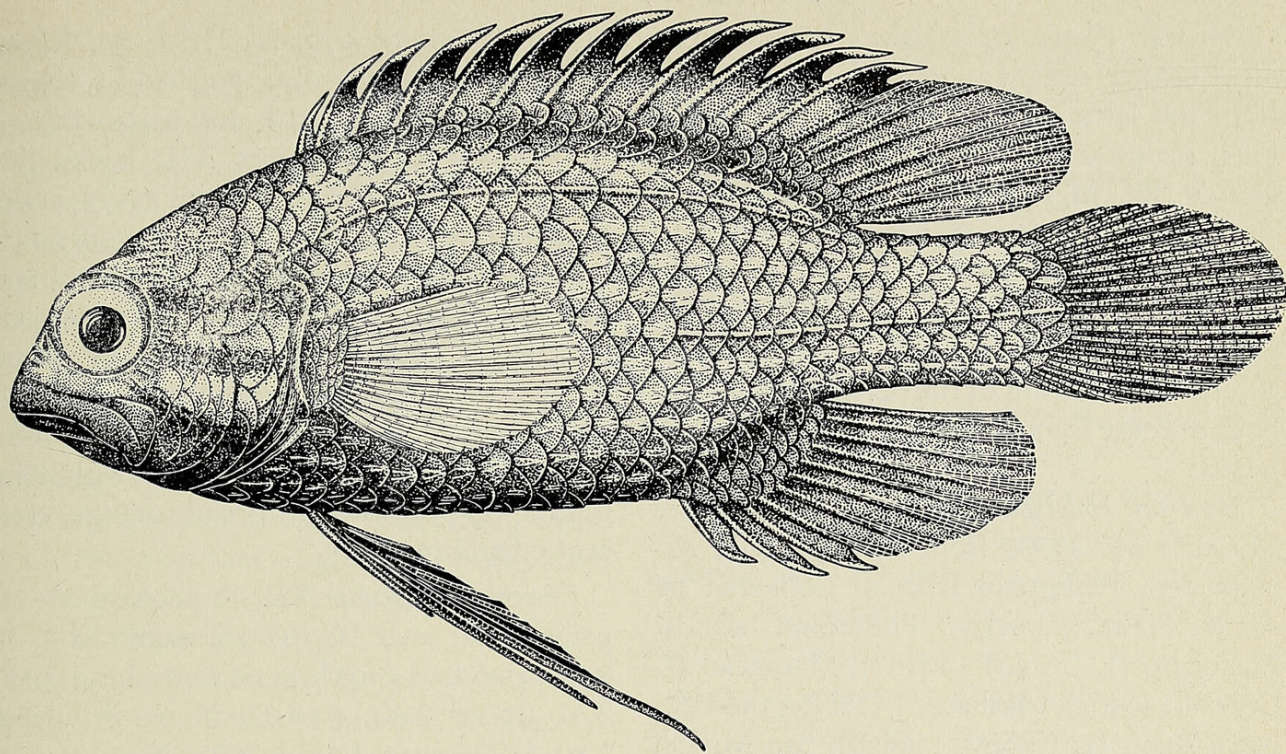


FIG. 4. *Plesiops cephalotaenia* new species. Holotype CNHM 44708 ($\times 2$).

two lowest rays with two branches each; fifth ray above ventral edge with four branches; all higher rays with two to four branches each.

Pelvics inserted before pectoral base; spine equal to or slightly shorter than last anal spine; first ray thickened, bifid beyond distal half of spine, elongated, reaching first or second soft anal ray; three inner rays bifid, not thickened.

Caudal rounded.

Head naked to level of preopercle; cycloid scales covering nape, preopercle, and opercle; scales of preopercle in five to seven forwardly sloping oblique rows; three or four scales in horizontal series across widest part of preopercle; opercle with six large scales, each about twice depth of preopercular series; scales above upper lateral line cycloid at least to tenth or twelfth lateral line scale; scales before line connecting third or fifth lateral line scale with top of pectoral base cycloid; scales before line connecting bottom of pectoral base with pelvic insertion cycloid; posterior limit of cycloid breast scalation occasionally one or two scale rows behind pelvic

insertion; all other body scales ctenoid; six or seven predorsals; anal and soft dorsal with low sheath of scales, those of anal mostly ctenoid.

Coloration (in alcohol) dark brown or black, body with six to nine obscure dark longitudinal stripes, each covering peripheral thirds of two adjacent scale rows; post-orbital part of head with three black stripes; one from upper corner of orbit, interrupted above preopercle, continuing as a bar near upper border of opercle; middle stripe horizontal, continuous from center of orbit to end of opercle; lower stripe sloping slightly, usually continuous from lower corner of orbit to angle of preopercle; gill membranes black; fins blackish; spinous dorsal with marginal white band narrower than post-orbital stripes, bordered proximally by intense black band; caudal with very narrow white margin; pelvics blackish with small dark spots.

The markings of the head are faded in several of the paratypes.

A female (USNM 146466), swollen with ripe ova, measures only 35.0 mm.

Remarks: *Plesiops cephalotaenia* appears to be most closely related to *oxycephalus*. It differs from the latter in having only three (rarely four) scales across the preopercle instead of five or six, in having a post-orbital black stripe crossing the preopercle and opercle, and in the color of the pelvics, caudal, and dorsal fins. The steeper rostrum-dorsal profile and the presence of ctenoid scales at or immediately behind the insertion of the pelvics distinguish both of these forms from the remainder of the genus.

Material: *Holotype*, Chicago Natural History Museum no. 44708 from Sitankai, Sulu Archipelago, Philippine Islands. Collected by A. W. Herre. *Paratypes*: Philippine Islands: Maculabo (1, USNM 146467), Mantacao (1, USNM 146462), Masbate (7, USNM 146466), Rapu Rapu (1, USNM 146460), San Miguel (1, USNM 146464), Sitankai (3, CNHM 47293), Tara (1, USNM 151323). Borneo: Darvel Bay (1, USNM 146469). Buru (2, USNM 162704). New Guinea: Tanamara Bay (1, USNM 123384).

Range: Philippine Islands from Mindoro Strait and San Miguel Bay (southeastern Luzon) to eastern Borneo and New Guinea.

Probably occurring throughout the Indo-Australian Archipelago east of the Sunda Shelf.

Plesiops oxycephalus Bleeker

Figs. 1c, 3b

Plesiops oxycephalus Bleeker, 1855, Nat. Tijds. Ned. Indië, 8: 320—Batu Islands; 1857, *op. cit.* 12: 234; 1865, Ned. Tijds. Dierk. 2: 279; 1875, Akad. Wetens. Amsterdam, Verh. 15 (Pseudochr.): 29; 1877, Atlas Ichthy. 9: pl. 389, fig. 7; Günther, 1861, Cat. Fishes Brit. Mus. 3: 364; Vaillant, 1889, Soc. Philom., Bul. VIII, 1: 57; Boulenger, 1895, Cat. Fishes Brit. Mus. 1: 341; Weber and de Beaufort, 1929, Fishes Indo-Aust. Arch. 5: 377; Fowler and Bean, 1930, U. S. Natl. Mus., Bul. no. 100, 10: 316.

Smith (1952) suggests, after a study of the literature, that *oxycephalus* may be a synonym

of *coeruleolineatus* Rüppell. These two forms, however, are readily distinguished by coloration, counts, head shape, and scalation.

Diagnosis: Dorsal spines XII; lateral line 18–20 + 7–12; mid-lateral scales 22–24; scales in transverse series 2–3/1/8–9; total gill rakers on first arch 14–16; two lowest pectoral rays with one or two branches each; lower pectoral rays free at tips or in distal third only; standard length to 65 mm.; total length up to 97 mm. (Bleeker, 1855); opercle yellowish, without ocellus; body scales usually with faint light spots; caudal with broad, orange, crescentic band medially.

Description: Dorsal XII, 7; pectoral 17–20; pelvic I, 4; anal III, 8; gill rakers 5–7 + 8–10; standard length to 65 mm.; head 2.32–2.51 (mean 2.40 ± 0.02; N = 8); depth 2.80–3.16 (mean 2.91 ± 0.05; N = 7).

Body compressed, oblong; dorsal profile convex; rostrum-dorsal profile moderately steep, bent at nape, making 35 degree angle with mid-lateral line; ventral profile convex, scarcely sloping from snout to pelvics; snout bluntly pointed in profile, slightly shorter than eye; mouth horizontal or somewhat oblique; maxilla reaching posterior level of orbit or just beyond; posterior nostril just before orbit, equidistant from orbit and anterior, tubulated nostril; diameter of orbit less than its distance from end of preopercle, about twice interorbital width.

Dorsal origin above tip of opercle; pointed posteriorly; base of spinous part about three times length of soft part; spines increasing in size to tenth; first spine about two-thirds length of second which is subequal to eye; last spine subequal to distance between orbit and end of preopercle; longest soft ray equal to post-orbital part of head; membrane extending beyond tips of spines, notched along front edge of spines to basal third of anterior spines; notch becoming shallower posteriorly, reaching to center of last spine.

Anal origin opposite ninth dorsal spine; shape similar to that of dorsal; first spine three-fifths second; second spine five-sixths

last, which is slightly shorter than last dorsal spine; longest soft ray equal to longest soft dorsal ray; membrane extending beyond tips of anal spines, notched before second and third spines.

Pectoral rounded; inserted just below midline; lowest ray free in distal half, next three or four rays at tips only; lowest four rays with one or two branches each; next four rays with two to four rays each.

Pelvics inserted slightly in advance of pectoral base; spine equal to last anal spine; first ray bifid to center of spine, thickened, elongated, reaching anal origin or first soft anal ray; inner rays bifid, not thickened.

Caudal obtusely pointed.

Head naked laterally to preopercle and dorsally to above end of preopercle; cycloid scales covering nape, preopercle, and opercle; scales of preopercle in eight forwardly sloping oblique rows; five or six scales in horizontal series across widest part of preopercle; opercle with six large scales, each twice depth of preopercular scales; scales above upper lateral line all cycloid or ctenoid posterior to twelfth or thirteenth lateral line scale; body scales anterior to line between sixth or seventh lateral line scale and top of pectoral base cycloid; scales before line connecting bottom of pectoral base with point two scales behind pelvic insertion cycloid; all other body scales ctenoid; nine predorsals; anal and soft dorsal with low sheath of mostly ctenoid scales.

Color (in alcohol) dark brown; a small black spot at upper posterior border and a larger spot behind center of orbit; lower two-thirds of opercle yellow; preopercle occasionally yellowish; gill membranes blackish; pectoral uniformly dark dusky; dorsal membrane dark brown basally bordered by cream-colored band; light band occupying distal half of membrane up to sixth or seventh spine, narrowing posteriorly to thin margin over soft dorsal; anal blackish with a thin light margin; pelvic same light brown or yellowish as opercle; caudal with a narrow light margin, bordered proximally by a broader black band,

preceded in turn by a broader orange, crescentic band equal in width to pupil; basally caudal with a black triangle.

The coloration varies. The anterior half of the heads of two Celebes fishes (USNM 146471) is densely dotted with dark brown; these small spots are not present on the other specimens. Five individuals (USNM 146451, 146461, 162704) from the Philippines and the Moluccas have 5 to 7 vertical dark bands made up of spotted body scales.

The entire sample is uniform in those color characteristics distinguishing *oxycephalus* from *cephalotaenia*, i.e., the yellow opercle, the light pelvics, the broad caudal crescent, and the unstriped preopercle.

Material examined: Philippine Islands: Bisucay (1), Luzon (1), Pangasinan (1). Celebes: Togeian Island (2). Buru (3). New Hebrides: Efate Island (1).

Range: From western Sumatra to the New Hebrides, northwards to Luzon.

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