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**A REVISION OF THE FISH GENUS *OGCOEPHALUS* WITH
DESCRIPTIONS OF NEW SPECIES FROM THE WESTERN
ATLANTIC OCEAN (OGCOEPHALIDAE; LOPHIIFORMES)**

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ABSTRACT. The New World genus *Ogcocephalus* comprises twelve species. Two species are island endemics in the eastern Pacific, *Ogcocephalus darwini* Hubbs in the Galápagos archipelago and *Ogcocephalus porrectus* Garman off Cocos Island, but the remaining ten are western Atlantic species. Five of the Atlantic species are described as new: *Ogcocephalus pantostictus* and *Ogcocephalus declivirostris* from the northern and western Gulf of Mexico, *Ogcocephalus rostellum* from the Atlantic coast of the southeastern United States, *Ogcocephalus corniger* also from the Atlantic coast of the southeastern United States but ranging into the eastern Gulf of Mexico, and *Ogcocephalus pumilus* from the Caribbean and coasts of the Guianas. *Ogcocephalus parvus* Longley and Hildebrand has a wider range than formerly known, from the coast of the southeastern United States and eastern Gulf of Mexico through the Caribbean to the Atlantic coast of South America. *Ogcocephalus vesperillo* (Linnaeus) has a more restricted range than formerly thought, the coast of Brazil from the mouth of the Amazon to the mouth of the Rio de la Plata. *Ogcocephalus notatus* (Cuvier and Valenciennes) also has a southerly distribution in the western Atlantic, the coast of northern South America from Colombia to northern Brazil. The variable species *Ogcocephalus nasutus* (Cuvier and Valenciennes) appears to be allopatric with *O. vesperillo* (Linnaeus), which it most resembles; *O. nasutus* ranges from the mouth of the Amazon through the Caribbean to the Bahamas and southeastern Florida. *Ogcocephalus cubifrons* (Richardson) ranges from the Bahamas and the coast of the southeastern United States into the eastern Gulf of Mexico to at least Pensacola, Florida, and Campeche Banks. The name *Ogcocephalus radiatus* (Mitchill) is placed in the synonymy of *Ogcocephalus cubifrons*. Illustrated keys, photographs, diagnoses, and distribution maps are provided.

INTRODUCTION

Ogcocephalids from the western Atlantic Ocean have become available in large numbers during the last two or more decades, much of the new material a handsome dividend from the work of exploratory vessels of the U.S. National Marine Fisheries Service sampling new fishing

grounds. Prior to this exploratory period, specimens of ogcocephalids were uncommon in collections except for those captured inshore by swimmers or divers, particularly off Florida and off islands in the Caribbean. Few in number and little studied, these specimens were difficult to assign names to because variation in characters then used in diagnoses was not understood. Variation in the length of the prominent rostrum was a frequent source of error. The information developed in this study is that some species may be diagnosed by their long rostrums at all sizes,

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but the rostrum in other species varies allometrically so that juveniles have long rostrums, but adults have short ones.

Analysis of morphometric data, including data about the rostrum, reveals that the genus *Ogcocephalus* is represented in the western Atlantic by ten species, five of which are described here as new. More recently, new material from the eastern Pacific has also become available. Study of this material confirms that two derivative species are present in the eastern Pacific (Garman 1899; Hubbs 1958).

Studies on the remaining genera of *Ogcocephalidae* of the Atlantic Ocean are underway currently. Discussions of the zoogeography of the group and intrafamilial relationships of all the Atlantic species will be published with the results of those studies.

ACKNOWLEDGMENTS

This study has been pursued intermittently since the late 1950's. During this time I became indebted to many colleagues to whom it is a pleasure to extend my grateful thanks at last. I deeply appreciate the encouragement given me by the late Loren P. Woods, who first suggested this problem and made available the specimens, skeletal material, and photographs of *ogcocephalids* in the Field Museum of Natural History; he also read an early version of the manuscript and devoted a great deal of time to assisting me. My dear friend, the late Marion Grey, gave valuable bibliographic assistance as well as the enthusiastic encouragement that so often characterized her relations with her colleagues. Pearl M. Sonoda sent specimens on each of a number of occasions and cheerfully gave much other assistance. Hymen Marx discussed ideas with zest and humor during one memorable Chicago summer. George S. Myers and the late Rolf L. Bolin, who were my professors at Stanford University, gave valuable help; Prof. Bolin gave skillful criticism of an early version of this report. With characteristic generosity, Giles W. Mead kindly made possible a study trip to museums in the eastern United States and gave support and encouragement in various ways. The late Carl L. Hubbs gave advice about taking counts and measurements and graciously examined for me a Linnaean type-specimen at Uppsala. He along with W. I. Follett and Lillian Dempster helped with the coining of names.

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SPECIAL TERMINOLOGY

The depressed anterior portion of the fish is called the disk and consists of the cranium, opercular apparatus, and the trunk back to the pectoral axillae. The lateral margins of the disk are formed by the opercular bones, which are very elongate relative to the cranium. The cranium is of ordinary proportions relative to the standard length, so the large total size of the disk is due primarily to the elongate opercular series, which sweeps backward from the cranium and envelops the trunk on either side to form the disk.

The (usually) conspicuous protuberance from the front of the head dorsal to the nasal openings is called the rostrum. Appearing as a median horn in most species, it varies in relative length from short to very long. It may bear cirri at its distal end, but its function remains unknown at this time. No skull bones are involved in the

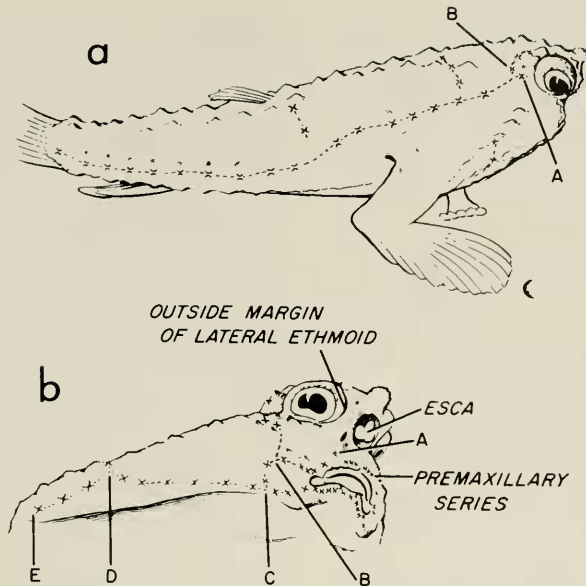


FIGURE 1. Lateralis system of *Ogcocephalus cubifrons*, 275 mm SL. Each lateral-line scale indicated by pair of opposing U-shaped symbols representing flaps of skin associated with such scales. Canals indicated by dashed line. (a) Lateral view showing lateral line beginning at A; portion of supraorbital series also shown, beginning at B. (b) Oblique view of head showing cheek series, A to C, premaxillary series, and subopercular series, C to E.

structure of the rostrum; it is formed solely of modified scales.

Just beneath the rostrum is a cavity lined with scaleless skin into which the angling lure or illicium may be drawn. This cavity is here called the illicial cavity. The somewhat bulbous structure seen within the illicial cavity is the bait of the angling apparatus, or esca (Fig. 1b), a movable glandular appendage attached to the distal end of the illicium. The illicium is a bony rod, quite short, but when extended, can be seen to be covered with scaleless skin like the skin which lines the illicial cavity; the skin of the illicium is thrown into accordionlike folds when the illicium is retracted.

In members of the *Ogcocephalidae* the scales are highly modified structures of three main types (Bradbury 1967: fig. 5). The simplest type is a pyramid- or cone-shaped scale called a tubercle, typically with a spine at its apex, although there may be several. The kind of scale that characterizes *Ogcocephalus*, called a buckler, is larger and more complex; bucklers are cone-shaped, too, but covered with small spinules rather granular in appearance and arranged in rows that radiate out from the apex of the buckler. These granular spinules fill the

spaces between bucklers. The morphological relationship between tubercles and bucklers is not clear; the spinules of bucklers often resemble tubercles, suggesting that the buckler may be a compound structure consisting of one enlarged tubercle overlain with small tubercles arranged in the radiating pattern, but the matter cannot be clarified until developmental studies of the scales are undertaken.

Finally, besides tubercles and bucklers, specially shaped lateral-line scales occur. With appropriate preparations it can be shown that lateral-line scales are bowl- or dish-shaped (Bradbury 1967: fig. 5), but under ordinary viewing conditions their shapes are difficult to discern. However, they are often made conspicuous because of associated flaps or fringes of epidermis; when epidermal decorations are absent, lateral-line scales may often be distinguished because of the large single neuromast lying in the center of the cup of each scale.

METHODS

COUNTS.—Vertebral counts were made from radiographs and include the hypural plate.

Scales of the lateral-line system can generally be seen in most species of *Ogcocephalidae*, al-

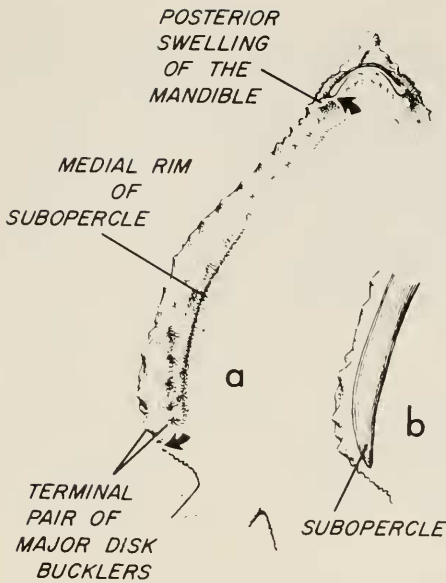


FIGURE 2. Ventral view of *Ogcocephalus cubifrons*, 275 mm SL, showing disk margin. (a) Length of disk margin is distance between two points indicated by the two arrows. (b) Position of subopercle relative to disk margin.

though the canals are difficult to discern as a rule. Thus it may be difficult to follow and count lateral-line scales when they are small and spaced far apart on the surface of the disk where they tend to become lost in the rough integument, but elsewhere on the body it is generally possible to see the scales and follow the lines of the canals by using adequate magnification. In this paper I have used four series of counts of scales of the lateral-line system as taxonomic characters.

1. Lateral line (Fig. 1a). The lateral line begins just posterior to the eye at A. Care must be taken not to include scales of the supraorbital series which begins at B. The line of scales continues back across the dorsal surface of the disk and suddenly descends ventrally just posterior to the gill pore, continuing along the lateral sides of the tail and on to the base of the caudal fin.

2. Subopercular series (Fig. 1b). This portion of the cephalic lateral-line system branches from the preoperculomandibular canal at C and continues posteriorly along the ventral side of the subopercle to E. A secondary branch leaves the subopercular series at D and runs up onto the dorsal side of the disk for a short distance. Care must be taken to avoid including the first scale

of this branch series in the subopercular lateral-line scale count. The subopercular lateral-line scale count was always taken as the count between C and D because the posterior section (between D and E) does not vary from a count of 3. Thus, the subopercular lateral-line scale count in the figure is 6.

3. Cheek series (Fig. 1b). I have called the section of lateral line that extends in a sigmoid curve from A to C the cheek series, although its topographic position suggests that it consists of lateral-line scales from the infraorbital canal plus the opercular section of the preoperculomandibular canal. The cheek series excludes scales of the branch extending from B towards the eye.

4. Premaxillary series (Fig. 1b). The premaxillary series is a short section of infraorbital canal just above the upper lip.

MEASUREMENTS.—The highly specialized body form of these fishes requires some modification of standard measuring procedures as pointed out by Hubbs (1958). I have followed his procedures in large part, but made adjustments that permit comparative measurements of members of other genera.

Measurements were made either with sharp-pointed steel calipers and a steel rule, or with dial calipers, and were recorded to the nearest 0.1 mm; measurements of approximately 15 mm or less were taken viewed through a low-power dissecting microscope. All measurements involving the upper or lower jaws were taken from the anteriormost median point of the lips without pressing the calipers into the lip tissue. All measurements involving bucklers were taken to the base of the buckler and not to its apex, unless otherwise stated.

Standard length is the distance from the upper lip to the base of the caudal rays. The latter point is difficult to establish in large specimens in which the integument is thick and stiff; the calipers were pressed firmly back against the swelling formed by the bases of the rays. Predorsal distance is the distance from the center of the upper lip to the base of the first dorsal ray; preanal distance is the distance from the center of the lower lip to the base of the first anal ray. The distance from the jaw to the anus is the distance between the center of the lower lip and the center of the anal opening.

The point of articulation of the mandible with the suspensorium is visible externally as a pronounced swelling at the posterior end of the

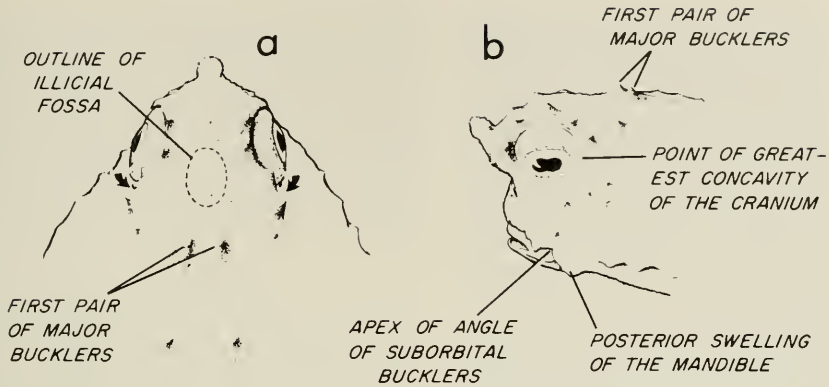


FIGURE 3. Views of head of *Ogcocephalus cubifrons*, 275 mm SL, showing specific locations of points used in taking measurements of head. Head depth is taken with one needle of calipers set between bucklers of first major pair (a) and (b), with other needle on apex of swelling of mandible (b). Width of cranium is taken between points of greatest concavity just posterior to orbits (b); also shown by arrows in (a). Suborbital width is least distance between orbit and apex of angle formed by suborbital bucklers (b).

mandible; the measurement of the disk margin was taken with one point of the calipers pressed against the front of this swelling and the other point pressed against the posterior end of the subopercle (arrows, Fig. 2a). Care must be taken in determining the posterior end of the subopercle in specimens with a thick stiff integument, but the tip of the subopercle can be felt with the caliper point just posterior to the terminal pair of large bucklers at the angle of the disk. This measurement of the disk margin was substituted for head length, which proved to be an awkward measurement in some species. Trunk width is the "width behind P_1 [pectoral] fins" (Hubbs 1958) which "is taken where the body margin reaches a maximum curvature near the solid part of the urosome, behind the disk."

Length of rostrum was taken as the distance from the dorsal rim of the posterior nostril to the distal tip of the terminal spine of the rostrum. The nostril landmark was chosen, in spite of being off-center, because it is in precisely the same relative position in all species. Although the rostrum appears to be highly variable in length in *Ogcocephalus*, results of this study show that some of the variation results from allometric growth patterns. When this allometry is borne in mind, the length of the rostrum proves a useful distinguishing feature in these fishes.

Width of cranium (Fig. 3a) corresponds to "skull prominence width" of Hubbs (1958). It is the distance taken between the "points of

greatest concavity" which lie just posterior to the orbits (Fig. 3a, arrows, and 3b). Head depth is the oblique distance from a median point on the roof of the cranium between the first pair of major bucklers (Fig. 3a) to the apex of the cone-shaped swelling with the mandible where it articulates with the suspensorium (Fig. 3b). The first pair of major bucklers invariably occurs just posterior to a noticeably soft spot on the dorsal surface of the cranium, which is actually the fossa into which the illicium retracts (Fig. 3a). Although off-centered, this measurement of head depth taken as described is a useful, repeatable measurement. The eye measurement is the greatest diameter of the bony orbit; since there are no circumorbital bones, the lateral process of the sphenotic bone forms all there is of a posterior bony margin of the orbit. The rear needle of the calipers was always pressed against this bone. Suborbital width is the least distance between the margin of the cornea (well marked by its rim of tubercles) and the apex of the sharp angle formed by the suborbital bucklers just above the angle of the lips (Fig. 3b). Lateral ethmoid width is the least distance between the outside margins of the lateral ethmoid bones, which are the bones that form the sides of the illicial cavity (Fig. 1b). Mouth width is the greatest overall width, i.e., the distance between the posterior tips of the maxillaries. Taking this measurement and the following one require some care because the maxillary tips are usually concealed beneath the suborbital integument.

The length of the jaw is taken from the median point of the upper lip to the posterior tip of the maxillary. The snout length measurement is the least distance from the anterior bony margin of the orbit to a point on the median line just above the upper lip and exactly at the base of a strip of scaleless skin lying between the two armored halves of the snout. Length of dorsal and length of anal are the lengths of these fins from the base of the first ray to the tip of the longest ray with the fin depressed.

The patterns of dentition in species of *Ogcocephalus* show little variation from the pattern described for *O. darwini* by Hubbs (1958). Bradbury (1967) described the dentition in the genus and compared it with patterns in other genera with the use of alizarin-stained and cleared specimens. Since there are no readily discernible distinctions in the dentitions of species of *Ogcocephalus* that are taxonomically useful, features of dentition are omitted from this report.

As is often the case with endeavors of this kind, sampling was not random, and specimens were studied as they came available regardless of their size or the locality from which they came. Usually habitat differences were not known. Meristic differences proved to be less useful for discriminating among populations than body proportions and color patterns, and the latter were used repeatedly in diagnosing specimens. It was convenient to express body proportions as ratios, and these ratios are used in the species diagnoses. However, for systematic comparisons, proportions are also given in terms of percent of standard length in tabular format. Counts of pectoral fin rays and the various lateral-line scale series were made on both right and left sides, and counts from both sides are included in the tables; most of the tables present these data in right-and-left pairs.

Abbreviations for fish collections are as follows: AMNH, American Museum of Natural History; ANSP, Academy of Natural Sciences of Philadelphia; BMNH, British Museum (Natural History); CAS, California Academy of Sciences; FMNH, Field Museum of Natural History; FSBC, Florida State Board of Conservation Marine Laboratory; GCRL, Gulf Coast Research Laboratory Museum; LACM, Los Angeles County Museum; MCZ, Museum of Comparative Zoology, Harvard University; MNHN, Muséum National d'Histoire Naturelle, Paris; SIO, Scripps Institution of Oceanography; SU,

Stanford University (this collection is now housed in the California Academy of Sciences and therefore listed as CAS-SU); UF, Florida State Museum, University of Florida; UMML, Marine Laboratory, University of Miami; USNM, U.S. National Museum of Natural History, Smithsonian Institution; ZMUC, Universitetets Zoologiske Museum, Copenhagen.

Ogcocephalus Fischer

Ogcocephalus FISCHER, 1813:78 [type-species *Lophius vespertilio* Linnaeus, by subsequent designation of Jordan and Evermann 1896:511]; BRADBURY 1967.

Malthe CUVIER, 1816:311 (part) [type-species *Malthe vespertilio* Cuvier and Valenciennes (non Linnaeus), 1837, by subsequent designation of Gill 1878:232].

Malthea (or *Malthaea*) CUVIER AND VALENCIENNES, 1837:440 [emended spelling of *Malthe* and therefore taking the same type-species].

Ongocephalus JORDAN, 1895:506 [unjustified emendation of *Ogcocephalus* Fischer].

Onchocephalus GILL, in GOODE AND BEAN, 1896:498 [unjustified emendation of *Ogcocephalus* Fischer].

Of the two unjustified emendations of *Ogcocephalus* which have appeared in the literature, at least one had the objective of correcting an alleged improper transliteration from the Greek. Jordan and Evermann (1898:2736) state with regard to the original spelling of *Ogcocephalus*, "properly written *Oncocephalus*, but Fischer chose the above monstrous spelling." The second emended spelling may have been introduced for the same reason, but in fact no reason was put forward. In any event, the original spelling of the name is a correct original spelling, and the name stands as *Ogcocephalus* Fischer (see also Briggs 1961).

DIAGNOSIS.—A genus of Ogcocephalidae with gill rakers in the form of oval pads which are studded with teeth resembling the fine teeth elsewhere in the buccal cavity (Bradbury 1967; fig. 7). Gills 2½, none on the first arch; complete holobranchs on the second and third arches, a hemibranch on the fourth arch. Scales on ventral surface of tail consisting of numerous, tiny, closely spaced tubercles; if any bucklers occur, they are scattered or may occur in a single short median row, but in any case, never are arranged in two longitudinal rows that cover the entire ventral surface as in *Zalieutes* or *Malthopsis*. Esca distinctly trilobed, with a median dorsal, somewhat leaf-shaped, lobe and two ventral lobes arranged symmetrically below the median lobe (Bradbury 1967; fig. 3).

TABLE 1. FREQUENCY DISTRIBUTION OF STANDARD LENGTHS IN SPECIES OF *Ogcocephalus*.

N	Standard lengths in millimeters																																
	11	20	21	31	41	51	61	70	71	81	90	91	100	110	111	120	130	140	150	160	170	180	181	190	200	210	220	230	240	251	261	270	
<i>notatus</i>	53	1	4	4	3	3	8	8	11	7	6	4	4	4	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>darwini</i>	30	—	—	1	—	1	1	—	1	—	—	6	4	4	6	4	5	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>porrectus</i>	35	—	—	—	1	—	2	4	4	8	4	2	6	3	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>vespertilio</i>	46	—	—	—	—	—	—	4	2	3	5	3	1	5	7	4	6	3	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>nasutus</i>	108	—	2	4	3	1	3	6	5	6	4	7	8	11	9	4	6	7	9	2	3	3	2	—	—	—	—	—	—	—	—	—	—
<i>cubifrons</i>	57	—	1	—	4	1	2	2	3	—	—	4	2	3	6	3	5	7	3	3	1	5	2	—	—	—	—	—	—	—	—	—	—
<i>pantostictus</i>	48	—	—	1	2	—	1	2	3	10	7	3	1	3	—	2	4	1	2	1	2	—	—	—	—	—	—	—	—	—	—	—	—
<i>rostellum</i>	70	—	—	1	3	3	4	1	3	7	8	9	9	12	8	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>corniger</i>	38	—	2	—	2	1	1	1	1	3	6	7	5	9	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>parvus</i>	56	—	1	—	6	19	17	10	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>dechlorostrius</i>	56	—	—	1	6	3	13	8	5	8	6	3	1	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>pumilus</i>	49	—	3	4	27	13	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

DESCRIPTION.—*Body form.* Body depressed anteriorly, forming a disk which is subtriangular in outline. Cranium well elevated above general slope of disk, proportions between width of cranium and head depth showing little variation within genus (width of cranium into head depth 1.4–2.1). Also, there is little variation in length of snout and width of suborbital relative to width of cranium (suborbital width into width of cranium 1.0–1.9; snout length into width of cranium 1.4–2.4). Rostrum variable in length, from a relatively small knob to a long median horn. Gill pores opening dorsally, lying in the axillae a short distance in advance of rear margin of disk. No membranes connecting pectoral peduncles with trunk as occur in *Halieutichthys*. Ventral surface of disk flat.

Tail stout and muscular, relatively wide at its junction with disk, tapering to a narrow caudal base. Ventral surface of tail flattened so that a cross section through anterior half of tail would be nearly a half circle. Predorsal distance 1.4–1.7 in standard length; preanal distance 1.2–1.4 in standard length. Anus slightly in front of a line drawn between posterior tips of pectoral elbows when pressed against trunk; distance from jaw to anus 1.6–1.9 in standard length.

Head Features. Eyes directed laterally and a little anteriorly and downward. Cornea much smaller than orbit, skin extending from cornea around eyeball studded with small tubercles. Depending upon its condition at time of preservation, iris shows a more or less pronounced pupillary operculum (except in *O. notatus*) on its ventral margin, giving pupil an approximate kidney shape. Sometimes a less noticeable dorsal operculum (again excepting *O. notatus*) extends downward towards its ventral mate so that pupil is dumbbell-shaped; presumably these opercula regulate pupil size, but I know of no experiments that demonstrate this function.

Anterior nostril round, the aperture encircled by a rim of skin which often forms a short tube; posterior nostril slitlike, larger than anterior nostril. Jaws very protractile, mouth moderate to small, usually semicircular, its width 2.6–5.2 in length of disk margin except in *O. notatus*, which has a relatively wide mouth and in which the ratio is 1.8–2.5. In normal position, posterior ends of maxillaries concealed beneath the suborbital bucklers. Upper jaw terminal or subterminal relative to snout; lower jaw included; gape oblique.

TABLE 4. FREQUENCY DISTRIBUTION OF LATERAL-LINE SCALE COUNTS IN SPECIES OF *Ogocephalus*. Counts were attempted on both right and left sides of specimens, but counts which were not repeated within two subsequent attempts were discarded.

N	Lateral-line scale counts																				\bar{x}					
	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34		35	36	37	38	39
54	—	—	—	—	—	—	—	—	—	—	—	1	—	—	3	6	9	13	6	5	3	5	3	—	—	32.4
26	—	—	—	—	1	2	3	5	8	2	2	2	—	—	—	—	—	—	—	—	—	—	—	—	—	26.3
53	—	—	—	—	—	1	5	8	12	8	12	5	1	—	—	—	—	—	—	—	—	—	—	—	—	25.5
62	—	—	—	—	—	—	—	—	—	—	—	—	1	3	6	9	6	14	9	8	2	1	3	—	—	31.8
114	—	—	—	—	—	—	—	—	—	2	5	2	9	5	8	17	19	19	11	8	3	2	2	2	—	30.8
83	—	—	—	—	—	—	—	—	—	—	—	—	2	4	8	5	12	10	14	7	6	8	5	1	—	32.5
71	—	—	—	—	—	—	—	—	—	2	2	5	8	19	6	14	2	3	2	1	—	—	—	—	—	28.1
73	—	—	—	—	—	1	2	10	16	18	9	4	5	2	4	1	—	—	—	—	—	—	—	—	—	25.9
44	—	—	—	—	4	5	15	8	3	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	20.5
118	7	24	37	35	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	17.2
59	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	24.9
34	—	—	—	—	—	2	10	9	10	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	21.1

even in species in which gill rakers are smallest (Bradbury 1967).

Integument. Most species with dermal cirri, but these variable among individuals of the same species; also, cirri are probably fragile and most likely do not preserve uniformly well, so their variability is difficult to assess. In any event, when they appear in preserved materials, they may occur singly or in clusters or thick fringes, most often in association with lateral-line system, particularly on face, disk margin, and lateral sides of tail. Scales consisting of close-set tubercles and bucklers, their bases sometimes slightly overlapping, forming a heavy armor. Large bucklers in dense groups over cranium and face and around disk margins, where they may be ankylosed to underlying bone. Heavy bucklers also on dorsal surface of trunk and tail where they form a median band which varies in width, extending in some species down sides of tail to lateral line. All species with large bucklers scattered elsewhere over dorsal surface of disk and pectoral peduncles with tubercles and small bucklers interspersed among them. Tubercles always invest skin covering surface of eyeballs between cornea and edges of bony orbits. Ventral surface of disk invariably covered with fine tubercles so that skin looks and feels like shagreen. Ventral surface of tail similarly covered, but there may be a short median line or a scattering of small bucklers. Dorsal and pectoral fins may or may not have minute tubercles running out along rays, but the fleshy anal and pelvic fins always have fine tubercles covering at least basal $\frac{1}{3}$ or $\frac{1}{4}$ of fin, except in *O. notatus* in which fins are nearly naked. Caudal fin with thick bands of small bucklers and tubercles running out along rays, but in alternating fashion so that rays 1, 3, 5, etc., have their thickest covering on one side of the fin while alternate rays have their thickest covering on opposite side, permitting fin to be tightly folded in spite of its dense armor.

Color in preservative. Most species with markings on "wings" of disk and in axillae in the form of clusters of spots. Less commonly, tracts of spots or reticula occur along lateral walls of tail, and in *Ogocephalus porrectus* and *O. darwini* the disk and tail markings have coalesced into a pair of prominent stripes. Color of dorsal and pectoral fins variable from species to species, but color of anal and pelvic fins generally the same as color of ventral surface of

TABLE 7. MORPHOMETRIC PROPORTIONS FOR SPECIES OF *Ogcocephalus*. Body measurements are given as thousandths of standard length.

	Jaw to anus			Snout to dorsal			Length of disk margin			Width of urosome		
	N	Range	\bar{x}	N	Range	\bar{x}	N	Range	\bar{x}	N	Range	\bar{x}
<i>notatus</i>	29	.549-.796	.585	22	.633-.680	.657	50	.365-.438	.403	36	.191-.318	.268
<i>darwini</i>	28	.547-.836	.703	28	.589-.668	.639	29	.328-.456	.385	28	.155-.244	.210
<i>porrectus</i>	31	.457-.716	.585	31	.615-.699	.647	35	.419-.539	.450	35	.189-.277	.243
<i>vespertilio</i>	37	.542-.617	.586	37	.635-.733	.670	46	.414-.490	.456	37	.180-.282	.231
<i>nasutus</i> (South Amer.)	11	.520-.618	.564	14	.611-.682	.643	40	.419-.506	.464	40	.185-.271	.236
<i>nasutus</i> (Cent. Amer.)	14	.535-.625	.571				25	.415-.482	.446	7	.207-.241	.221
<i>nasutus</i> (W. Indies)	8	.550-.588	.566	9	.626-.684	.656	40	.415-.508	.465	26	.160-.262	.228
<i>pantostictus</i>	5	.529-.574	.558	5	.646-.671	.657	48	.420-.483	.441	25	.196-.281	.247
<i>cubifrons</i>	16	.543-.621	.577	16	.613-.684	.653	54	.396-.482	.438	31	.169-.294	.237
<i>rostellum</i>	20	.528-.608	.551	20	.624-.686	.651	71	.405-.493	.448	19	.211-.282	.249
<i>corniger</i>	32	.545-.641	.591	33	.641-.732	.680	37	.388-.481	.441	33	.192-.258	.228
<i>parvus</i> (northern)	18	.480-.652	.603	17	.646-.704	.674	40	.452-.524	.486	29	.183-.284	.241
<i>parvus</i> (southern)	7	.610-.636	.621	8	.644-.691	.666	15	.453-.501	.479	13	.199-.280	.245
<i>declivirostris</i>	17	.540-.601	.564	16	.605-.679	.635	56	.390-.447	.419	29	.193-.342	.264
<i>pumilus</i>	29	.523-.588	.547	29	.611-.844	.635	49	.398-.463	.429	29	.204-.264	.235

	Head depth			Width of cranium			Length of rostrum			Width of mouth		
	N	Range	\bar{x}	N	Range	\bar{x}	N	Range	\bar{x}	N	Range	\bar{x}
<i>notatus</i>	49	.198-.260	.223	53	.121-.185	.146	50	.050-.195	.079	53	.172-.213	.196
<i>darwini</i>	29	.196-.291	.223	29	.103-.155	.123	29	.088-.181	.128	29	.106-.137	.121
<i>porrectus</i>	35	.207-.250	.224	35	.120-.207	.137	32	.131-.164	.149	35	.127-.153	.139
<i>vespertilio</i>	35	.224-.255	.239	46	.104-.157	.140	46	.169-.293	.213	37	.134-.165	.152
<i>nasutus</i> (South Amer.)	41	.213-.282	.234	41	.127-.172	.142	39	.079-.230	.135	41	.134-.177	.149
<i>nasutus</i> (Cent. Amer.)	24	.212-.262	.240	25	.110-.150	.135	25	.068-.258	.136	24	.122-.162	.144
<i>nasutus</i> (W. Indies)	34	.208-.262	.229	40	.118-.176	.133	37	.083-.229	.132	34	.120-.164	.137
<i>pantostictus</i>	36	.200-.250	.223	48	.119-.155	.136	47	.067-.170	.104	40	.130-.168	.142
<i>cubifrons</i>	47	.206-.258	.225	52	.119-.177	.141	51	.075-.224	.111	41	.097-.141	.117
<i>rostellum</i>	53	.185-.234	.204	71	.105-.165	.130	69	.053-.123	.073	52	.100-.147	.118
<i>corniger</i>	37	.223-.290	.251	38	.121-.171	.136	36	.189-.267	.228	37	.130-.183	.152
<i>parvus</i> (northern)	41	.238-.301	.276	41	.136-.180	.157	40	.074-.152	.119	41	.109-.149	.123
<i>parvus</i> (southern)	15	.241-.270	.253	15	.133-.158	.146	15	.094-.136	.118	15	.095-.120	.106
<i>declivirostris</i>	56	.198-.244	.218	56	.107-.157	.133	56	.029-.131	.077	56	.117-.151	.133
<i>pumilus</i>	49	.205-.244	.222	49	.123-.155	.137	49	.135-.219	.184	49	.125-.158	.144

	Length of jaw			Width of eye			Width of interorbital			Depth of caudal peduncle		
	N	Range	\bar{x}	N	Range	\bar{x}	N	Range	\bar{x}	N	Range	\bar{x}
<i>notatus</i>	52	.110-.137	.124	53	.072-.112	.086	53	.046-.090	.061	52	.069-.094	.082
<i>darwini</i>	28	.081-.110	.090	29	.081-.103	.090	29	.050-.080	.064	28	.066-.090	.079
<i>porrectus</i>	35	.087-.117	.098	35	.078-.105	.088	35	.055-.090	.064	34	.065-.083	.076
<i>vespertilio</i>	46	.095-.113	.106	46	.076-.106	.095	46	.060-.093	.071	46	.069-.094	.080
<i>nasutus</i> (South Amer.)	41	.091-.121	.101	40	.079-.118	.091	41	.054-.074	.064	40	.070-.090	.081
<i>nasutus</i> (Cent. Amer.)	25	.096-.112	.104	25	.070-.110	.094	25	.056-.077	.064	8	.081-.089	.085
<i>nasutus</i> (W. Indies)	40	.087-.115	.098	40	.076-.130	.088	40	.053-.097	.067	35	.079-.122	.089
<i>pantostictus</i>	48	.085-.110	.096	43	.068-.106	.087	48	.054-.080	.066	47	.077-.096	.086
<i>cubifrons</i>	53	.069-.100	.081	36	.074-.116	.091	53	.062-.092	.075	43	.078-.105	.091
<i>rostellum</i>	71	.070-.107	.080	69	.073-.109	.085	71	.044-.083	.059	59	.055-.088	.074
<i>corniger</i>	38	.093-.125	.104	38	.082-.124	.101	38	.044-.082	.064	38	.061-.087	.076
<i>parvus</i> (northern)	41	.082-.102	.091	41	.098-.134	.116	41	.042-.076	.056	40	.075-.102	.083
<i>parvus</i> (southern)	15	.071-.084	.078	15	.091-.116	.103	15	.055-.073	.062	15	.078-.095	.087
<i>declivirostris</i>	56	.080-.108	.092	56	.081-.107	.095	56	.039-.070	.050	55	.077-.100	.086
<i>pumilus</i>	49	.070-.111	.093	49	.094-.128	.106	49	.037-.054	.044	49	.070-.088	.079

TABLE 7. Cont.

	Width of suborbital			Width between lateral ethmoids			Length of snout			Length of dorsal fin			Length of anal fin		
	N	Range	\bar{x}	N	Range	\bar{x}	N	Range	\bar{x}	N	Range	\bar{x}	N	Range	\bar{x}
<i>notatus</i>	35	.067-.112	.087	36	.086-.110	.096	36	.068-.097	.080	48	.105-.219	.146	48	.114-.180	.150
<i>darwini</i>	29	.065-.096	.084	29	.057-.088	.071	29	.059-.083	.066	26	.087-.121	.105	25	.144-.191	.162
<i>porrectus</i>	34	.085-.103	.093	34	.073-.092	.080	34	.049-.079	.070	33	.087-.121	.102	34	.150-.190	.171
<i>vespertilio</i>	46	.089-.114	.103	37	.064-.084	.077	37	.065-.082	.074	34	.099-.152	.123	35	.147-.183	.167
<i>nasutus</i> (South Amer.)	31	.084-.123	.097	32	.069-.100	.083	31	.063-.084	.073	31	.081-.147	.108	31	.114-.178	.146
<i>nasutus</i> (Cent. Amer.)	8	.099-.116	.104	21	.073-.096	.085	7	.076-.100	.083	7	.095-.119	.109	7	.140-.172	.156
<i>nasutus</i> (W. Indies)	40	.087-.117	.103	34	.074-.103	.083	34	.065-.083	.074	25	.089-.153	.111	30	.123-.193	.160
<i>pantostictus</i>	31	.084-.112	.097	25	.076-.095	.084	24	.065-.084	.074	41	.088-.160	.120	36	.133-.191	.164
<i>cubifrons</i>	35	.085-.110	.096	29	.072-.096	.079	28	.061-.097	.073	41	.097-.159	.126	29	.152-.204	.170
<i>rostellum</i>	38	.070-.097	.085	44	.065-.099	.076	20	.057-.077	.065	19	.088-.141	.103	17	.122-.169	.147
<i>corniger</i>	33	.088-.112	.101	33	.069-.110	.081	33	.064-.084	.073	37	.072-.125	.091	38	.124-.177	.150
<i>parvus</i> (northern)	29	.110-.136	.120	29	.082-.117	.097	29	.078-.098	.089	36	.109-.175	.145	39	.132-.177	.158
<i>parvus</i> (southern)	13	.091-.110	.101	13	.079-.089	.084	13	.071-.083	.079	14	.120-.176	.143	15	.143-.202	.165
<i>declivirostris</i>	34	.069-.105	.084	34	.068-.100	.083	34	.058-.084	.070	53	.114-.186	.150	54	.141-.187	.166
<i>pumilus</i>	29	.078-.099	.087	29	.069-.094	.078	29	.060-.075	.067	43	.096-.192	.132	44	.108-.178	.150

in the eastern Pacific. In the Atlantic the genus occurs along the coast of the United States from Cape Hatteras south to the Gulf of Mexico, West Indies, the coasts of Central America and South America to Uruguay. In the Pacific the genus is known from the vicinity of Cocos Island, the Galápagos Islands, and Peru (but not from south of the Gulf of Panama as stated by Lundy (1956) or from off Cabo Corrientes as stated by Hubbs (1958); of course, it is possible, even likely, that *Ogcocephalus* will be found eventually at these localities, but I know of no such records to date. I suspect the error is owed simply to a misreading of coordinates on the map of the eastern Pacific Ocean concerning the locality of the type-series of *Ogcocephalus porrectus* (Garman, 1899).

Relative to other genera in the family, *Ogcocephalus* has the shallowest bathymetric range. Although data on depth distribution are still scanty for some species, some generalizations may be attempted. Four species appear to occur most commonly at depths shallower than 50 m; these species are *O. cubifrons*, *O. pantostictus*, *O. vespertilio*, and *O. darwini*, with *cubifrons* often recorded from depths of 10 m or less. Two

species that have their depth distribution centered at 50-60 m are *O. nasutus* and *O. notatus*, and three that have their depth distributions centered at 60-100 m are *O. parvus*, *O. pumilus*, and *O. declivirostris*. *Ogcocephalus porrectus* has been taken only between 100 and 170 m, but the species has been taken from few localities. Finally, there are two species, *O. rostellum* and *O. corniger*, that have relatively wide bathymetric ranges from 30 to 250 m. Thus, for the genus as a whole, most specimens have been taken at depths shallower than 100 m, but some have been taken as deep as 200 m, and a few individuals have been taken from depths over 350 m.

Key to Species of *Ogcocephalus*

Few species were found to be unique in the characters studied, and constructing a key proved difficult. This key will permit identification of most specimens of juvenile and adult specimens of *Ogcocephalus*, but some couplets utilize characters that do not discriminate completely between members of the couplet. In these cases, species intermediate between mem-

bers of a couplet are carried from there through both sides of the key.

- 1a. Distribution: western Atlantic Ocean .. 2
- 1b. Distribution: eastern Pacific Ocean 13
- 2a. Pectoral rays 10/10 to 11/11 or 11/12 (3% of specimens belonging to species included here have pectoral rays 12/12) .. 3
- 2b. Pectoral rays 12/12 to 15/15 (2% of specimens belonging to species included here have pectoral rays 11/12 or 11/11) 6
- 3a. Rostrum very long, length 0.9–1.6 in head depth, 1.6–3.1 in length of disk margin 4
- 3b. Rostrum moderate to short, length 1.7–4.0 in head depth, 3.2–8.5 in length of disk margin 5
- 4a. Anal rays 3–4. Body pale tan or gray without markings except dark spots occasionally present dorsally on either side of disk. No fleshy pads on ventral surface of pectoral rays; fin membrane relatively thin and translucent (Fig. 4a). A small species reaching 70 mm SL. Known from northern Bahamas through Puerto Rico and Lesser Antilles to Surinam. One record from Honduras
Ogcocephalus pumilus
 new species (Fig. 26), p. 272
- 4b. Anal rays 4. Dorsal body surface brownish, evenly covered with small whitish spots (which are the tips of bucklers). Distal ends of pectoral rays with thickened fleshy pads on their ventral surfaces; fin membrane thick and opaque (Fig. 4b). A moderate-sized species reaching 140 mm SL. Known from eastern Cuba, eastern Gulf of Mexico, and eastern coast of United States as far north as Cape Lookout, North Carolina
Ogcocephalus corniger
 new species (Fig. 26), p. 274
- 5a. Rostrum short, usually tilted upward; never sloping downward. Body surface rough, contours craggy with prominent bucklers. Head raised relatively high above disk, head depth 3.1–4.2 in standard length. Mouth small, its width 2.0–2.8 in head depth. Distal ends of pectoral

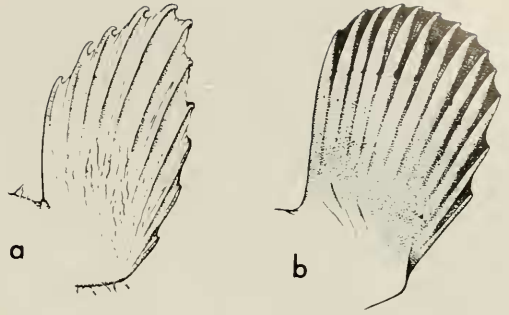


FIGURE 4. (a) Ventral view of pectoral fin of type found in *O. notatus*, *O. pumilus*, and *O. declivirostris*. Skin relatively thin, membranes translucent, and articulations of fin rays visible through skin. (b) Ventral view of pectoral fin of type found in all other species. Skin thick, spongy along the rays, especially distally where small pads form. Membranes thick and elastic. (These features often undeveloped in small individuals.)

rays with thickened fleshy pads on ventral surfaces; fin membrane thick and opaque (Fig. 4b). A small species reaching 85 mm SL. Western Atlantic from South Carolina to Recife, Brazil, except absent from western Gulf of Mexico

..... *Ogcocephalus parvus*
 (Fig. 28), p. 276

5b. Rostrum horizontal or sloping downward relative to long axis of body. Bucklers giving body a roughened surface, but not craggy contours. Head relatively low to the disk, head depth 4.3–5.1 in standard length. Mouth width 1.4–1.9 in head depth. Distal ends of pectoral rays without fleshy pads; fin membrane thin and translucent (Fig. 4a). A moderate-sized species reaching 140 mm SL. Known only from northern and western Gulf of Mexico

..... *Ogcocephalus declivirostris*
 new species (Fig. 24), p. 269

6a. Mouth wide, its width 1.8–2.5 in length of disk margin, 1.0–1.4 in head depth. Lateral-line scales in premaxillary series 4/4, in cheek series usually 10/10 (Fig. 1b). Pupil oval; no opercula. Atlantic coast of South America from Caribbean coast of Venezuela to mouth of Rio Plata in Uruguay *Ogcocephalus notatus*
 (Fig. 5), p. 243

6b. Mouth width 2.6 or more in length of

- disk margin, 1.4 or more in head depth. Lateral-line scales in premaxillary series 3/3, in cheek series 8/8 to 9/9 or 9/10, rarely 10/10 (Fig. 1*b*). Pupil kidney- or dumbbell-shaped because of presence of opercula (flaps of iris tissue) encroaching over pupil 7
- 7a. Rostrum very long, length 1.4–3.1 in length of disk margin, 0.8–1.7 in head depth 8
- 7b. Rostrum moderate to short, length 3.2 or more in length of disk margin, 1.8 or more in head depth 10
- 8a. Anal rays 3–4. Subopercular lateral-line scales 5/5 to 6/6, occasionally 6/7. Interorbital relatively narrow, 2.5–3.7 in width of cranium. Distal pectoral rays without fleshy pads ventrally; fin membrane thin and translucent (Fig. 4*a*). A small species reaching 70 mm SL. Known from northern Bahamas through Puerto Rico and Lesser Antilles to Surinam. One record from Honduras
Ogcocephalus pumilus
 new species (Fig. 26), p. 272
- 8b. Anal rays 4, rarely 3. Subopercular lateral-line scales 7/7 to 9/9 or 9/10, seldom fewer. Interorbital wide, its width 1.4–2.6 in width of cranium. Distal ends of pectoral rays generally with fleshy pads ventrally; fin membrane thick and opaque (Fig. 4*b*) 9
- 9a. Pectoral count most often 14/14. Color pattern usually consisting of network of light-colored lines on patches of dark background, these reticulated patches present dorsally on either side of disk, sides of tail, bases of pectoral fins, and on face. Known from mouth of Amazon River to São Paulo, Brazil
Ogcocephalus vespertilio
 (Fig. 5), p. 247
- 9b. Pectoral count most often 12/12 to 13/13. May be devoid of color markings, but more often with clusters of dark rounded spots, these spots sometimes with light borders, present dorsally on either side of disk in some, extending on to face, pectoral fins, or even entire dorsal surface of body in others 10
- 10a. Round dark spots occurring over entire dorsal surface of disk and prominent on dorsal surface of pectoral fins 11
- 10b. Round dark spots either absent or, if present, restricted to center of disk on either side; some specimens of *O. nasutus* from the West Indies are darkly mottled and may have networks of pale lines on face, tail, and around gill pores. Pectorals without spotted pattern, or if spots occur, they are dim and restricted to the bases of pectorals 12
- 11a. Mouth relatively narrow, its width 1.7 or more in head depth; interorbital wide relative to the short jaw, interorbital 0.8–1.3 in length of jaw. Subopercular lateral-line scales usually 7/7 to 8/8. Northern Bahamas and coasts of southeastern United States from Cape Lookout, North Carolina, to Pensacola, Florida, and south to Campeche Banks, Mexico
Ogcocephalus cubifrons
 (Fig. 18), p. 258
- 11b. Mouth wide, width 1.7 or less in head depth; width of interorbital 1.2–1.8 in length of jaw. Subopercular lateral-line scales usually 8/9, 9/9, or more. Northern and western Gulf of Mexico from Pensacola, Florida, to Tamaulipas, Mexico
Ogcocephalus pantostictus
 new species (Fig. 23), p. 264
- 12a. Rostrum a well-developed median horn. Head often marked by stripes radiating from eye in specimens from West Indies. Jaw relatively long, length 1.2–1.6 in width of cranium. A variable species with a broad range as understood here; known from the Bahamas, southeastern Florida, the Caribbean, and northern coast of South America to mouth of Amazon River
Ogcocephalus nasutus
 (Figs. 12, 13), p. 251
- 12b. Rostrum extremely short, not produced into a median horn except in very small specimens. No stripes radiating from eye, although spots may occur on iris. Jaw short, length 1.4–1.9 in width of cranium. Eastern coast of United States from Cape Hatteras to the Florida Keys
Ogcocephalus rostellum
 new species (Fig. 24), p. 267

- 13a. Skin shagreenlike, bucklers not spiny and protuberant -- *Ogocephalus darwini* (Fig. 29), p. 279
- 13b. Spiny bucklers protuberant; skin not smooth and shagreenlike -----
----- *Ogocephalus porrectus* (Fig. 29), p. 282

***Ogocephalus notatus* (Cuvier and Valenciennes)**

(Figure 5)

- [?] *Lophius histrio* (non Linnaeus): ROSENTHAL 1822:pl. 19, fig. 2 [skeleton and legend; see comment after synonymy].
- Malthea notata* CUVIER, 1829:252 [nomen nudum].
- Malthe angusta* CUVIER, 1829:252 [nomen dubium; after plate in Rosenthal 1822].
- Malthe truncata* CUVIER, 1829:252 [nomen nudum].
- Malthea notata* CUVIER AND VALENCIENNES, 1837:453 [Surinam; holotype MNHN 4764]; DEKAY 1842:167 [partial description, compiled]; LÜTKEN 1866:208 [Marum, Brazil; description; *truncata* placed in synonymy of *notata*].
- Malthea angusta* CUVIER AND VALENCIENNES, 1837:454 [Surinam; holotype MNHN 4767].
- Malthea truncata* CUVIER AND VALENCIENNES, 1837:454 [holotype MNHN 4772].
- Malthe notata*: STORER 1846:132 (separate) [partial description, compiled]; CASTELNAU 1855:26, pl. 12, fig. 3 [Bahia, Brazil]; GILL 1862:47 [listed, after Storer 1846].
- Malthe notata*: GILL 1873:14 [range: southern Atlantic coast, compiled].
- Malthe vespertilio* [?] (non Linnaeus): GILL 1883:556 [cites Rosenthal 1822, in list of osteological works].
- Ongocephalus truncatus*: MIRANDA RIBEIRO 1915: on page 575 of unnumbered text, 2 figs. [Santos, Brazil; description; photographs]; 1918:154 [synonymy].
- Ogocephalus radiatus*: PUYO 1936:233 [off Cayenne River, French Guiana; description; figures; synonymy; behavior]; MENEZES 1964:157 [Brazil; description; figures; comparisons with *Ogocephalus vespertilio* (Linnaeus); photographs].
- Ogocephalus nasutus* var. *cayennensis* PUYO, 1936:241 [Cayenne, French Guiana; figures; holotype unknown].
- Ongocephalus radiatus*: FOWLER 1941:184 [compiled; after *Ongocephalus truncatus* of Miranda Ribeiro 1915].
- Ongocephalus notatus*: DELSMAN 1941:76 [mouth of Amazon River; said to resemble photograph of *O. truncata* (Cuvier & Valenciennes) in Miranda Ribeiro 1915].
- Onchocephalus radiatus*: PUYO 1949:257 [French Guiana; description; figures; synonymy; behavior].
- Onchocephalus nasutus* var. *cayennensis*: PUYO 1949:260 [Cayenne, French Guiana; description; figures; synonymy].
- Ogocephalus truncatus*: LOWE (McCONNELL) 1962:679 [British Guiana; partial description; ecology].
- Ogocephalus nasutus*: CERVIGNON M. 1966:867 [Venezuela; description; figures; key]; DAHL 1971:316 [Colombia; figures; key].
- Ogocephalus notatus*: BRADBURY 1967:417 [type-series enumerated].

The figure of a skeleton labeled *Lophius histrio* in Rosenthal (1822:pl. 19, fig. 2) is assigned to the Ogocephalidae; the strongly depressed

body and the elongate pectoral radials and opercular bones are unmistakably those of an ogocephalid. The details of the skull, however, are not clear enough to identify the figure to genus. The high cranium with what appears to be a secondary roof over the illicial groove is characteristic of *Ogocephalus*, and the relatively large mouth suggests that the skeleton may be that of *O. notatus*, but other possibilities cannot be excluded. I place *Lophius histrio* (non Linnaeus) of Rosenthal, 1822, in the synonymy of *Ogocephalus notatus* so as to retain it with the synonym *Malthe angusta* Cuvier, 1829, which was based on Rosenthal's figure. Since the name *M. angusta* Cuvier, 1829, was given in a footnote with no other designation, and since the figure cannot be identified with certainty, the name becomes a nomen dubium. Two other names given in the same footnote, *M. notata* and *M. truncata*, are without designations and are therefore nomina nuda.

All three names were published with designations at a later date (Cuvier and Valenciennes 1837). Their holotypes are all representatives of the same species, in spite of the variation the specimens exhibit in length of the rostrum and number of spots on the disk. Since *M. notata* has page priority over the other two available names, it is the valid name.

DIAGNOSIS AND COMPARISONS.—Distinguished from all other species of *Ogocephalus* by its wide mouth (Fig. 6) and an additional lateral-line scale in the premaxillary series (4 in *notatus*, 3 in all other species). Four species of *Ogocephalus* have geographic ranges overlapping that of *notatus*; these are *parvus*, *pumilus*, *vespertilio*, and *nasutus*. Of the four, only *nasutus* seems to occupy the same grounds and is occasionally taken in the same net hauls with *notatus*, but *vespertilio*, which seems to be an inshore species, may also eventually be shown to co-occur with *notatus*. *O. notatus* is distinguishable from *nasutus* and *vespertilio* by the shorter length of its disk margin (Fig. 7). The other two species, *parvus* and *pumilus*, with geographic ranges overlapping that of *notatus*, probably do not co-occur with *notatus* because they have relatively deep bathymetric distributions. *O. notatus* is distinguishable from *parvus* and *pumilus* by its higher number of pectoral rays (nearly always 13 or more in *notatus*, 12 or fewer in *parvus* and *pumilus*, Table 3).

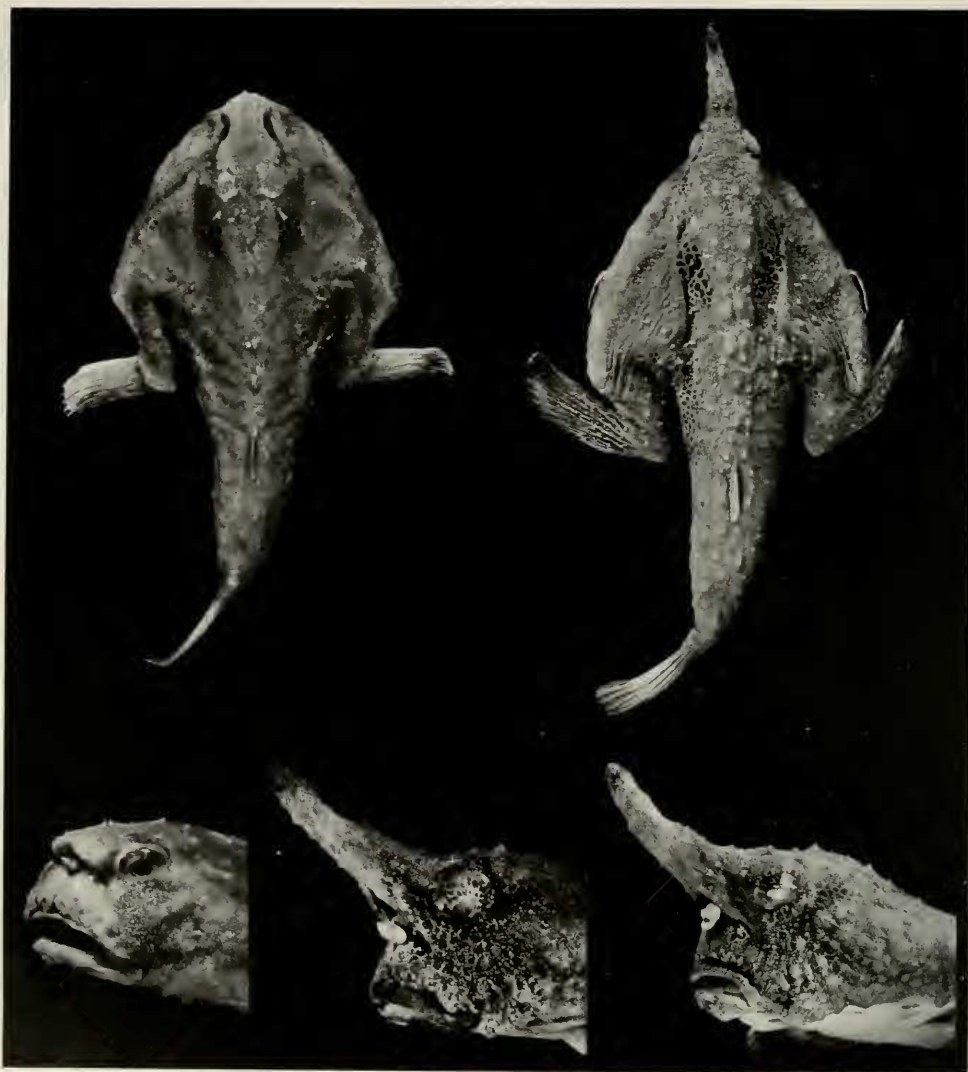


FIGURE 5. *Ogcocephalus notatus* (Cuvier and Valenciennes), MCZ 45075, 104.5 mm SL, from off northern Brazil, *left top*: view of face, *left bottom*, showing shelflike rostrum (small specimens usually have short median horn). *Ogcocephalus vespertilio* (Linnaeus), CAS-SU 59624, 175.0 mm SL, from off northern Brazil, *right top*: view of face, *right bottom*, showing reticulated pigment pattern. *O. vespertilio*, *bottom center*, also CAS-SU 59624, 150.0 mm SL, showing reticulated pattern commonly found on face and iris in this species.

O. notatus is further distinguished from all other species in the genus in having an oval-shaped pupil, whereas all the others have the iris modified by the presence of opercula so that the pupil is irregular in shape, approximately kidney- or dumbbell-shaped. It is inferred that these opercula regulate the amount of light passing through the pupil; if so, it appears that *O. notatus* lacks this mechanism. However, I have never observed this species alive. It is possible

that appropriate tests of the iris in this species when subjected to bright illumination would show that opercula are present even though they fail to show in preserved materials.

DESCRIPTION.—Counts and measurements from 72 specimens, 20.0 to 133.8 mm SL (Table 1).

Counts. Counts given in Tables 2–6. *Ogcocephalus notatus* has relatively high meristic counts; the high count for lateral-line scales in

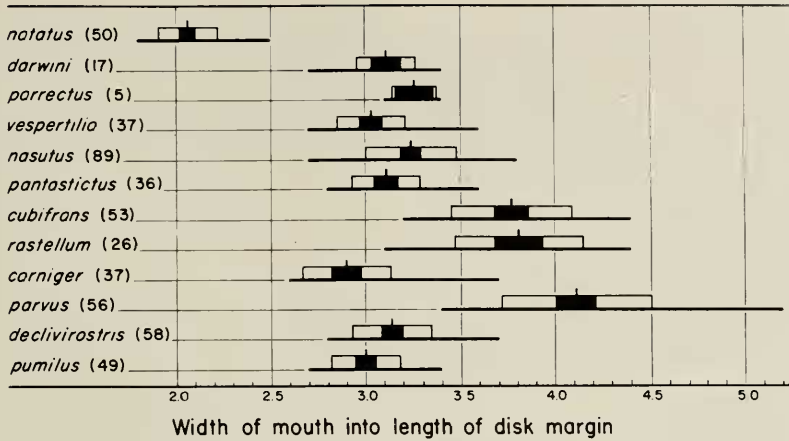


FIGURE 6. Variation in ratio of width of mouth into length of disk margin in *Ogcocephalus* (horizontal axis). Black bar = 2 standard errors of mean, white bar = 2 standard deviations, center vertical line = mean, and heavy horizontal line = range. This figure was drafted before all material of *darwini* and *porrectus* became available, but material studied subsequently does not change the point: *O. notatus* has a wider mouth than any other species in genus.

cheek series (usually 10) is diagnostic for the species (Table 5). The mean count of lateral-line scales in subopercular series in *O. notatus* (8.5) is exceeded only by *pantostictus* (9.1) and *vespertilio* (8.6) (Table 6). The mean count for pectoral rays in *notatus* (13.4) is less distinctive, resembling the *nasutus* population from off South America (13.1) and *rostellum* (13.0), but exceeded by *darwini*, *porrectus*, and *vespertilio* (all with mean pectoral counts of 14.0 or more) (Table 3).

Proportions. Proportions expressed as ratios given as the mean followed by the range in parentheses.

Disk margin shorter on average than in other species of *Ogcocephalus* except *darwini*, its length 2.5(2.3–2.8) in standard length. Tail wider on average than in other species, its width 1.6(1.2–2.3) in length of disk margin. Caudal peduncle of average depth, 2.7(2.4–3.2) in head depth. Rostrum produced into a short horn in small specimens, becoming extremely truncated and shelflike in larger specimens; length of rostrum 5.6(2.1–7.9) in length of disk margin. Aperture of illicial cavity oval to subdiamond shaped, wider than high in specimens of medium to large size, higher than wide in specimens about 50 mm SL or less. Cranium less sharply demarcated from disk than in other members of *Ogcocephalus*, its elevation above disk surface (when viewed from front) presenting a convex and gradual contour, not concave or abrupt.

Head depth 1.8(1.6–2.1) in length of disk margin. Cranium broad, its width 2.8(2.2–3.3) in length of disk margin. Eye 1.7(1.4–2.0) in width of cranium, prefrontal width 1.5(1.3–1.7) in width of cranium. Interorbital space concave, moderately wide, its width 2.4(2.1–2.9) in width of cranium, 3.7(2.8–4.6) in head depth. Mouth wider than in other species of *Ogcocephalus*, 1.1(1.0–1.4) in head depth, 2.1(1.8–2.5) in length of disk margin; length of jaw 1.8(1.6–2.2) in head depth. Upper lip thin, lower lip a little fleshy laterally. Dorsal fin relatively long, its length 2.8(2.0–3.8) in length of disk margin; anal fin 2.7(2.3–3.5) in length of disk margin.

Integument. Dermal cirri conspicuous along lateral line of face, disk margin, and tail. Large bucklers present on disk margin and median dorsal area of body. Pectoral fins with tiny tubercles running out along rays dorsally but bare ventrally. Dorsal, anal, and pelvic fins devoid of tubercles except for a few tiny scattered ones at bases of pelvics and anal. Caudal fin as in generic description. Skin covering the eyeballs bearing tiny tubercles; edge of cornea not beaded by a row of small bucklers as occurs in other species. Pectoral membranes moderately thick, opaque, but no fleshy pads on ventral surfaces of ray tips.

Color in preservative. Dorsal surface uniformly gray with apices of bucklers paler than ground color. Distinct round spots with pale narrow margins in a cluster on either side of disk, 1 to

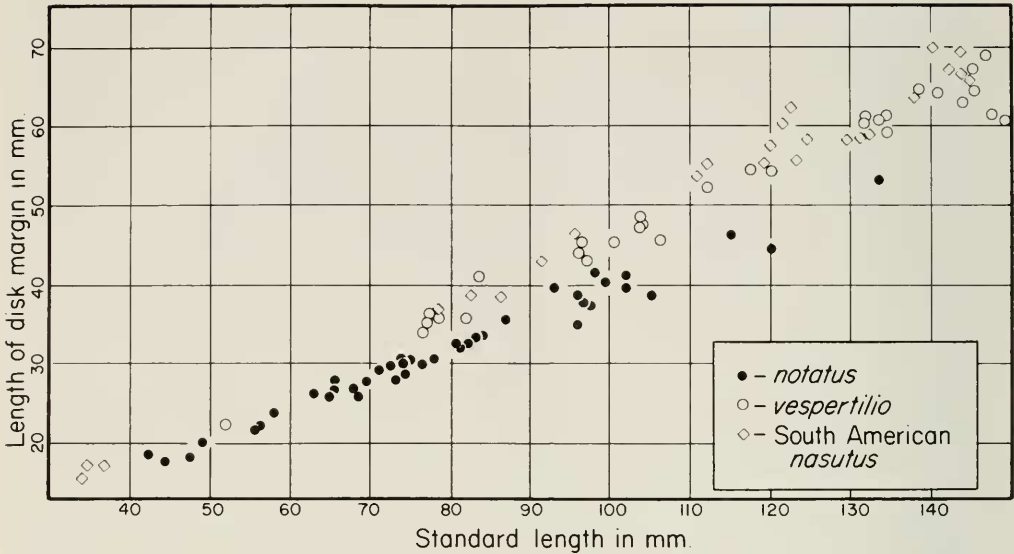


FIGURE 7. Comparisons between *Ogocephalus nasutus* (only specimens from coast of South America), *O. vespertilio*, and *O. notatus* of relationship between length of disk margin and standard length. *O. notatus* over 75 mm SL shown to have relatively short disk margin.

7 on each side, occasionally none, particularly in very small specimens. One specimen 41.5 mm SL with dark rings scattered on dorsal surface of body and along sides of tail into the axillae. Ventral surface uniformly creamy pale, chin dusky in a few specimens. Lips the same pale ground color as the ventral body surface. Iris golden or dark gray, never with spots or radiating lines. Pectorals dusky, shading to darker gray distally, almost to black in some very small specimens, but tips of rays pale. Pelvic and anal fins the same creamy pale ground color as ventral body surface; anal sometimes with a dusky spot distally, especially in small specimens. Dorsal dusky, often with indistinct dark splotches; an oblique black stripe slashed across dorsal fin rays and membrane in specimens about 25.0 mm SL or less. Caudal fin as in generic description.

Color in life. Unknown.

DISTRIBUTION (Fig. 8).—Specimens studied ranged from Trinidad on the northeastern coast of South America to the mouth of the Amazon River, but the species is known from farther south and also from farther west into the Caribbean. Miranda Ribeiro (1915) reports one specimen, about 125 mm SL (his *Ongocephalus truncatus*), from Santos, Brazil; Cervigon (1966)

reports specimens from the Caribbean coast of Venezuela at Laguna de Unare, and Menezes (1964) reports on a collection (his *Ogocephalus radiatus*) from Aracajú. Bathymetric range: 18–64 m. Puyo (1949) reports specimens from estuaries, particularly of the Cayenne River, French Guiana, at depths of less than 2.5 m. He also reports one example from a swampy upstream section of a creek 8 km inland from Cayenne at a depth of approximately 1.8 m.

MATERIAL EXAMINED.—Numbers in parentheses are numbers of specimens. Data for OREGON stations (=O) in Bullis and Thompson (1965).

Trinidad: ANSP 53381 (1), Oropuche; CAS 23928 (2), O-2208.

Venezuela: CAS 23929 (2), O-2223; CAS-SU 62120 (1), O-2215; FMNH 65975 (13), O-2212; FMNH 65976 (2), O-2213; FMNH 65977 (1), O-2224.

Guyana: ANSP 103629 (5), O-2226; BMNH 1950.5.15.56 (2), Georgetown; BMNH 55.8.28.70 (1), Demerara; FMNH 65978 (24), O-2225; FMNH 65979 (77), O-2226; FMNH 65980 (1), O-2234; USNM 197108 (4), "Cape St. Mary."

Surinam: CAS-SU 62126 (3), O-2279, FMNH 65974 (3), O-2208; MCZ 45077 (4), COQUETTE sta. 193, 6°24'N, 55°03'W, 24 m; MNHN A.4764 (holotype); MNHN A.4767 (holotype of *Malthaea angusta* Cuvier and Valenciennes); MNHN A.4768 (1); MNHN 5259 (1); USNM 188772 (1), COQUETTE sta. 142, 6°23.5'N, 54°56'W, 26 m; USNM 188791 (1), COQUETTE sta. 167, 6°18.5'N, 55°28'W, 18 m; USNM 188781 (8), COQUETTE sta. 2, 6°23'N, 55°05.5'W, 27 m.

French Guiana: USNM 188773 (2), O-2038.

Brazil: *Amapá:* CAS-SU 51215 (5), O-2058; FMNH 65971 (1), O-2056; FMNH 65972 (4), O-2057; MCZ 45078 (4), O-2059. *Pará:* FMNH 65973 (13), O-2075; USNM 188797 (1), O-2076.

Specimens without locality data: CAS-SU 59629 (1), Brazil; MNHN A.4772 (holotype of *Malthaea truncata* Cuvier and Valenciennes); MNHN 5242 (said to be from New York, but this undoubtedly an error).

Ogcocephalus vespertilio (Linnaeus)

(Figure 5)

Lophius vespertilio LINNAEUS, 1758:236 ["American Ocean"]; holotype in Zoologiska Institutionen Uppsala; HOLM 1957:12 [holotype listed].

Malthaea longirostris CUVIER AND VALENCIENNES, 1837:450, pl. 365 [Bahia, Brazil; holotype MNHN 6369]; LÜTKEN 1866:208 [Maruim, Brazil; description].

Malthaea guacucuja: CASTELNAU 1855:26 [Bahia, Brazil; cited as being the same as *Malthaea longirostris* Cuvier and Valenciennes].

Maltha vespertilio: GÜNTHER 1861:200 (part) [partial description; places the following names of Cuvier and Valenciennes, 1837, in the synonymy of *vespertilio*: *longirostris*, *nasuta*, *notata*, *angusta*, and questionably *truncata*]; JORDAN 1885:927 (part) [*longirostris* referred to synonymy of *vespertilio*]; LÖNNBERG 1896:39 [holotype listed].

Ongocephalus longirostris: MIRANDA RIBEIRO 1915: on page 574 of unnumbered text [Recife, Brazil; description]; 1918:153 [synonymy]; FOWLER 1941:184 [fishes of the coast of Brazil, compiled].

Ogcocephalus vespertilio: DE SOTO 1922:52 [Amazon R., 1300–1450 km upstream]; [?] CARVALHO 1943:71 [São Paulo, Brazil; partial description]; MENEZES 1964:155 [Brazil; synonymy; description; photographs]; BRADBURY 1967:417 [listed]; DE SCARABINO 1974:306 [mouth of Rio de la Plata; description; photographs].

DIAGNOSIS AND COMPARISONS.—*Ogcocephalus vespertilio* is distinguished from the majority of species of *Ogcocephalus* by its extremely long rostrum. Only two other species in the genus have rostrums that reach the relatively great lengths seen in *vespertilio*; these two long-nosed species are *corniger* and *pumilus* (Fig. 9 and Table 7), but they are easily separated from *vespertilio* on the basis of fewer pectoral rays (10–12 pectoral rays in *corniger* and *pumilus* compared to 13–15 in *vespertilio*). *O. vespertilio* also differs from *corniger* in color pattern, having dark spots separated by pale lines that usually form a reticulum occurring in patches on the face and sides of the tail and in the pectoral axillae, while *corniger* is evenly covered by closely set pale spots on a darker background. *O. pumilus* is a far smaller species than *vespertilio*, reaching only about 70 mm SL; from deeper waters than *vespertilio* (generally from waters 40 m or more in depth rather than the inshore, shallower depths attributed to *vespertilio*), *pu-*

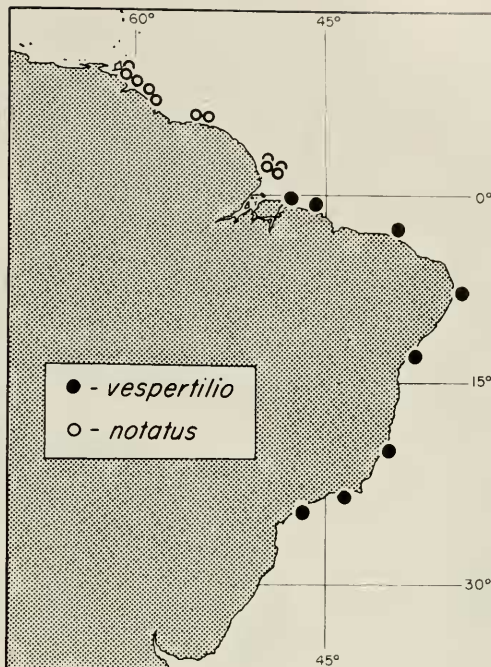


FIGURE 8. Distribution of study material of *Ogcocephalus notatus* and *O. vespertilio*. *O. notatus* also known from Caribbean and from Brazil, and *O. vespertilio* from mouth of Rio de la Plata (see text).

milus is a pale gray species generally lacking markings of any kind; at the most, it has only light gray spots.

Ogcocephalus nasutus, *cubifrons*, and *pantostictus* all closely resemble *vespertilio* in their large size and body shape, but the relative length of the rostrum in *nasutus*, while highly variable, is seldom as great as in *vespertilio* (Fig. 10); *cubifrons* and *pantostictus* show allometric growth of the rostrum, with the smallest specimens having long rostrums and juvenile and adult specimens having progressively shorter ones. *O. vespertilio* is distinguished from *nasutus* by its relatively wide interorbital distance compared to the distance between the lateral ethmoids (Fig. 11) and by the modal number of pectoral rays (14 in *vespertilio*, 12–13 in *nasutus*, Table 3).

None of the long-nosed forms of *Ogcocephalus* are sympatric with *vespertilio*, including *cubifrons* and *pantostictus*, which are long-nosed only when small. These latter as well as *corniger* are at the northern edge of the range

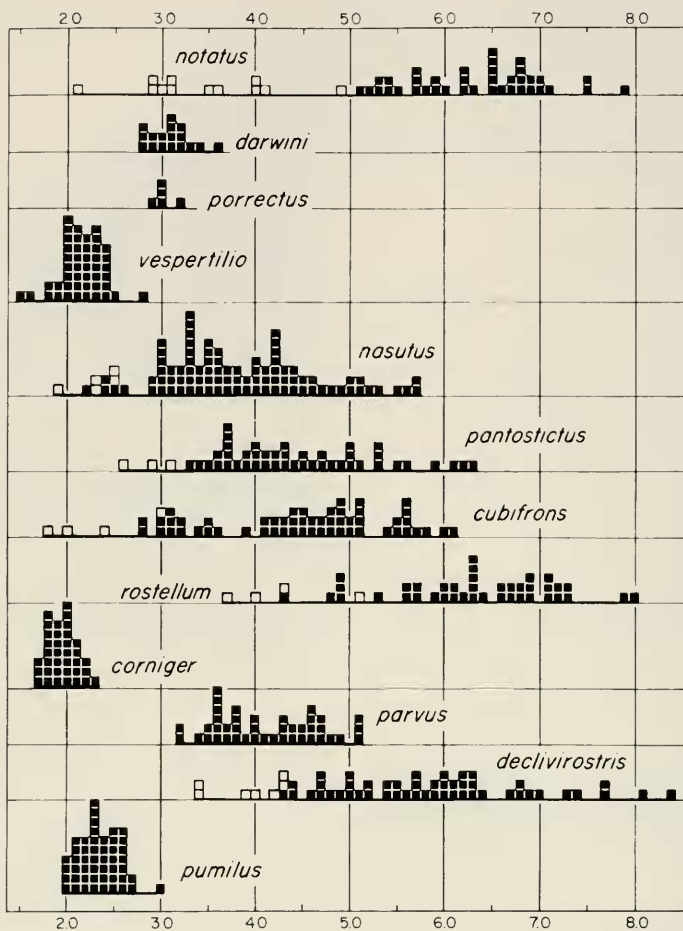


FIGURE 9. Histogram showing ratio of length of rostrum into length of disk margin (horizontal scale). One square = one specimen. White squares = specimens less than 50 mm SL (not shown for long-nosed species *vespertilio*, *corniger*, and *pumilus*, nor small species *parvus*). This figure was drafted before all material of *darwini* and *porrectus* became available, but new material does not change general picture. (With inclusion of new material, data for 30 *darwini* are: range 2.8 to 3.6, \bar{x} = 3.1; for 35 *porrectus*: range 2.8 to 3.4, \bar{x} = 3.0.)

for the genus (east coast of the United States and the Gulf of Mexico), while *vespertilio* occupies the southernmost range for the genus (coasts of Brazil and Uruguay). *O. pumilus* and *nasutus* have intermediate ranges (together ranging from Cuba and the Bahamas to Surinam). Only *nasutus* has a range which, as presently known, reaches almost to the northern edge of the range of *vespertilio*, that is, the vicinity of the mouth of the Amazon River.

The one species of *Ogcocephalus* which is sympatric with *vespertilio* is the short-nosed form, *notatus*, also distinguished from *vesper-*

tilio by its wide mouth (Fig. 6) and higher number of lateral-line organs in the cheek series (4 in *notatus* but 3 in *vespertilio*).

DESCRIPTION.—Counts and measurements from 46 specimens, 52.0–222.5 mm SL (Table 1).

Counts. Counts given in Tables 2–6. Menezes (1964) recorded the pectoral count for *O. vespertilio* as 13–14, but I find a wider range of 12–15 with a strong mode of 14, which places the species second only to *O. darwini* in high number of pectoral rays. *O. vespertilio* also has relatively high counts for all lateral-line scale se-

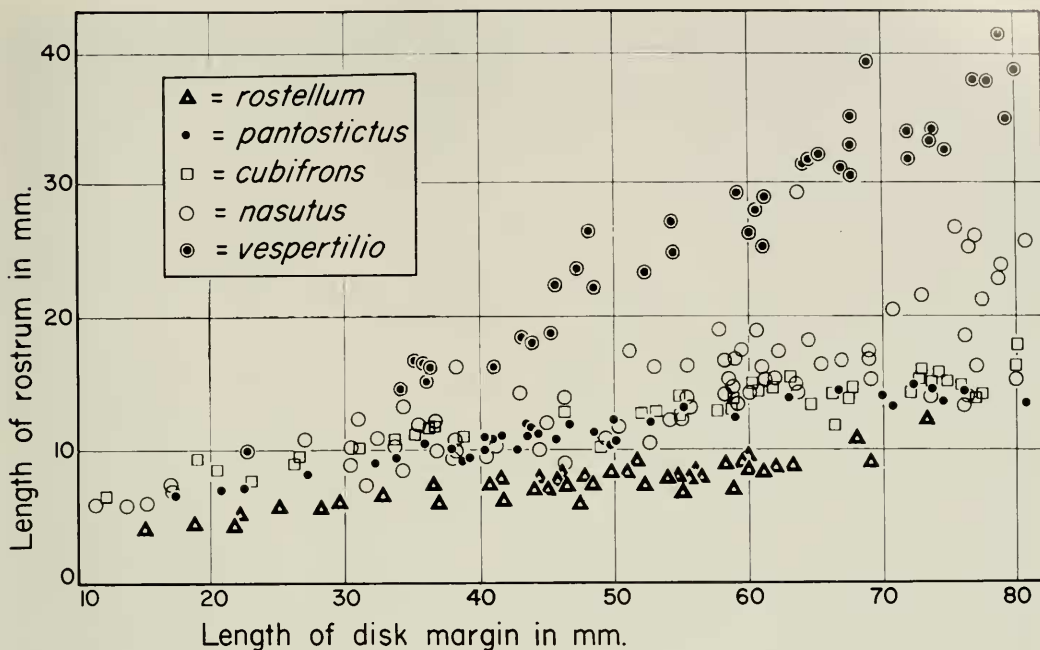


FIGURE 10. Comparisons among five closely similar species of *Ogcocephalus* to show relationship of length of rostrum to length of disk margin (see also Fig. 9). *O. vespertilio* shows long rostrum at all stages of growth, *cubifrons* and *pantostictus* show shortening of rostrum with growth, *rostellum* shows short rostrum at all stages of growth. Length of rostrum in *nasutus* extremely variable.

ries: subopercular lateral-line scale count modally 9 as in *notatus* and *pantostictus*; modal count for the cheek series 9. Scales in lateral line relatively numerous as in three other large species: *nasutus*, *pantostictus*, and *cubifrons*.

Proportions. Proportions expressed as ratios given as the mean followed by the range in parentheses. Length of disk margin intermediate within the range of variation for the genus, 2.2(2.0–2.4) in SL. Width of tail also intermediate, 2.0(1.5–2.5) in length of disk margin; caudal peduncle moderately deep, 3.0(2.5–3.5) in head depth. Rostrum with a thick base, proportionately longer than in any other species save *corniger*, its length 2.1(1.5–2.8) in length of disk margin. Aperture of illicial cavity elongate, triangular, always higher than wide. Cranium rising steeply above the disk, becoming massive in large adults; head depth 1.9(1.7–2.0) in length of disk margin. Width of cranium 3.3(2.9–4.0) in length of cranium; eye 1.5(1.3–1.8), lateral ethmoid width 1.9(1.6–2.3). Interorbital moderate to wide, flat

posteriorly but distinctly convex anteriorly, grading into the roundness of the rostrum; interorbital width 2.0(1.5–2.4) in width of cranium, 3.4(2.6–4.0) in head depth. Mouth moderate, its width 1.6(1.5–1.7) in head depth, 3.0(2.7–3.6) in length of disk margin; jaw 2.2(2.0–2.4) in head depth. Upper lip fleshy, of an even width for its entire length; lower lip also fleshy, thickened medially. Dorsal fin of moderate size, 3.8(3.0–4.6) in length of disk margin; anal fin 2.7(2.4–3.1) in length of disk margin.

Integument. Dermal cirri present on tip of the rostrum, disk margins, and lateral sides of tail, usually sparse except on rostrum. Large bucklers prominent, arranged as in generic description. All fins with tiny tubercles, those on pectorals restricted to the base, those on ventrals and anal running out from base for about half length of fin. Tubercles on dorsal fin sparse except for anterior edge of fin where they thickly encrust the first ray and run out nearly to end of ray. Caudal as in generic description. Skin covering eyeballs studded with tiny tubercles,

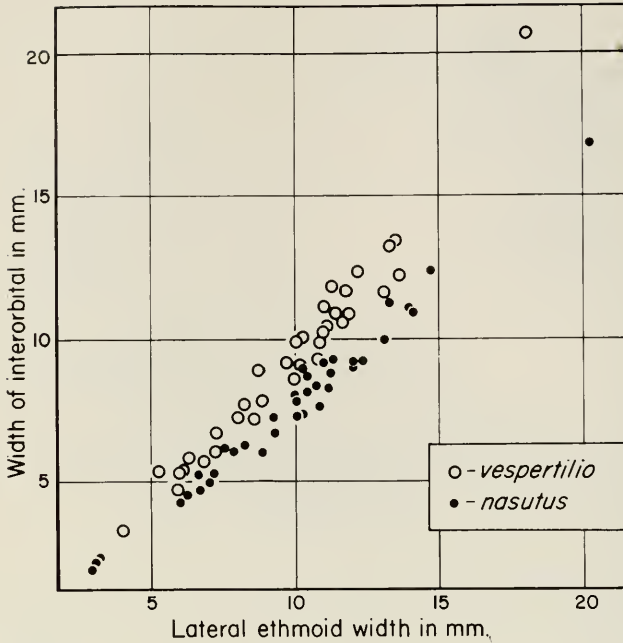


FIGURE 11. Comparison between *Ogocephalus vespertilio* and *O. nasutus* (only specimens from South America) to show relatively wide interorbital distance compared to lateral ethmoid width in *vespertilio*.

the rim around cornea with small bucklers, but these not so prominent as in other species. Pectoral membranes thick, opaque, ventral surface of ray tips with well-developed fleshy pads.

Color in preservative. Ground color medium brown. Markings consist of dark spots separated by pale lines that form a reticulum. These markings occur on face, often within illicial cavity, and on esca, and generally extend in a band across each eye. On the eye, including the iris, light lines radiate from pupil. The markings extend posteriorly from each eye and are often continuous on each side with a patch of markings on each shoulder. Similar markings extend from axillae along lateral sides of tail. Sometimes patch in axilla also continuous with shoulder patch on each side. Ventral surface of body uniformly light yellowish brown, or sometimes chin and tail slightly darker. Lips pale; rostrum with a diffuse dark subterminal ring. Iris marked with an extension of the same pattern that covers face. Pectorals with reticulate markings basally, grading into a dark border; rays tips pale. Dorsal also with reticulate pattern. Ventrals and anal the same ground color as ventral surface of body; tips of ventrals dusky, tip of anal dusky

to black. Caudal as in generic description, but with reticulate markings superimposed on basal two thirds.

Color in life. Unknown.

DISTRIBUTION (Fig. 8).—Coasts of Brazil and Uruguay from Amazon River south to La Plata River. Little bathymetric data available; appears to be an inshore species. One specimen identified as *Ogocephalus vespertilio* recorded from 1300–1450 km upstream in Amazon River (de Soto 1922).

MATERIAL EXAMINED.—The holotype, Linnésamling no. 163, Museum Alströmer-Linné no. 40, Uppsala University, examined for me by C. L. Hubbs; exact locality unknown. All other material from **Brazil**: numbers in parentheses are numbers of specimens. *Pará*: USNM 12575 (1), Amazon. *Maranhão*: CAS-SU 59627 (1) and CAS-SU 59628 (4), Rio Bacanga, Madre Deus; CAS-SU 59630–59632 (3), Madre Deus. *Ceará*: CAS-SU 59616–59620 (5) and CAS-SU 59622–59626 (10), Mucuripe, Fortaleza; CAS-SU 59621 (2), Fortaleza. *Pernambuco*: USNM 104286 (1), Recife. *Bahia*, all from Salvador: CAS-SU 59633 (1), market; MCZ 1037 (1); MCZ 25741 (1); MNHN 6369 (holotype of *Malthaea longirostris* Cuvier and Valenciennes); ZMUC 18 (1). *Espírito Santo*: CAS-SU 59612 (1) and CAS-SU 59614 (1), Enseada, Vitória; CAS-SU 59615 (1), Vitória. *Rio de Janeiro*: MCZ 11755 (1) and MCZ 11756 (2), Rio de Janeiro. *São Paulo*: CAS-SU 59610 (1) and CAS-SU 59613 (1), Ponta da Praia, Santos; CAS-SU 59611 (1), Ponta do Rabo Azedo, 113 km NE São Paulo.

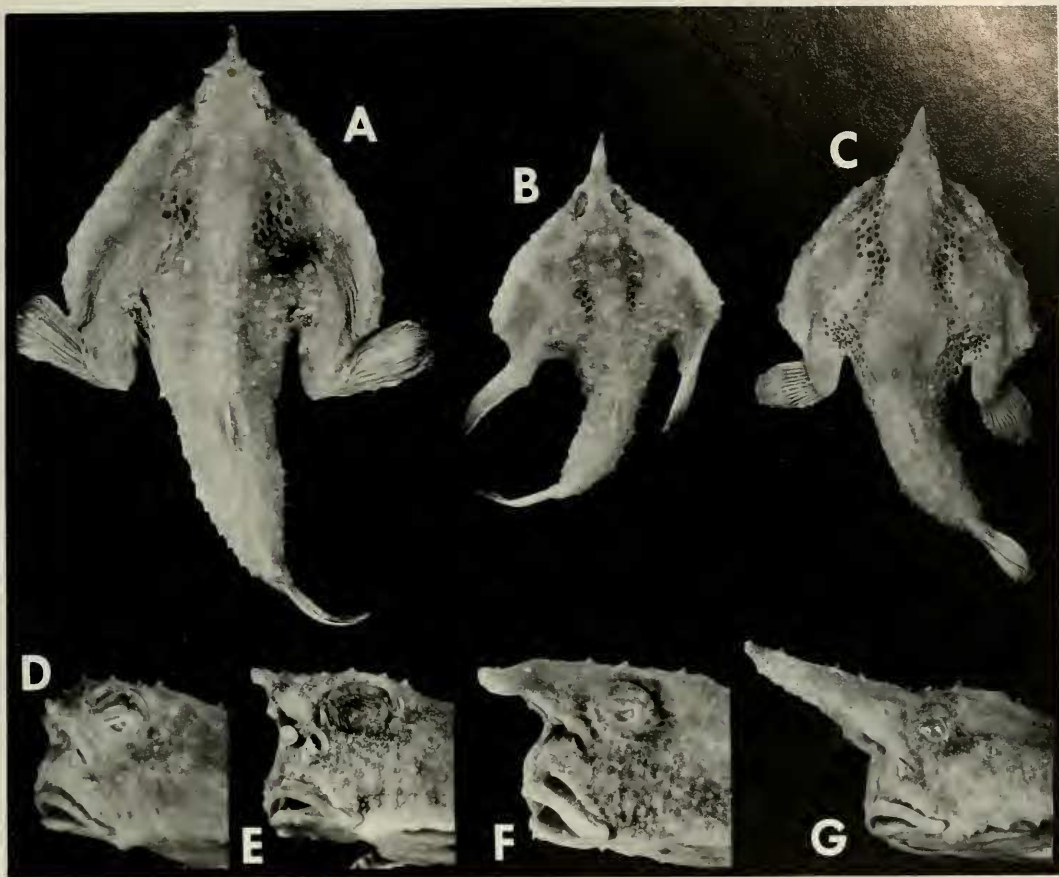


FIGURE 12. Variation in *Ogcocephalus nasutus* (Cuvier and Valenciennes). (A) Specimen from off Surinam, FMNH 87034, 135.0 mm SL, and (B) specimen (juvenile) from Caribbean off Venezuela, MCZ 41510, 84.0 mm SL, both showing common pattern of clusters of spots on shoulders. (C) Specimen from northern Brazil, FMNH 66386, 130.0 mm SL, showing uncommon condition of clusters of spots extending from eyes backwards to axillae, reminiscent of *O. vespertilio*. (D) From Honduras, CAS 28520, 148.5 mm SL. (E) and (F) From Surinam, CAS-SU 51208, 130.5 mm SL, and FMNH 64900, 203.0 mm SL. (G) From Nicaragua, CAS 28494, 205.0 mm SL. Extremely short rostrum (D), bent rostrum (F), and extremely long rostrum (G) are unusual, but all occur in both Central American and South American material.

Ogcocephalus nasutus (Cuvier and Valenciennes)

(Figures 12 and 13)

[?] *Rana piscatrix* SEBA, 1734:pl. 74, fig. 2 [Curaçao; see comment after synonymy].

Lophius vespertilio (non Linnaeus): BLOCH 1787:8, pl. 110 [description]; PARRÁ 1787:pl. 4 [not seen; a hand-drawn copy by Señorita Poey was consulted; Cuba]; CUVIER 1816:311 [based on Bloch 1787].

[?] *Lophius rostratus* SHAW, 1804:383 [description; nomen dubium; see comment following synonymy].

[?] *Malthe nasuta* CUVIER, 1829:252 [nomen dubium, based on Seba 1734; see comment following synonymy].

Malthea vespertilio (non Linnaeus): CUVIER AND VALENCIENNES 1837:440 ["Porto-Rico, Martinique, Terre-Neuve"; description].

Malthea nasuta CUVIER AND VALENCIENNES, 1837:452 [Martinique, "Saint-Domingue, New-York"].

Ogcocephalus vespertilio (non Linnaeus): JORDAN AND EVERMANN 1898:2737 ["Havanna, Cuba"; description]; MEEK AND HILDEBRAND 1928:1017 [Porto Bello, Panamá; description]; BEEBE AND TEE-VAN 1928:272 [Port-au-Prince Bay, Haiti; key; field characters; color in life]; HERRE 1942:305 [Bridgetown, Barbados]; MARTIN S. 1956:142 [Los Roques off coast of Venezuela; description]; [?] LOWE (McCONNELL) 1962:680 [British Guiana (Guyana); partial description; ecology]; [?] CERVIGON M. 1966:870 [Venezuela; description; key]; [?] DAHL 1971:317 [Colombia; key].

Ogcocephalus nasutus: BEEBE AND TEE-VAN 1928:273 [Port-au-Prince Bay, Haiti; key; field characters; color in life]; BRADBURY 1967:417 [listed]; RANDALL 1967:825 [West Indies; food habits]; 1968:295 [photograph; description];

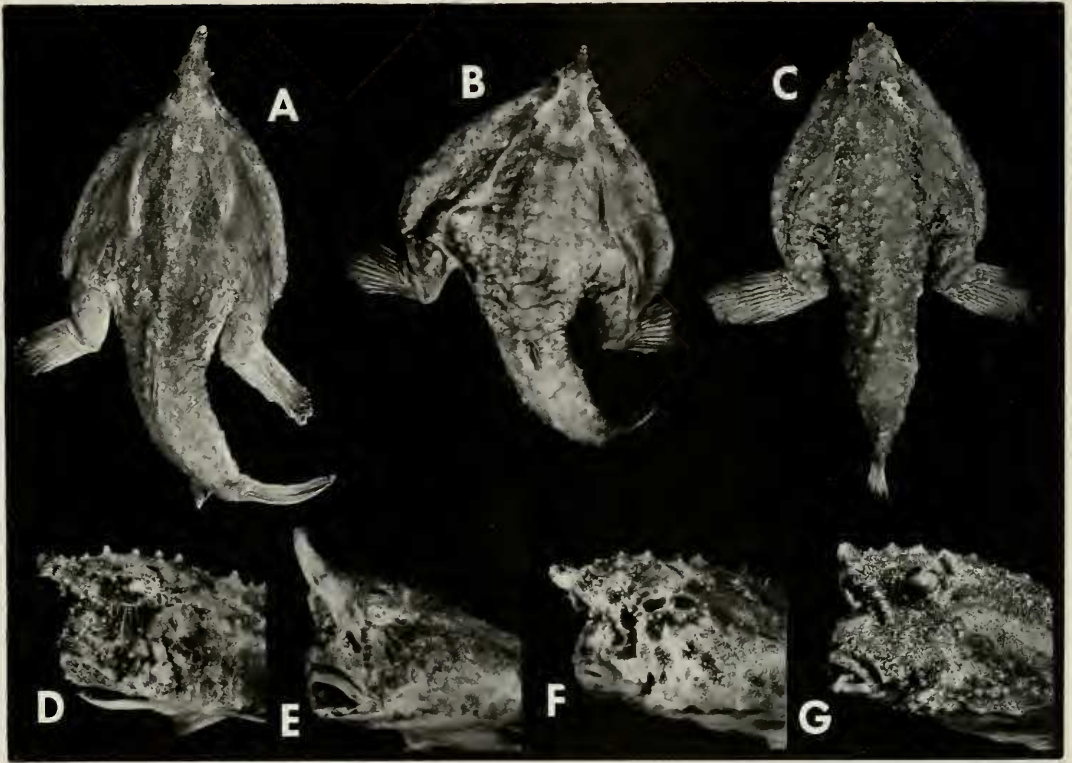


FIGURE 13. Variation in *Ogocephalus nasutus* (continued from Fig. 12). (A) From Belize, CAS 42579, 182.0 mm SL, and (B) from the Bahamas, ANSP 90674, 187.0 mm SL, both lacking color pattern except for few dim ocellated spots on disk of Belize specimen. In spite of absence of color pattern on body, striped and spotted patterns on face common in specimens from West Indies and Central America: (D) from Panama, MCZ 11768, 112.0 mm SL; (E) from Belize, same specimen as (A); (F) from the Bahamas, UF 24185, 108.0 mm SL. (D) Also shows exaggeratedly spiny bucklers occasionally seen among specimens from West Indies and Central America; (F), a less pronounced example of spiny squamation. (C) From the Bahamas, ANSP 90670, 170.0 mm SL, showing clusters of spots frequently seen in West Indies material; however, this specimen also has square-browed conformation of head characteristic of *O. cubifrons* and is intermediate between *cubifrons* and *nasutus* in other characters. (G) From the Bahamas, ANSP 90671, 162.0 mm SL, also intermediate between *cubifrons* and *nasutus*, with extremely dark coloration sometimes seen in West Indies material, but photographed while wet and intensely highlighted; compare conformation of rostrum with Figure 23G.

BÖHLKE AND CHAPLIN 1968:728 [description: bathymetric range; habits; key; figure].

Ongocephalus vespertilio (non Linnaeus): FOWLER 1947:14, fig. 9 [Nassau or Hog I., Bahama Is.; description].

Ogocephalus radiatus: BREDER 1949:95, pl. 10, figs. 1-4 [Bimini, Bahama Is.; behavior: photographs]; DAHL 1971:317 [Colombia; key; figs.].

The name *Lophius rostratus* Shaw, 1804, is based upon a textbook compilation drawn from Linnaeus together with the pre-Linnaean authors Seba (1734), Browne (1756), and Marcgrave (1648). The description in Marcgrave of a fish from Brazil gives proportions of the rostrum indicating it was the same species Linnaeus later described and named *vespertilio*. Linnaeus used

the term "rostratus" (beaked) in describing *vespertilio*, suggesting that Shaw's name derives from Linnaeus's description. In any case, *rostratus* Shaw in part refers to the long-nosed Brazilian form described by Marcgrave and Linnaeus. However, the other two authors to whom Shaw referred, Seba and Browne, described and figured specimens said to be from Curaçao and Jamaica, respectively; the localities and the figures suggest *nasutus* but do not limit the possibilities to *nasutus*. The illustration in Shaw also appears to depict *nasutus* because it shows a rostrum of only moderate proportions, but apart from that the illustration is highly stylized

and difficult to interpret. Finally, the range given by Shaw, "South-American seas," is too general to apply to any particular species. As I am unable to determine Shaw's *Lophius rostratus* either from his sources or from his description, I hereby reject the name *Lophius rostratus* Shaw as a nomen dubium.

The name *Malthe nasuta* Cuvier, 1829, was published in a footnote with no other designation than a figure in Seba (1734) labeled *Rana piscatrix*. This stylized drawing may represent the Antillean-Caribbean form of the species of *Ogcocephalus* under consideration here, but it is a very generalized figure and could be a representation of any of several other species. Because it is impossible to establish the identity of the figure upon which the name *Malthe nasuta* Cuvier, 1829, was based, the original description of *Ogcocephalus nasutus* is here considered to be that of Cuvier and Valenciennes, 1837.

COMPARISONS AND DIAGNOSIS.—At the beginning of this study, only specimens from the West Indies and the Venezuela-Guiana coast of South America were available for examination. These specimens showed some differences in color pattern and sometimes in squamation. Specimens from the West Indies included many with relatively dark overall color and reticulated markings around the gill pores, in the axillae, and on the lateral sides of the tail; these sometimes had jagged clusters of spinules at the tips of bucklers that made the body very rough (Fig. 13D shows this condition). Specimens from the northern coast of South America were a lighter, more uniform brown in color with less jagged bucklers; these generally were from depths of 30 m or more, but no comparisons with the West Indies specimens could be made on this point, as the latter usually lacked bathymetric data.

Eventually, specimens from the Caribbean coast of Central America became available. They generally came from offshore in depths over 30 m, but some were from shallower water. These Central American specimens resembled the South American specimens in color and squamation, their integument relatively pale and smooth, but the dark, rough-skinned variants occur here too, known from older museum specimens that also lack bathymetric data. In any case, the three groups of specimens were treated separately, so tables of data in this report show three sets of data for *O. nasutus*, which are des-

ignated as West Indies *nasutus*, Central American *nasutus*, and South American *nasutus*.

Besides varying in color pattern, *O. nasutus* is more variable than other species in the genus in lateral-line scale counts and in rostrum proportions, features relied upon in this study to characterize species. Apparently, *nasutus* also has a greater bathymetric range than any of its congeners, occurring inshore as well as offshore to depths of approximately 200 m in parts of its range. Perhaps bathymetric variations will eventually help explain morphological variation in this form.

One of the largest species of *Ogcocephalus* (Table 1), *nasutus* most resembles *cubifrons* to the north of its range and *vespertilio* to the south. At this time it appears that *nasutus* is allopatric with the Brazilian species *vespertilio*, but this assertion needs verification. In the north *nasutus* occurs with *cubifrons* off southeastern Florida and in the western Bahamas; whether or not it is entirely distinct from *cubifrons* in the western Bahamas is in doubt because a few specimens which are intermediate between *nasutus* and *cubifrons* have been taken there. *O. nasutus* differs from *cubifrons* in having a longer jaw (Fig. 14) and a narrower interorbital distance (Fig. 15), a rostrum longer on the average but more variable (Fig. 10), and higher modal number of lateral-line scales in the cheek series (9 instead of 8 as in *cubifrons*, Table 5). Color pattern also assists in separating *nasutus* from *cubifrons*: clusters of dark spots occur on the face, disk, and tail in both species, but *nasutus* lacks the bright pattern of spots on the pectoral fins seen in *cubifrons*. From *vespertilio*, *nasutus* differs in usually having a shorter rostrum (Fig. 10), a narrower interorbital distance (Fig. 11), and a lower modal count of pectoral rays (12–13 in *nasutus*, 14 in *vespertilio*, Table 3).

Ogcocephalus nasutus also resembles *pantostictus* and *rostellum* in general appearance. Compared to *pantostictus*, which shows allometric growth of the rostrum, the rostrum in *nasutus* is variable but generally longer than in *pantostictus* (Fig. 10). *O. nasutus* also differs from *pantostictus* in having a lower modal number of lateral-line scales in the subopercular series (8 compared to 9, Table 6), and *nasutus* has a pattern of spot clusters or may lack spots entirely, while *pantostictus* has a pattern resembling polkadots covering the entire dorsal sur-

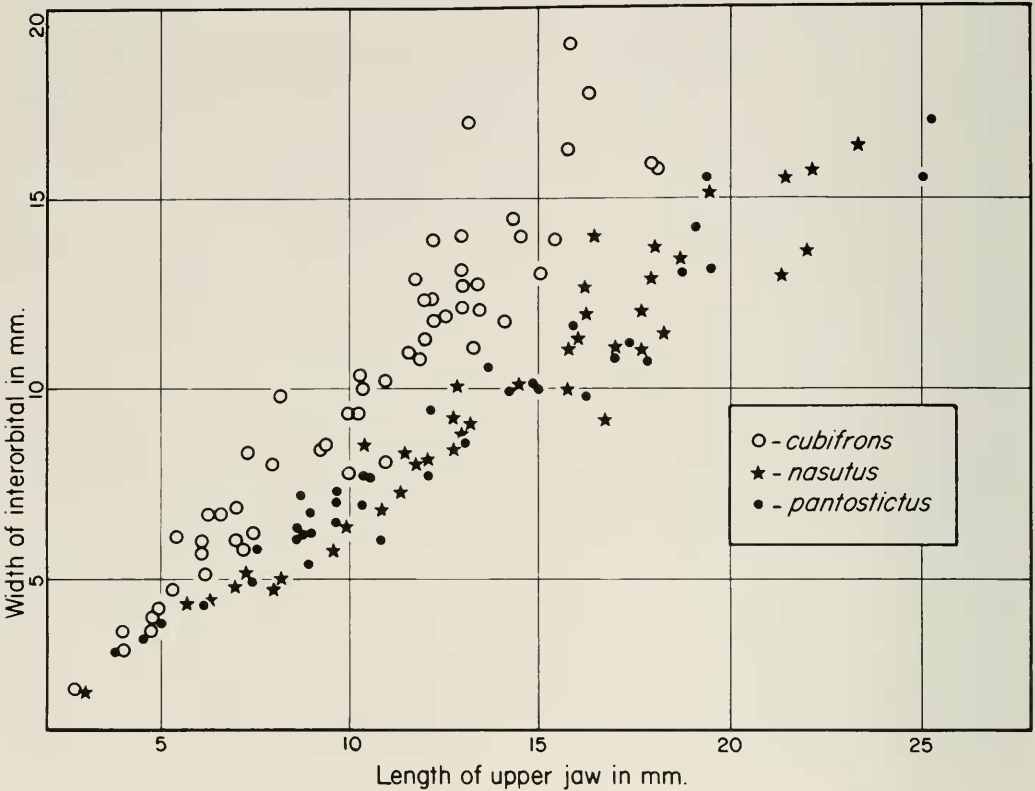


FIGURE 14. Comparisons between *Ogcocephalus nasutus* (only specimens from West Indies), *O. cubifrons*, and *O. pantostictus* to show that jaw is short in *O. cubifrons* relative to width of interorbital.

face of the body. *O. nasutus* differs from *rostellum* in having a longer rostrum (Fig. 10), a higher modal number of lateral-line scales in the cheek series (9 compared to 8 as found in *rostellum*, Table 5), and a relatively longer jaw (Fig. 16)

Ogcocephalus parvus and *O. pumilus* occur within the range of *nasutus*, but both are smaller species, reaching only 85 mm in standard length. Both differ further from *nasutus* in some meristic counts: pectoral rays usually 12–13 in *nasutus*, 10–12 in *parvus* and *pumilus*; lateral-line scales in the cheek series 9 in *nasutus*, 8 in the other two (Tables 3 and 5).

The range of *O. nasutus* slightly overlaps that of *corniger* in the vicinity of southeastern Florida and the western Bahamas; however, *corniger* is distinguished by its color pattern of close-set pale spots on a darker background evenly covering the entire dorsal surface, while *nasutus* has spot clusters on a lighter background or no

spots at all. *O. nasutus* and *O. corniger* also differ in some meristic counts: pectoral rays usually 12–13 in *nasutus*, 10–12 in *corniger*; lateral-line scales in the cheek series 9 in *nasutus*, 8 in *corniger* (Tables 3 and 5).

The southern portion of the range of *nasutus* overlaps the range of *notatus*, but the two are distinguished by the relative length of the disk margin (longer in *nasutus*, Fig. 7) and width of the mouth (narrower in *nasutus*, Fig. 6) as well as the lateral-line scale count of 3 in the premaxillary series in *nasutus* (4 in *notatus*) and 9 in the cheek series (10 in *notatus*).

DESCRIPTION.—Counts and measurements based on 106 specimens as follows: 40 specimens, 26.2–232.0 mm SL from the West Indies; 25 specimens 42.7–223.0 mm SL from the coast of Central America and Yucatán; 41 specimens, 29.0–233.5 mm SL from the coast of South America.

Counts. Counts given in Tables 2–6. A

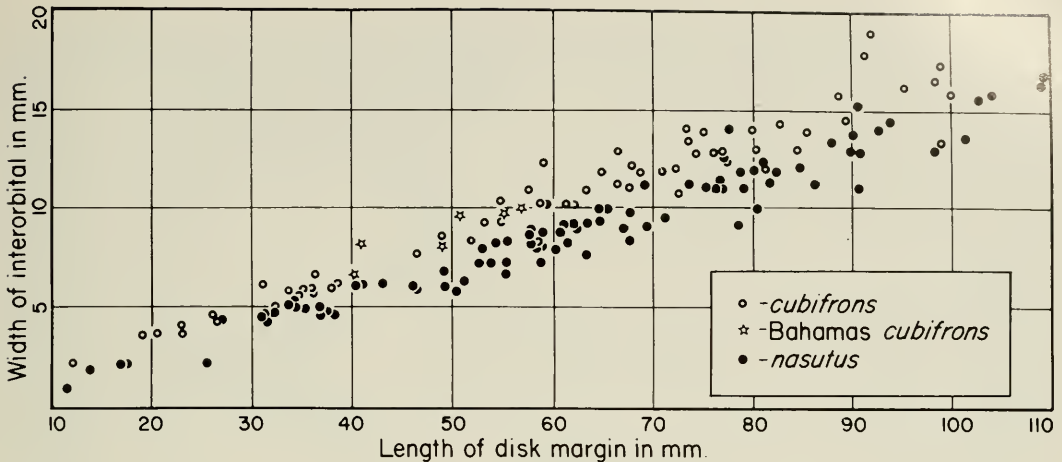


FIGURE 15. Comparison between *Ogccephalus cubifrons* and *O. nasutus* to show that interorbital is widest in *O. cubifrons* relative to length of disk margin.

marked difference in pectoral count exists between Antilles–West Indian and Central American specimens on the one hand and South American specimens on the other, most frequently 12 in Antilles–West Indian and Central American specimens, usually 13 in South American specimens. A small cline is formed between these two groups of *nasutus* and *vespertilio*, which most frequently has 14 pectoral rays, but clinal variation is not found in other counts. *O. nasutus* shows a wider range of variation with a higher degree of asymmetry in counts of lateral-line scales in the subopercular series than other species in the genus, but resembles most other species in having a relatively narrow range of variation in the count for the cheek series of lateral-line scales (modally 9, a feature in which *nasutus* resembles *vespertilio*). *O. nasutus* has a relatively high count for lateral-line scales, perhaps associated with the large size of the species, since other large species (*vespertilio*, *pantostictus*, and *cubifrons*) also have high lateral-line scale counts.

Proportions. Proportions expressed as ratios given as the mean followed by the range in parentheses.

Length of disk margin intermediate for the range of variation in the genus, 2.2(2.0–2.4) in SL. Tail moderately wide to narrow, its width 2.0(1.7–2.7) in length of disk margin; depth of caudal peduncle quite variable but averaging relatively deep, 2.8(2.2–3.5) in head depth. Ros-

trum extremely variable in length and contour. It may be as short as the rostrum of examples of *cubifrons* of comparable size (especially true among Bahaman and western Caribbean specimens) or as long as that of *vespertilio*. It may be thick-based and conical or slender and finger-shaped. Usually it is straight, either horizontal or tilted upward, but a few specimens have it crooked with its tip bent sharply upward or drooping downward (Fig. 12, 13). Length of rostrum 3.7(1.9–5.7) in length of disk margin. Aperture of illicial cavity subtriangular, higher than wide. Cranium rising steeply above disk, head depth 2.0(1.7–2.2) in length of disk margin. Width of cranium 3.4(2.5–4.0) in length of disk margin. The following in width of cranium: eye 1.5(1.3–1.9), lateral ethmoid width 1.7(1.4–2.0). Interorbital variable, from slightly concave to flat or even a little convex anteriorly where the interorbital contours grade into the roundness of the rostrum. Width of interorbital 2.1(1.7–2.7) in width of cranium, 3.6(2.8–4.4) in head depth. Mouth moderate, its width 1.6(1.4–1.8) in head depth, 3.2(2.7–3.8) in length of disk margin; jaw 2.3(2.1–2.5) in head depth. Upper lip fleshy, of an even width for its entire length; lower lip fleshy, swollen medially. Dorsal fin 4.4(2.9–5.6) in disk margin; anal fin 3.0(2.4–3.9) in disk margin.

Integument. Dermal cirri sometimes present. Large bucklers prominent, arranged as in generic description. All fins with tiny tubercles.

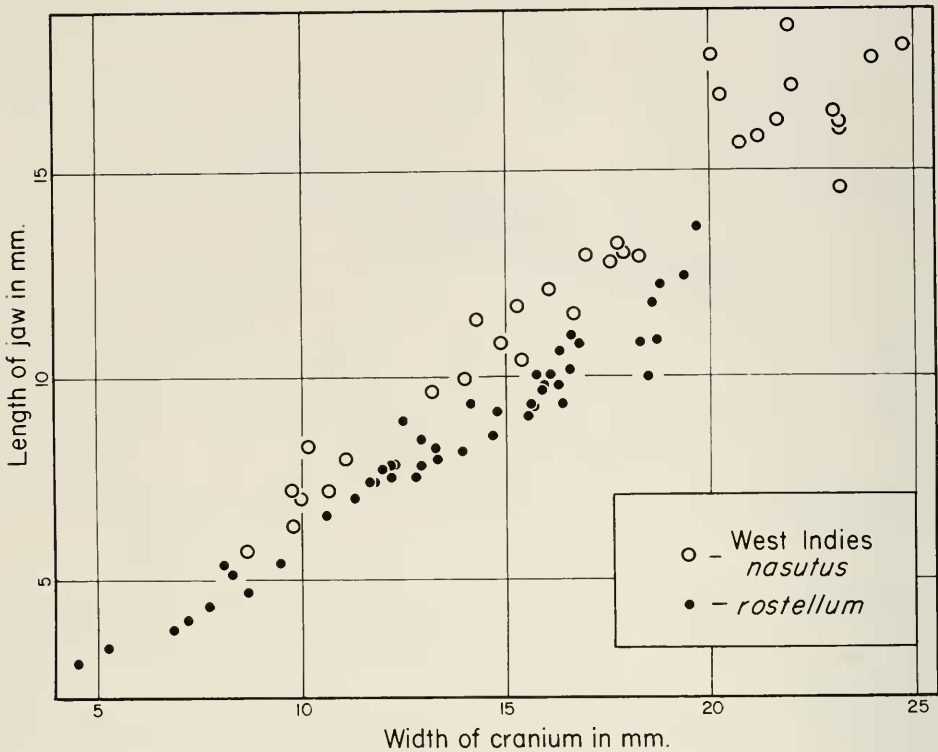


FIGURE 16. Comparison between *Ogcocephalus nasutus* (only specimens from West Indies) and *O. rostellum* to show that jaw is long in *O. nasutus* relative to width of cranium.

On pectorals, ventrals, and anal, tubercles are variable in distribution, sometimes restricted to bases of fins, sometimes running out along rays for half their length. Dorsal fin with tubercles on anterior edge of first ray, sometimes running out along ray nearly to its tip. Caudal as in generic description. Skin covering eyeballs bearing tiny tubercles with rim around the cornea beaded by a row of small bucklers. Pectoral membranes thick, opaque, ventral surface of rays with fleshy pads.

Color in preservative. Specimens from West Indies often very darkly pigmented, but specimens from off coast of South America and Central America usually have dorsal surface of body tan or medium brown, with ventral surface of body usually paler than dorsal surface. As pointed out elsewhere, it is likely that this color variation is correlated with depth and not geographical locality; a corroborative observation is that several specimens from Central America from presumed shallow water (exact depths not given) were relatively darkly pigmented.

Roundish dark spots often present clustered

in a patch on either shoulder. Markings on face, lateral walls of tail, and in axillae tend to be reticula of pale lines between dark irregular patches. Specimens from West Indies sometimes have dark stripes with narrow light borders on face and iris which form a radiating pattern around pupil. Ventral surface pale to dark gray in West Indian specimens, the chin often particularly dark; ventral surface uniformly pale in South American and Central American specimens. Lips in West Indian specimens usually darkly pigmented in dark specimens, but otherwise lips pale. Rostrum generally with a diffuse black subterminal ring. Iris black or marked with an extension of color markings of face. Pectorals of West Indian specimens generally dark to nearly black, always with a black margin even when fin pale basally; pectorals of South American and Central American specimens usually pale dusky to medium gray or tan, shading to a darker margin. Dorsal variable, pale to dark, ordinarily without markings. Ventrals and anal the same ground color as ventral surface of body; in dark specimens the ventrals and anal

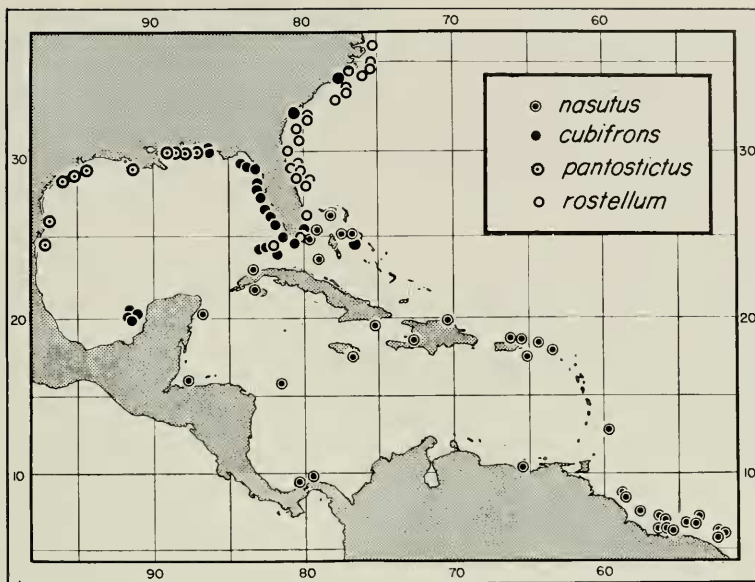


FIGURE 17. Localities for study material of *Ogcocephalus nasutus*, *O. cubifrons*, *O. pantostictus*, and *O. rostellum*. Scale of map too small to show that *O. cubifrons* and *O. pantostictus* are parapatric in northern Gulf of Mexico; see text for localities.

may have dark tips, and small specimens nearly always have anal black-tipped. Caudal fin as in generic description.

Color in life. Kodachrome transparencies made of a freshly captured specimen from off coast of South America show dorsal surface of body uniformly grayish olive-green, a mudlike color, with conspicuous clusters of black spots on either shoulder. Pectorals and caudal the same greenish shade basally, shading to black margins. Lips, ventral surface of body, and anal fins rosy tan.

Breder (1949) writes of a specimen captured from off Bimini and kept in an aquarium, "For the most part the fish remained an intense black, so much so that it was only with difficulty that any of the ordinarily visible fish structures could be seen. Thus the pupil, iris, and skin about the eye were so much the same that none of the details could ordinarily be seen at all. The inside of the mouth and the membranes shown when 'yawning' were at all times a rich mahogany and very contrasting to the entirely black fish. At night on a few occasions the iris became mahogany colored, and vague lighter bands appeared across the back."

Perhaps color variation is governed to some extent by variations in the amount of ambient light, with dark specimens coming from shallow,

well-lighted waters and lighter colored specimens coming from deeper water. Dr. John E. Randall (personal communication) says of a specimen 164 mm SL which was taken in water about 21 m deep in Reef Bay, St. John, Virgin Islands, "The fish was brown on top with no spots. There were some short white lines near the gill opening and around the ventral half of the eye and snout below the rostral prominence. The mouth was bright red. The ventral part of the fish was red."

Dr. Bruce B. Collette (personal communication) noted that a specimen he took from water 1–1.5 m deep off the Isle of Pines had lips that were brilliant vermilion.

DISTRIBUTION (Fig. 17).—Material used for counts and measurements in this study came from the West Indies and the coasts of Central and northern South America to the mouth of the Amazon River. However, during the final preparation of this report, the following specimens were seen which extend the range to southeastern Florida: UMML 16813, 1 specimen, bridge at Bear Cut, Dade Co., and UMML 33252, 1 specimen, Bear Cut at Virginia Key, Dade Co. Bathymetric range: shore to 275 m.

REMARKS.—Early in this study I examined the type material in the Muséum National d'Histoire Naturelle, Paris, which consisted of the follow-

ing three specimens: A.4665, Martinique, Keraudren; A.4765, Saint Domingue, Ricord (Pichon); and A.4766, New York, Milbert. The Martinique specimen, a dried example mounted on a wooden stand and about 200 mm SL, was difficult to perform counts and measurements on, but had a relatively short rostrum, wide mouth, and narrow interorbital. The Saint Domingue specimen, 192.5 mm SL, had an extremely short rostrum, wide mouth, and wide interorbital. The New York specimen, 34.0 mm SL, had a relatively long, slender rostrum, but the specimen is too small for other proportions to be useful. This specimen is also problematical because the locality is outside the known range of *nasutus* as understood here. Although a stray occurrence off New York is certainly possible, it is also possible that the original locality information is wrong. None of the specimens had discernible markings.

Recognizing now that *nasutus* is variable and difficult to characterize, and that setting its limits is yet to be accomplished, I cannot assert that the three types are conspecific. To compound the difficulty, I recently checked the status of these specimens and was informed by Dr. M.-L. Bauchot (personal communication) that specimen A.4665 (the Martinique specimen) unfortunately has disappeared from the collection.

MATERIAL EXAMINED.—Numbers in parentheses are numbers of specimens. For data from OREGON stations (=O), refer to Bullis and Thompson (1965).

West Indies: Bahamas: AMNH 18025 (1); ANSP 72336 (1), Nassau and Hog I.; ANSP 90669 (1) and ANSP 90673 (1), N shore of Hog I.; ANSP 90672 (1) and 90674 (1), S shore of Hog I.; MCZ 11767 (2), Nassau; UF 24185 (1), SILVER BAY sta. 2464, 23°34'N, 79°05'W, 274 m. Cuba: ANSP 89011 (1), Havana; CAS-SU 3096 (1), Havana; CAS 27215 (1) and CAS 42578 (1), Havana; MCZ 11758–11760 (5); MCZ 11763 (3); MCZ 35096 (1), Guantánamo Bay; USNM 13051 (1). Jamaica: CAS-SU 4744 (3). Haiti: USNM 132575 (1), Port-au-Prince; USNM 178027 (1). Dominican Republic: AMNH 8297 (2) and AMNH 17462 (1); ZMUC 10 (1) and ZMUC P9229 (1), Puerto Plata. Puerto Rico: FMNH 64842 (1), O-2626; CAS 23918 (1), O-2668. Virgin Islands: FMNH 53947 (1), St. Croix; UMML 6821 (1), W end Reef Bay, St. John; USNM 116432 (1), Shoy Lagoon, St. Croix; ZMUC 5 (1), St. Croix. Lesser Antilles: ANSP 10622–10623 (2), St. Martin; MCZ 27332 (1), "St. Bart." [=Saint Barthélemy?]; CAS-SU 39893 (1), Bridgetown, Barbados; FMNH 64847 (1), O-2631.

Central America: British Honduras: AMNH 8209 (1), Porta Cortez; CAS 28495 (2), O-6405, 17°18'N, 88°01'W, 183 m; CAS 42579 (2), UNDAUNTED cr. 6703, Sta. 72, 17°12'N, 88°11.2'W, 18–20 m; USNM 37123 (1), off Cozumel; BMNH 1927.9.16.18–22 (4), Watercey I. Honduras: CAS 28520 (1), HURRICANE, 15°48'N, 83°54'W, 24 m; CAS 28521–22 (4), SHADY LADY, 15°49.5'N, 83°44'W, 31 m; CAS 28523 (2),

SHADY LADY, 15°54'N, 83°40'W, 37 m; FMNH 64329 (2), O-1934; FMNH 64330 (4), O-1937. Nicaragua: CAS 28494 (2), O-6426, 12°56'N, 82°21'W, 190 m. Panama: MCZ 11768 (1), Isthmus of Darien; USNM 81728 (1), Porto Bello.

South America: Venezuela: CAS 28527 (1), CALAMAR sta. 502, 11°15'N, 65°15'W, 82–104 m; FMNH 64900 (4), O-2348; MCZ 41510 (4), ATLANTIS sta. 5599, 10°19'N, 65°32.5'W, 64 m. Guyana: CAS 28525 (1), CALAMAR sta. 425, 95–101 m; FMNH 64894 (1), O-2251; FMNH 65950 (2), O-2249; FMNH 65960 (4), O-2231; FMNH 65961 (2), O-2233; FMNH 65962 (2), O-2254; FMNH 66386 (1), O-1996; UF 24184 (1), O-2241. Surinam: CAS 23915 (1), O-2279; CAS 23917 (1), COQUETTE sta. 178, 6°19'N, 55°50.5'W, 27 m; CAS-SU 51208 (1), COQUETTE sta. 30, 6°49.5'N, 54°54'W, 48 m; CAS-SU 51211 (1), COQUETTE sta. 213, 6°46'N, 54°29.5'W, 44 m; FMNH 64896 (1), O-2275; FMNH 64898 (8), O-2329; FMNH 65959 (1), O-2016; FMNH 65963 (1), O-2266; MCZ 45076 (1), COQUETTE sta. 182, 6°15'N, 55°54'W, 24 m; UMML 4012 (1), O-2268. French Guiana: CAS 23916 (1), O-2043; FMNH 64889 (1), O-2035; FMNH 64890 (1), O-2036; FMNH 64897 (1), O-2303; FMNH 65964 (1), O-2301. Brazil: MCZ 45075 (4), O-2074.

Undetermined material. Seven specimens from the Bahama Islands are intermediate in color pattern between *nasutus* and *cubifrons*, and also cannot be diagnosed with certainty on the basis of morphometric characters; these are ANSP 72335 (1), Hog I., ANSP 90670–90671 (2), south shore of Hog I., and FMNH 64139 (4), Grand Bahama I.

Ogcocephalus cubifrons (Richardson)

(Figures 18 and 22)

[?] *Lophius radiatus* MITCHILL, 1818:326 ["Strait of Bahama"; nomen dubium; see comment after synonymy].

Lophius (Malthe) cubifrons RICHARDSON, 1836:103, pl. 96 [Labrador (see comment after synonymy); holotype BMNH 1855.9.19.848].

Malthaca cubifrons: CUVIER AND VALENCIENNES 1837:452 [based on Richardson 1836; *cubifrons* placed in synonymy of *nasutus*].

Malthe nasuta (non Cuvier and Valenciennes): STORER 1846:131 [synonymy; partial description; range, compiled].

Malthe cubifrons: GÜNTHER 1861:203 [partial description of holotype]; GILL 1873:14 [Labrador; name only]; GOODE AND BEAN 1879:121 [west Florida; fin formulae]; 1882:235 [Gulf of Mexico; name only]; JORDAN AND GILBERT 1882:850 [coasts of Florida; partial description].

Malthaca radiata: GILL 1862:47 [name only; based on *Malthaca nasuta* of Storer 1846].

Malthe vespertilio (non Linnaeus): GILL 1873:14 [Labrador, compiled]; JORDAN AND SWAIN 1885:234 [Cedar Keys, Florida; partial description; *cubifrons* and *nasutus* referred to synonymy of *vespertilio*]; HENSHALL 1895:220 [Tampa, Florida]; JORDAN 1899:172 [name listed].

Malthe vespertilio nasuta (non Cuvier and Valenciennes): JORDAN AND GILBERT 1882:850 [range: South Atlantic coast of United States; partial description].

Malthe vespertilio radiata: JORDAN 1885a:927 (part) [variety *cubifrons* referred to the synonymy of *radiatus*]; 1885b:144 [Key West, Florida; partial description]; 1885c:45 [Egmont Key, Florida].

Malthe radiata: HENSHALL 1891:383 [southern Florida]; 1895:220 [Tampa, Florida; partial description].

Onchocephalus radiatus: GOODE AND BEAN 1896:498 [Pensacola, Florida; description; notes on holotype of *cubifrons* Richardson, 1836].

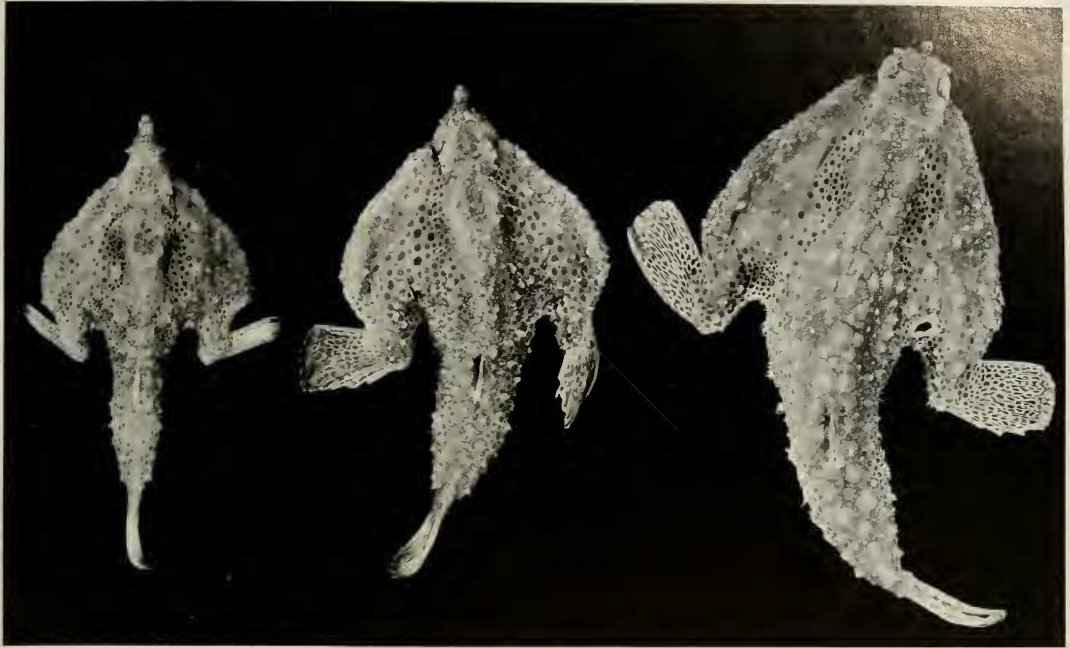


FIGURE 18. *Ogcocephalus cubifrons* (Richardson) from west coast of Florida showing interorbital width increases with size and rostrum length decreases. Left to right: 78.0 mm SL, FSBC 342, 64–81 km NE Dry Tortugas; 98.0 mm SL, UF 2730, off Pensacola; 194.0 mm SL, FSBC 1369, off Don-ce-Sar, Pinellas County.

Ogcocephalus vespertilio (non Linnaeus): JORDAN AND EVERMANN 1896:511 (part) [list, compiled]; EVERMANN AND KENDALL 1900:99 (part) [locality records, compiled]; GUNTER, WILLIAMS, DAVIS, AND SMITH 1948:314 [Fort Myers, Florida; mortality].

Ogcocephalus radiatus: JORDAN AND EVERMANN 1898:2738 [Cedar Key, Florida; description; range; *radiatus* (= *cubifrons*) removed from synonymy of *vespertilio*]; EVERMANN AND KENDALL 1900:99 (part) [Key West, Florida; other localities compiled]; FOWLER 1906:108 [Florida Keys; color in life; behavior; figure]; 1915:251 [Palm Beach, Florida]; BREDER 1929:303 [Florida]; JORDAN, EVERMANN, AND CLARK 1930:507 [compiled]; STOREY AND GUDGER 1936:648 [mortality]; GUNTER, WILLIAMS, DAVIS, AND SMITH 1948:312 [Englewood, Florida; mortality]; BRIGGS 1958:301 [range, compiled]; BÖHLKE AND CHAPLIN 1968:727 [Bahama Is.; description; key; figure]; WALLS 1975:117 [partial description; color photograph].

Oncocephalus radiatus: FOWLER 1926:254 [Captiva Pass, Florida]; 1945:335 (part) [Sanibel I., Florida].

Ogcocephalus cubifrons: LONGLEY AND HILDEBRAND 1941:311–312, pl. 33, fig. 2 [Tortugas, Florida; key; description]; HILDEBRAND 1955:219 [(Campeche Banks, Yucatán; partial description); SPRINGER AND McERLEAN 1962:41 [south Florida; listed]; MOE AND MARTIN 1965:147 [off Pinellas Co., Florida; ecological survey; listed]; MOE et al. 1966:120 [Florida; list of museum specimens]; BRADBURY 1967:417 [listed]; STARK 1968:33 [Alligator Reef, Florida; composition of reef fauna].

Ogcocephalus nasutus (non Cuvier and Valenciennes): REID 1954:73 [Cedar Key, Florida; description; ecology]; HERALD 1972:110 [color photograph].

Ogcocephalus sp.: SPRINGER AND WOODBURN 1960:91 [Tampa Bay, Florida; ecology].

Although the name *radiatus* Mitchill, 1818, has often been used for this form, I agree with Longley (Longley and Hildebrand 1941) that the usage is mistaken. Longley wrote concerning Mitchill's description that the ". . . facts of distribution make it improbable that Mitchill's *Lophichthys radiatus* is the same [as *cubifrons* Richardson]." Unfortunately, the holotype for *radiatus* Mitchill cannot be found. The fairly extensive search that I made yielded no results, and there is no record in the literature or elsewhere that any later author ever saw the specimen(s) that Mitchill (1818) described. Therefore, we have only the original description of *radiatus* on which to rely, but it is impossible to tell from it what Mitchill had in hand. All but one of the characters in the original description are generic or familial characters: the nature of the modified scales and their surface sculpturing, the way that scales with their crystalline tubercles form the rostrum, the location of the rostral cavity, the "minute" jaw teeth, the "distinct" tongue, and the size and placement of the various fins. The one character given which is helpful in discrim-

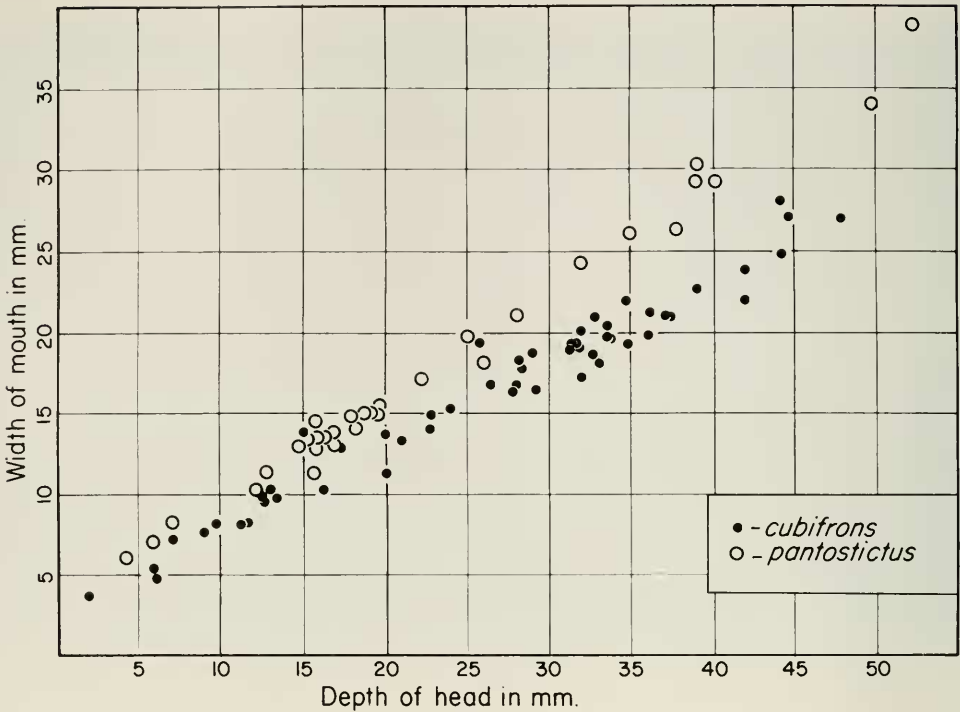


FIGURE 19. Comparison between *Ogocephalus cubifrons* and *O. pantostictus* to show mouth is widest in *O. pantostictus* relative to depth of head.

inating species is the pectoral fin ray count, given as nine or ten. But these numbers are too low to correspond to *cubifrons*, for which the range in the pectoral fin count is 11 to 14. However, Mitchill (1818) described a total of three species of ogocephalids in his paper and several times gave fin counts that are impossibly low, indicating that fin ray counts cannot be used with confidence in this case. The locality given in the original description of *radiatus* is "the depths of the Strait of Bahama." Strait of Bahama is an old name for the Straits of Florida, an area from which could be taken at least three species that fit the description; these are *rostellum*, *nasutus*, and *parvus*, the latter having the low number of pectoral fin rays that best fits the description if we could be sure that it were accurate. Of course, *cubifrons* also is taken in the general area, but it is an inshore form and less likely to be taken in "the depths of the Strait" by a "drag net," if we interpret that to mean relatively deep water as Longley evidently did (Longley and Hildebrand 1941). Since the original description of *Lophius radiatus* Mitchill, 1818, is inadequate

for specific assignment, and since the single diagnostic character in the description (the pectoral fin ray count) fails to characterize the species at hand, I hereby reject the earlier name in favor of *Lophius (Malthe) cubifrons* Richardson, 1836.

The name *cubifrons* Richardson is represented by a holotype, BMNH 1855.9.19.848, in reasonable condition except for fading, and the original description with illustration is unequivocally of this form, but there is a question regarding locality. Jordan and Evermann (1898) first drew attention to the problem: "*Malthe cubifrons*, Richardson, [is] . . . said to be from Labrador (Coll. J. J. Audubon), but this is certainly an error; Audubon collected also in Carolina and Florida." Labrador is indeed far beyond the range of this species, but "Carolina" and Florida are both likely type-localities. However, I am unable to assign the holotype to any specific locality, or even general locality, within the range of the species.

DIAGNOSIS AND COMPARISONS.—A large species of *Ogocephalus* reaching 230 mm SL

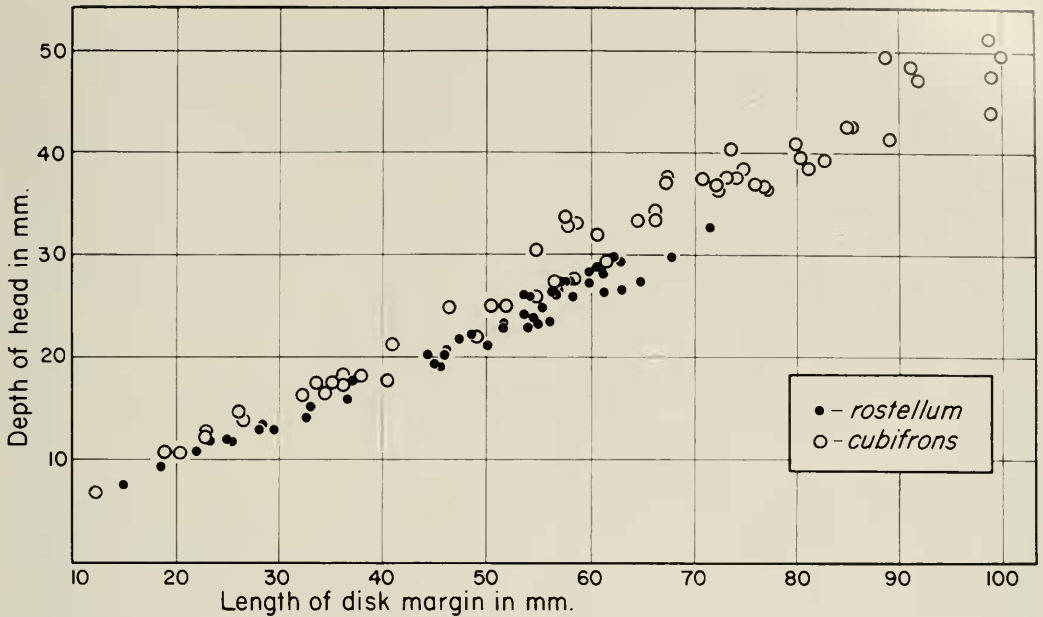


FIGURE 20. Comparison between *Ogocephalus rostellum* and *O. cubifrons* to show that depth of head is greatest in *O. cubifrons* relative to length of disk margin.

(Table 1) and distinguished by the combined features of a bright pattern of dark spots on the pale pectoral fins, a small mouth (Fig. 6), a wide interorbital distance, and a thick, massive head on which, in large individuals, is perched a small, knoblike rostrum, because the rostrum is characterized by ontogenetic allometry: very long in juveniles, very short in large adults (Fig. 22).

In general appearance, *O. cubifrons* most closely resembles *nasutus*, *rostellum*, and *pantostictus*, especially the latter, which is also large and heavy. *O. cubifrons* is distinguished from *pantostictus* by its smaller mouth (Fig. 19) and lower count of lateral-line scales in the subopercular series (usually 7–8 in *cubifrons*, modally 9 in *pantostictus*, Table 6). *O. cubifrons* is distinguished from both *pantostictus* and *nasutus* by the lower number of lateral-line scales in the cheek series (modally 8 in *cubifrons*, 9 in *pantostictus* and *nasutus*, Table 5), and is further distinguished from *nasutus* by having a shorter jaw and wider interorbital (Figs. 14 and 15) and in having allometric growth of the rostrum (Fig. 22).

Although the ranges of *cubifrons* and *rostellum* overlap off the southeastern United States,

the two evidently seldom co-occur, *cubifrons* being taken in shallower water than *rostellum*. *O. rostellum* has a more flattened disk as expressed by the head height (Fig. 20), a less massive head as expressed by the rostrum measurement (Fig. 9), and a smaller caudal peduncle (Fig. 21); it is a smaller species than *cubifrons*, reaching only 160 mm SL.

Ogocephalus parvus and *corniger* occur off both coasts of Florida and off the Carolinas and Yucatán, as does *cubifrons*, but *parvus* and *corniger* are taken in deeper water than *cubifrons*. Both *parvus* and *corniger* have fewer pectoral fin rays than *cubifrons* (usually 12–13 in *cubifrons*, 10–11 in *parvus* and *corniger*, Table 3) and differing color patterns; *parvus*, a small species reaching only 85 mm SL, has blotches of varying tones as the color pattern on the dorsal surface of the body, but it lacks the prominent clusters of dark circles seen on the body and pectoral fins in *cubifrons*. *O. corniger* differs from *cubifrons* in having close-set pale spots on a dark background evenly covering the entire dorsal surface of the body.

Ogocephalus declivirostris is restricted to the northwestern Gulf of Mexico and is evidently allopatric with *cubifrons*. *O. decliviro-*

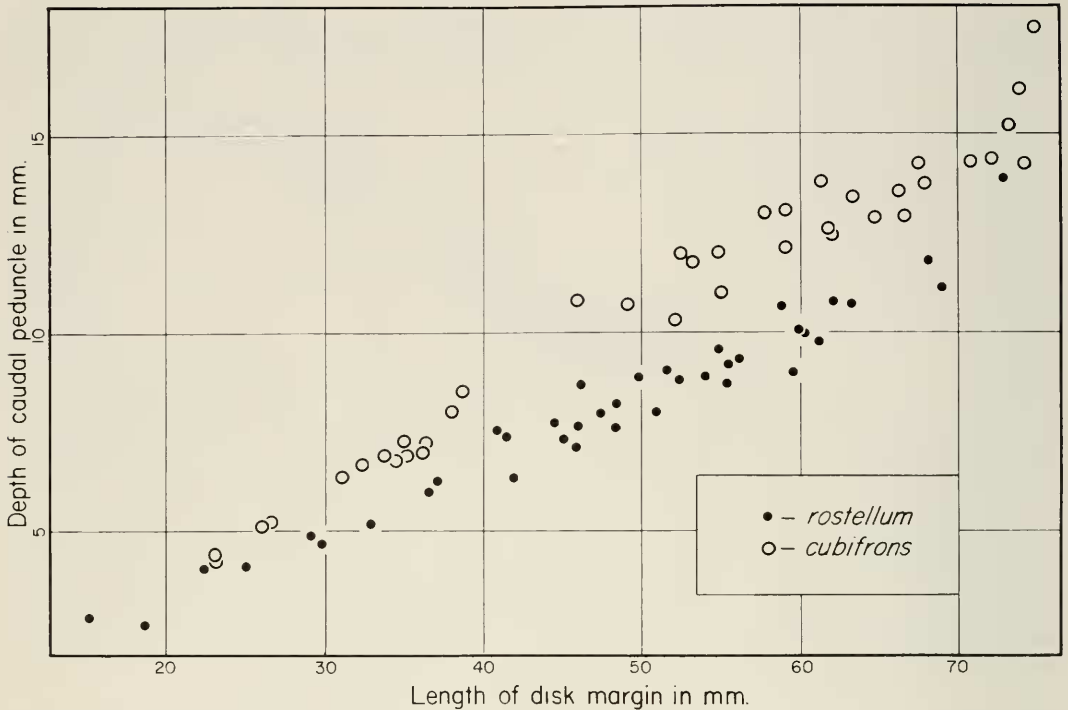


FIGURE 21. Comparison between *Ogocephalus rostellum* and *O. cubifrons* to show that depth of caudal peduncle is greatest in *O. cubifrons* relative to length of disk margin.

tris is distinguished, in any case, in having fewer pectoral fin rays (modally 11 in *declivirostris*, usually 12–13 in *cubifrons*, Table 3); *declivirostris* lacks the fleshy ventral pads on the distal tips of the pectoral fin rays as well as the spotted pattern of the pectoral fins so prominent in *cubifrons* (although occasionally *declivirostris* has a few very pale spots on the pectorals). Finally, *declivirostris* differs from *cubifrons* in having its rostrum jutting horizontally or downwards instead of upwards as in *cubifrons*.

DESCRIPTION.—Counts and measurements from 95 specimens 29.9 to 224.0 mm SL (Table 1).

Counts. Counts given in Tables 2–6. Two counts for *cubifrons* lie in the middle of the range for the genus; pectoral fin ray count is generally 12–13 in *cubifrons*, which is the middle of the generic range of 10–15, and the subopercular lateral-line scale count in *cubifrons* is usually 7–8, which is the middle of the generic range (excluding extremes) of 5–10. The lateral-line scale count, although showing wide variation, is also near the middle of the range for the

genus (Table 4). However, *cubifrons* agrees with *pantostictus*, *rostellum*, and *declivirostris* in having a high modal vertebral count of 20, whereas the more usual count for the genus is 19.

Proportions. Proportions expressed as ratios given as the mean followed by the range in parentheses.

Length of disk margin intermediate within range of variation for the genus, 2.3(2.0–2.5) in SL. Width of tail also intermediate, varying from thin in smallest specimens to thick and broad in large specimens, 1.8(1.5–2.4) in length of disk margin; caudal peduncle thick and deep, its depth 2.5(2.2–2.9) in head depth. Rostrum long, conical, and upturned in small specimens, becoming relatively small and knoblike in large ones (Fig. 22); length of rostrum 4.3(1.8–6.1) in length of disk margin. Aperture of illicial cavity subtriangular in small specimens, much higher than wide, becoming merely oval or round in large ones. Cranium rising steeply above the disk, its contours becoming massive and boxlike in adults; head depth 2.0(1.7–2.2) in length of

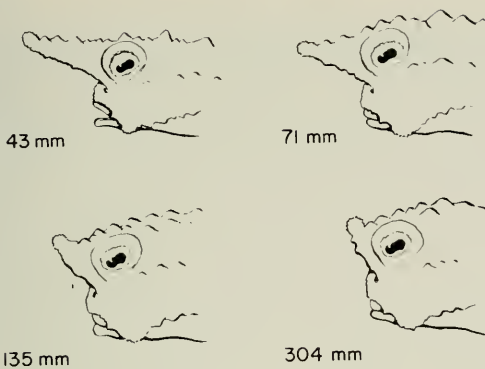


FIGURE 22. Heads of four examples of *Ogcocephalus cubifrons* showing allometric growth of rostrum.

disk margin. Width of cranium 3.1(2.6–3.6) in length of disk margin. The following in width of cranium: eye 1.6(1.4–1.9), lateral ethmoid width 1.8(1.5–2.0). Interorbital very wide, slightly concave, 1.9(1.5–2.2) in width of cranium, 3.0(2.3–3.4) in head depth. Mouth small, its width 1.9(1.6–2.2) in head depth, 3.8(3.2–4.4) in length of disk margin; jaw 2.8(2.5–3.2) in head depth. Upper lip fleshy, of an even width for its entire length; lower lip fleshy, usually thickened medially although no median lobe is developed. Dorsal fin 3.4(2.7–4.8) in length of disk margin; anal fin 2.6(2.2–3.1) in length of disk margin.

Integument. Dermal cirri generally well developed on lateral sides of tail, less so on disk margin; cirri also frequently scattered thickly on dorsal surface of body, particularly in half-grown specimens. Large bucklers prominent, arranged as in generic description. Tubercles relatively sparse on fins, occurring at bases of dorsal and pectoral fins with only a few scattered along fin rays. Anal and ventrals with tubercles at bases and running out on fin rays for a third to a half their length. Caudal as in generic description. Skin covering eyeballs bearing tiny tubercles with rim of cornea beaded by a row of small bucklers. Pectoral membranes thick, opaque, the ventral surface of ray tips with well-developed fleshy pads.

Color in preservative. Ground color of dorsal surface of body light tan to dark brown or gray with black spots sprinkled on face, on skin covering eyeballs, on shoulders and lateral sides of tail, in the axillae, on pectoral fins, and usually on lateral margins of disk. Spotted pattern on shoulders does not form a reticulum as it does

in *O. vespertilio*. Shoulder spots often with pale centers in small specimens. Ground color of pectoral fins and sides of tail usually pale with dark spots so close together that the background appears as a reticulum; even in specimens so dark as to obscure most of the spotted pattern of body, the pattern on pectoral fins remains prominent. Pectoral fins with a broad dark brown or black border in medium-sized and small specimens. Lips pale; rostrum with a diffuse black subterminal ring; iris black, or golden with black spots, in which case color pattern of face extends over eyes to margin of pupil. Ventral surface of body uniformly pale or creamy. Ventral and anal fins the same ground color as ventral surface of body, ventrals often with a pale patch distally in dark specimens, anal fin sometimes dark or at least tipped with brown or black in small specimens. Ventral pads of pectoral fin rays white or pale. Dorsal fin spotted or sometimes with merely vague blotches. Caudal fin as in generic description but generally with spotted pattern of tail carried back and superimposed on caudal's basic pattern.

Color in life. I have not seen this species alive. The following is a description by Longley (Longley and Hildebrand 1941), "The young are dark gray on the under side; older fish coppery red, with much individual variation in color on the dorsal side, usually lighter or darker brown, variegated with reddish orange or yellow-orange patches, disappearing in preserved specimens; the chief patches behind the eyes, the two sometimes meeting across the nape to form a great U-shaped mark open to the rear; usually an additional one above and behind the branchial aperture; and one about base of soft dorsal fin. Even at a standard length of 50 mm. there is some, and in fish of medium and large size much spotting with light-bordered dark spots in a long, narrow tract from eye to gill opening. Here the spots usually are less crowded than elsewhere, and more nearly circular. On the sides of the head, margin of the disk, and sides of the trunk, the pattern is less open, being principally a network of light lines on the dark ground. Small fish have pectorals and caudal yellow proximally and dark brown distally, with a netted pattern appearing first at the base of these fins and extending gradually to their tips, the yellow advancing before it at the expense of the darker brown, which gives way to the lighter color on which the marbling spreads."

A photograph in Walls (1975:263) shows a specimen (his *O. radiatus*) with margins of pectorals bright yellow; the size of the fish is not given, but the small relative size of the rostrum indicates that the specimen is probably a large adult. A smaller specimen is shown in color in Herald (1972). In this specimen the yellow color lies just proximal to the dark brown fin margins about as Longley described (Longley and Hildebrand 1941). Both photographs show the "netted" pattern on the base of the pectorals.

DISTRIBUTION (Fig. 17).—Northern Bahamas, coast of the southeastern United States from the vicinity of Cape Lookout, North Carolina, around the Florida peninsula to Pensacola, Florida, and south to Campeche Banks, Yucatán. Bathymetric range: shore to 68 m.

MATERIAL EXAMINED.—BMNH 1855.9.19.848, the holotype, said to be from Labrador, but this undoubtedly an error (see p. 260). For following material, numbers in parentheses are numbers of specimens. For data of OREGON stations (= O), refer to Springer and Bullis (1956).

United States: **North Carolina:** UF 24912 (1), near Cape Lookout Bight, Carteret Co. **South Carolina:** UF 24903 (1), 31°58'N, 79°43'W, about 77.3 km SE Edisto Beach, Beaufort Co. **Georgia:** UF 25931 (1), off Brunswick. **Florida:** **Dade County:** FMNH 46128 (1), inshore reef between Miami and Angelfish Creek; FMNH 46854 (1), Triumph Reef off Elliot Key; USNM 89710–89711 (2), Biscayne Bay near Cocoanut Grove, Miami. **Monroe County:** ANSP 90667 (1), E end Grassy Key, Florida Bay; CAS 18585 (1), near Key West; FMNH 7020 (1), Key West; FMNH 21645–21647 (3), near Marathon; FMNH 64123 (1), O-1004; FSBC 342 (4), FSBC 381 (1), FSBC 410 (1) all from 24°41'–24°52'N, 82°00'–82°35'W; FSBC 626 (1) and FSBC 762 (1), both from 24°43'10"–24°52'00"N, 82°00'–82°35'W; UF 4071 (1), Marquesas Keys; UF 7022 (1), Big Pine Key; UMML 1201 (10), 24°45'–24°50'N, 82°10'–82°30'W; UMML 4786 (1), 5.3 km sw of Greyhound Key; USNM 57243 (1), Matecumbe Key; USNM 84035 (1), 24°36'N, 81°48'W; USNM 117003 (7), Tortugas; USNM 117006 (3), channel w of White Shoal, Tortugas; USNM 117170 (2), Tortugas; USNM 126488 (2), Key West. **Collier County:** FSBC 1157 (1), Everglades. **Lee County:** CAS-SU 5841 (1), Captiva Pass; CAS-SU 36404 (6), Sanibel I.; FMNH 510, 512, and 513 (3), Captiva Pass; FMNH 38584–38586 (3) and FMNH 38587 (1), Boca Grande; USNM 76025 (1), Boca Grande Pass; USNM 86159 (1), Boca Grande. **Hillsborough County:** USNM 143160 (2), Port Tampa. **Pinellas County:** FSBC 61 (1), Blind Pass, St. Petersburg Beach; FSBC 878 (1), John's Pass, Madeira Beach; FSBC 1369 (1), due w of Don-ce-Sar; USNM 158543 (1), Bay at Clearwater. **Levy County:** the following all from Cedar Key: ANSP 90668 (2); CAS-SU 99 (5); UF 229 (1); UF 753 (1); UF 916 (1); UF 919 (1); UF 1522 (1); UF 1612 (1); UF 3169 (1); UF 3374 (1); UF 7832 (1); UF (1), R-I-650-4; UF (1), R-I-651-3; UF (2), R-I-2351-1; UF (1), R-II-551-6; UF (1), R-II-2051-4; UF (1), R-III-451-1; UF (1), R-III-451-4; UF (2), R-IV-551-1; UF (1), R-IV-551-7; UF (2), R-VI-650-3; UF (4), R-VI-750-2; UF (4), R-VI-1750-4; UF (1), R-VII-150-5; UF (4), R-VII-150-6; UF (6), R-VIII-2650-1; UF (4), R-VIII-2650-1; UF (2), R-VIII-2650-2;

UF (1), R-IX-1250-1; UF (1), R-IX-1250-1; UF (2), R-X-850-7; UF (1), R-X-2250-5-5; UF (1), R-XI-750-6; UF (1), R-XI-750-7; UF (1), R-XII-1050-1; UF (2); R-XII-1050-2; USNM 88499 (1); USNM 164928 (1). **Franklin County:** CAS 23914 (1), Apalachicola Bay. **Okaloosa County:** UF 5586 (1), UF 5587 (1), UF 5596 (1), all from Choctawhatchee Bay at Destin; UF 2730 (1), Pensacola.

Florida Straits: UF 28649 (1), SILVER BAY sta. 144, 27°44'N, 82°46'W, 7.3 m.

Bahamas: ANSP 103627 (1), GEORGE M. BOWERS sta. 659, w side Eleuthra I.; ANSP (3), Chaplin Program sta. 513B, Hatchet Bay, Eleuthra I.; ANSP (2), Chaplin Program sta. 526, Hatchet Bay, 4.8 km offshore, Eleuthra I.; UMML 4719 (1), Exuma Sound adjacent to Eleuthra I., 7.3 m.

Mexico: Campeche Banks: FMNH 46745 (5), O-436; FMNH 64107 (8), O-713–716; FMNH 64134 (3), O-710; UF 28647 (1), SILVER BAY sta. 362, 20°00'N, 91°43'W, 44 m; UF 28648 (1), O-417. **Yucatán:** USNM 148497 (1).

Undetermined material. Seven specimens from the Bahama Islands are intermediate in color pattern between *cubifrons* and *nasutus*, and also cannot be diagnosed with certainty on the basis of morphometric characters. These specimens are: ANSP 72335 (1), Hog I.; ANSP 90670–90671 (2), s shore of Hog I.; and FMNH 64139 (4), Grand Bahama I.

Ogcocephalus pantostictus new species

(Figure 23)

Ogcocephalus vespertilio (non Linnaeus): WOODS 1942:192 [off Corpus Christi, Texas].

Ogcocephalus cubifrons (non Richardson): HILDEBRAND 1954:321 [off Texas].

Ogcocephalus radiatus: ANONYMOUS 1976:131 and 427 [Mexican coast of Gulf of Mexico; color photograph: key]; HOESE AND MOORE 1977:144, fig. 101 [NW Gulf of Mexico; key: partial description: range].

DIAGNOSIS AND COMPARISONS.—A very large *Ogcocephalus* (Table 1) with the entire dorsal surface of the body covered with a polkadotlike pattern of dark spots (sometimes dim in museum specimens). Resembling *cubifrons* in many features, it has allometric growth of the rostrum: a relatively long rostrum in small specimens, but short and sometimes merely knoblike in large specimens. *O. pantostictus* is distinguished from *cubifrons* by its wider mouth (Fig. 19; also expressed by the jaw measurement, Fig. 14) and in having higher modal counts of lateral-line scales in the cheek series (9 in *pantostictus*, 8 in *cubifrons*, Table 5) and in the subopercular series (9 in *pantostictus*, 8 in *cubifrons*, Table 6).

With its range restricted to the northern and western Gulf of Mexico, *pantostictus* is largely sympatric with *declivirostris*, but the two are distinguished by the pectoral fin ray count (usually 12–13 in *pantostictus* and 11 in *declivirostris*, Table 3) and the lateral-line scale count in the subopercular series (modally 9 in *pantostictus*, 7 in *declivirostris*, Table 6), *O. pantostictus*

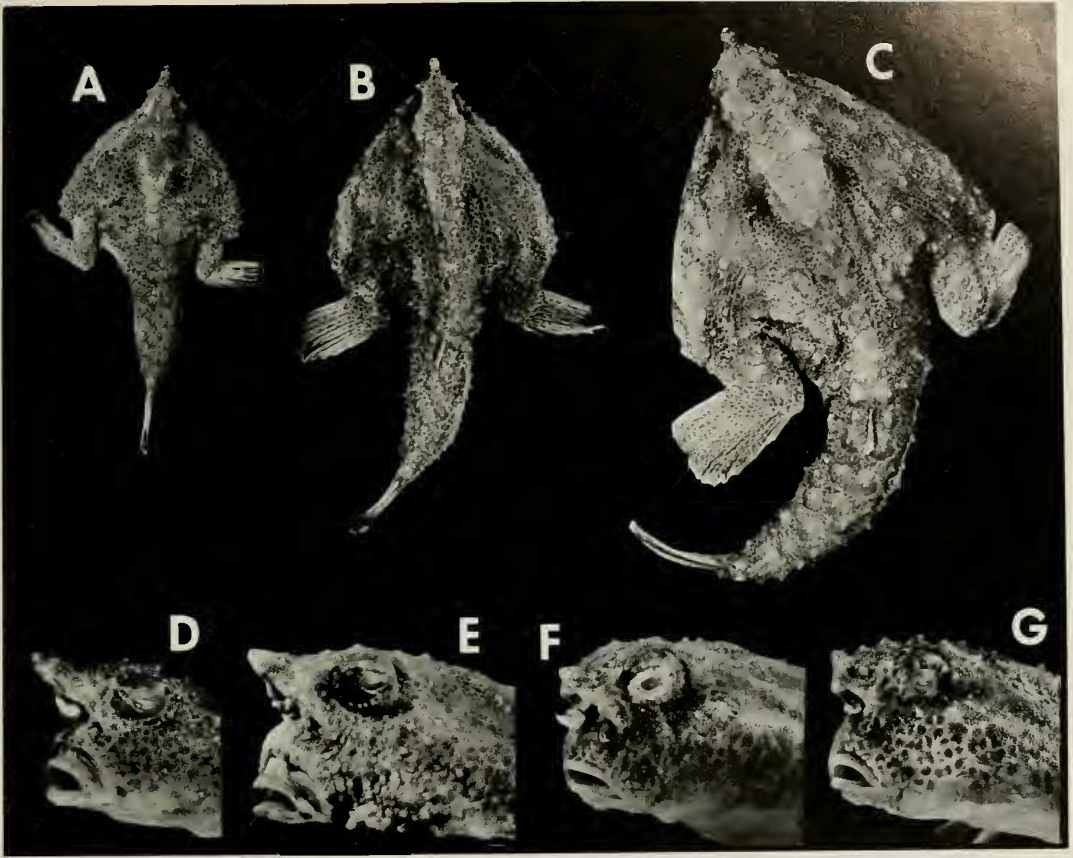


FIGURE 23. *Ogocephalus pantostictus* new species, all from Gulf of Mexico. (A) and (D) Paratype 77.0 mm SL, CAS-SU 40559, Galveston, Texas. (B) Paratype 96.0 mm SL, FMNH 64111, off Mobile Bay, Alabama. (C) and (E) Holotype 226.0 mm SL, FMNH 50765, off Pensacola, Florida. (F) Paratype 187.0 mm SL, CAS-SU 40559, showing variation of rostrum resembling *O. cubifrons*. Compare with (G), *O. cubifrons* (same specimen as in Fig. 18C).

also has the ventral surfaces of the pectoral fin rays thickened with fleshy pads which are not present in *declivirostris*.

The species *corniger* and *parvus* have ranges slightly overlapping that of *pantostictus* in the northern Gulf of Mexico, but both are separable from *pantostictus* by their lower pectoral fin ray counts (usually 12–13 in *pantostictus* and 10–11 in *corniger* and *parvus*, Table 3). *O. parvus* is a far smaller species than *pantostictus*, reaching only about 85 mm SL. *O. corniger* has a much longer rostrum than does *pantostictus* (Fig. 9) and has a distinctive color pattern of pale spots on a darker background distributed evenly over the dorsal surface of the body in contrast to the darkish circles on a lighter background found in *pantostictus*.

DESCRIPTION.—Counts and measurements from 65 specimens, 38.6 to 261.0 mm SL (Table 1).

Counts. Counts given in Tables 2–6; in the following description, counts for the holotype given in brackets. Pectoral fin ray counts in *pantostictus* in middle of range for genus, 12–13 in a range of 10–15 [12,12]. Subopercular lateral-line scale count, modally 9 [10,10] in *pantostictus*, high relative to range of 5–10 (excluding extremes) for genus; only two other species have as high a count: *vespertilio* usually has 9 scales in subopercular series, *notatus* usually 10. The count for cheek lateral-line scales nears high end of range, too, with count in *pantostictus* usually 8 or 9 [9,10]; in this character *pantostictus* agrees with *nasutus*, and only *vespertilio* and

notatus have higher counts in cheek series. Lateral-line scale count [35,36] varies widely, but mean is highest for genus. *O. pantostictus* resembles *cubifrons*, *rostellum*, and *declivirostris* in vertebral count of 19–21, modally 20, in contrast to remaining eight species which nearly always have 19, occasionally 18, vertebrae. [D.4; A.4.]

Proportions. Proportions expressed as ratios given as the mean followed by the range in parentheses and the proportion for the holotype in brackets.

Length of disk margin intermediate within range of variation for the genus, 2.3(2.1–2.4)[2.4] in SL. Tail moderately thick and broad in large specimens, relatively narrow in small ones, its width 1.8(1.5–2.0)[1.7] in length of disk margin; caudal peduncle thick and deep, its depth 2.6(2.3–2.9)[2.5] in depth of head. Ontogenetic allometry in growth of rostrum resembles that in *cubifrons*; however, I have not seen specimens of *pantostictus* less than 38.6 mm in standard length and therefore do not know whether or not the remarkably long rostrum seen in very small *cubifrons* (30 mm SL) is also characteristic of small *pantostictus*. Rostrum cone-shaped in small examples, becoming relatively small and finger-shaped in large ones. Length of rostrum 4.3(2.6–6.3)[5.0] in length of disk margin. Aperture of illicial cavity subtriangular in small specimens, higher than wide, becoming oval in adults. Cranium rising steeply above disk, becoming heavy and massive in large specimens; head depth 2.0(1.8–2.1)[2.1] in length of disk margin. Width of cranium 3.2(2.9–3.7)[3.4] in length of disk margin. The following in width of cranium: eye 1.6(1.4–1.8)[1.8], lateral ethmoid width 1.6(1.4–1.8)[1.6]. Interorbital slightly concave, wide, 2.0(1.8–2.5)[1.9] in width of cranium, 3.3(2.9–4.1)[2.9] in head depth. Mouth moderate, its width 1.6(1.4–1.8)[1.6] in head depth, 3.1(2.8–3.6)[3.3] in disk margin; jaw 2.3(2.1–2.7)[2.5] in head depth. Upper lip fairly fleshy, of an even width along its entire length; lower lip fleshy, usually thickened medially although no median lobe is developed. Dorsal fin 3.7(2.9–4.8)[4.8] in length of disk margin; anal fin 2.7(2.3–3.2)[3.2] in length of disk margin.

Integument. Dermal cirri often present on disk margin and lateral sides of tail. Large bucklers prominent, arranged as in generic description. Tubercles relatively sparse on fins, occurring at very base in dorsal and anal fins and on about proximal third of anal and ventrals. Cau-

dal as in generic description. Skin covering eyeballs bearing tubercles with rim around cornea usually beaded by a row of small bucklers. Pectoral membranes thick, opaque; ventral surfaces of ray tips with well-developed fleshy pads.

Color in preservative. Dorsally the ground color of body gray or tan sprinkled fairly evenly with round dark spots over entire tail and disk, including face and skin covering eyeballs. Markings on shoulders, sides of tail, and in axillae generally darkest and showing greatest contrast with background color. Ventral surface uniformly pale, usually paler than ground color of dorsal body surface. Lips pale; rostrum with a diffuse dark subterminal ring; iris golden with black spots, or entirely black.

Pectorals with same spotted pattern as dorsal surface of body. In small or medium-sized specimens, spotted pattern on pectorals grades into a dark border. In many individuals spots close together so that background appears as a light-colored reticulum. Ventrals and anal same color as ventral surface of body; anal sometimes dusky near tip in specimens under about 100 mm SL. Dorsal fin usually spotted, especially when spotted pattern of dorsal body surface relatively intense.

Color in life. Unknown.

DISTRIBUTION (Fig. 17).—Coasts of northern and western Gulf of Mexico from approximately longitude 87°W to latitude 25°N. Bathymetric range: from limited data available, about 9–31 m.

NAME.—The name *pantostictus* means all spotted, in reference to the distinctive over-all spotted color pattern.

MATERIAL EXAMINED.—HOLOTYPE: FMNH 50765, Santa Rosa Sound, Pensacola, Florida; a male 226.0 mm SL.

PARATYPES. Numbers in parentheses are numbers of specimens. **United States:** Florida: ANSP 71329 (1), Pensacola; MCZ 45080 (1), OREGON sta. 1648, 30°11'N, 86°55'W, 31 m. **Alabama:** FMNH 64111 (1), OREGON sta. 882, 30°10'N, 87°50'W, 10 m. **Mississippi:** CAS 23934 (1), off Horn I.; FMNH 21636 (1), Horn I.; FMNH 46734 (1), outside Petit Bois I.; GCRL 562 (1), outside Petit Bois I.; GCRL 563 (1), sw of Ship I.; GCRL 564 (1), off Horn I.; GCRL 565 (1), off w end of Horn I.; UF uncat. (1), SILVER BAY sta. 167, 30°12'N, 88°40'W, 7.3 m. **Louisiana:** FMNH 50997 (2); GCRL 566 (1), s of Grand Isle, 17 m; USNM 188755 (1), PELICAN sta. 66-7, 28°59'N, 91°48'W. **Texas:** CAS 23932 (1); USNM 94443 (1); USNM 118610 (9). *Vicinity of Galveston:* CAS-SU 40559 (10); USNM 118603 (1); USNM 118604 (1); USNM 118606 (1); USNM 120071 (1); USNM 176982 (1); USNM 188803 (2). **PELICAN sta.** 56-5, 29°10.5'N, 94°50.5'W; USNM 188805 (1). **PELICAN sta.** 62-2, 29°19'N, 94°31.5'W. *Vicinity of Freeport:* MCZ 45079 (1), USNM 117804 (14), USNM 118605 (1), USNM 118611 (1). *Southern Texas:* USNM 120070 (1).

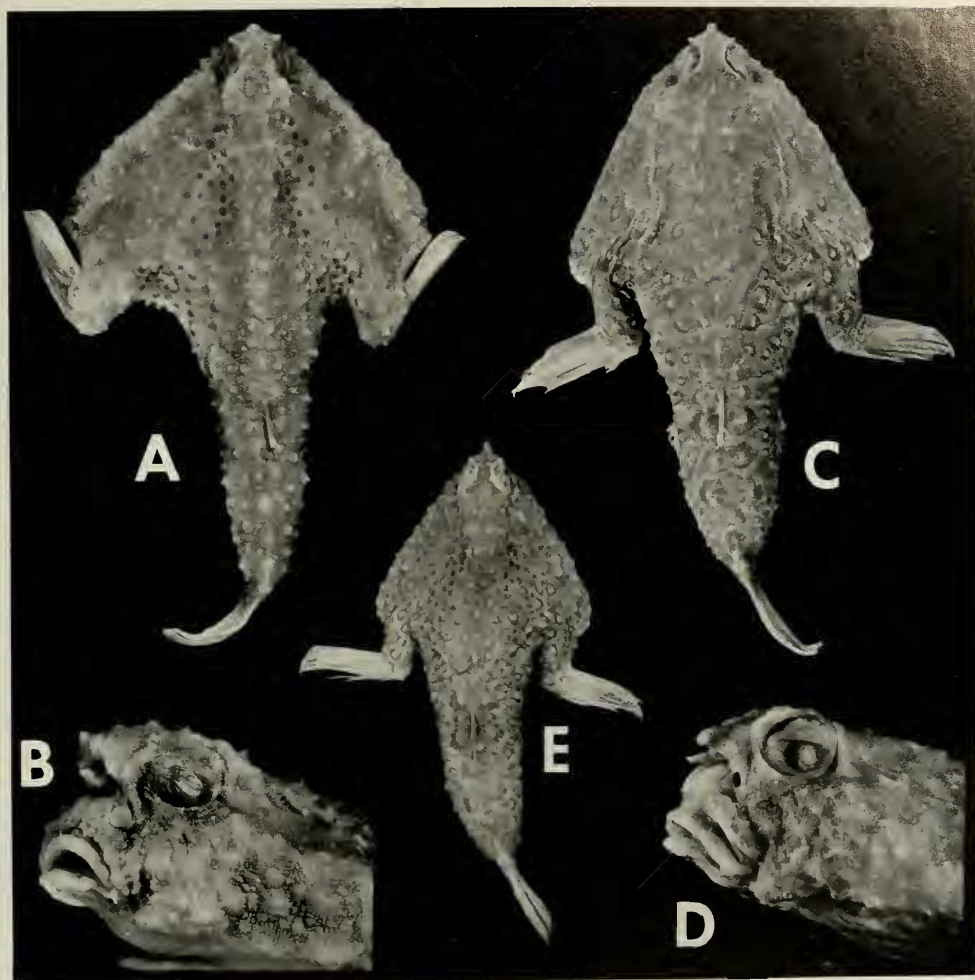


FIGURE 24. (A) and (B) *Ogcocephalus rostellum* new species, holotype, 133.0 mm SL, USNM 188809, off Atlantic coast of Florida, 29°10'N, 80°19'W. (C) and (D) *Ogcocephalus declivirostris* new species, holotype, 129.5 mm SL, FMNH 64136, Texas coast of Gulf of Mexico, 28°02'N, 96°03'W. (E) Paratype of *O. declivirostris*, 107.5 mm SL, FMNH 61577, Texas coast of Gulf of Mexico, 28°02'N, 96°04'W, showing pattern of dim spots sometimes seen on dorsal surface of body.

Aransas Pass; FMNH 37728–37729 (2), Port Aransas; FMNH 40298 (1), within 80 km of Corpus Christi; ANSP 90675 (1), Brownsville Ship Channel, Pt. Isabel; USNM 188800 (1), Pt. Isabel.

Mexico: USNM 188775 (1) and USNM 188783 (1), both from off Huts Bayon, approximately 24°30'N, 6–18 m.

Material without exact localities: USNM 188756 (1), PELICAN sta. 37; USNM 188758 (1), PELICAN sta. 104-2; USNM 188769 (1), MC 9; USNM 188798 (1), 8.1 km offshore.

Ogcocephalus rostellum new species

(Figure 24A–B)

Malthaea nasuta (non Cuvier and Valenciennes): DEKAY 1842:166, pl. 28, fig. 89 [synonymy; description: range, compiled].

DIAGNOSIS AND COMPARISONS.—A moderate-

sized *Ogcocephalus* with a very abbreviated rostrum resembling the shelflike condition seen in *notatus*. (In the smallest specimens of both *rostellum* and *notatus*, 40 mm SL or less, a short median horn is developed on the rostrum.) *O. rostellum* is distinguished from *notatus* by its narrower mouth (Fig. 6) and lower number of scales in the cheek lateral-line series (modal number 8 in *rostellum*, 10 in *notatus*, Table 5) and in the premaxillary series (3 in *rostellum*, 4 in *notatus*).

In general appearance and color pattern, *rostellum* most closely resembles *cubifrons*; the ranges of the two species overlap along the At-

lantic coast of the southeastern United States, but *rostellum* is ordinarily taken from deeper water than *cubifrons*. The two are distinguished by some differences in body proportions: *rostellum* has a relatively more flattened disk as expressed by the head height measurement (Fig. 20) and a less massive head as expressed by the rostrum measurement (Fig. 10); also it has a narrower caudal peduncle than *cubifrons* (Fig. 21). *O. rostellum* is a smaller species than *cubifrons*, reaching 160.0 mm in standard length compared to 230.0 mm in *cubifrons*. Finally, the color pattern of the pectoral fin helps discriminate between *rostellum* and *cubifrons*; often there are no dark spots on the pectoral fins in *rostellum* compared to the bright pattern of dark spots on a light background covering the pectoral fins in *cubifrons*, but when spots do occur on the pectorals in *rostellum*, they are generally dim and also less numerous than in *cubifrons* and restricted to the basal portions of the fins.

Ogcocephalus rostellum has its range adjacent to that of *nasutus* but is a smaller species than *nasutus* (Table 1) and lacks the long rostrum seen in *nasutus* (Fig. 10); *rostellum* differs further from *nasutus* in having a shorter jaw (Fig. 16).

The range of *rostellum* overlaps the ranges of *parvus* and *corniger*; all occur at moderate depths on the continental shelf off the southeastern United States. *O. rostellum* may be separated from *parvus* and *corniger* by the pectoral fin ray count (usually 13 in *rostellum*, usually 10–11 in *parvus* and *corniger*, Table 3). *O. rostellum* is further distinguished from *corniger* in lacking a long rostrum (Fig. 9), and is further distinguished from *parvus* in its flatter disk with less elevated cranium (head depth 4.3–5.4 into SL in *rostellum*, 3.1–4.2 in *parvus*).

DESCRIPTION.—Counts and measurements from 69 specimens, 33.3 to 154.2 mm SL (Table 1).

Counts. Counts given in Tables 2–6; in the following description, counts for holotype given in brackets. Pectoral fin ray count usually 13 [13, 13], range 11–15, about intermediate within range of variation for genus. Count of lateral-line scales in subopercular series moderately low for genus, usually 6 or 7 [5,6], range 5–9. Count of cheek series of lateral-line scales 8 [8,8], the most common count for the genus; range 7–9. Lateral-line scale count, 21–32 [26,

25]. Mean for each of the counts of series of lateral-line scales in *rostellum* lower than in the closely similar *cubifrons*. *O. rostellum* agrees with *cubifrons*, *pantostictus*, and *declivirostris* in having a modal count of 20 vertebrae, compared to other species in genus in which modal count is 19. [D. 4; A. 4.]

Proportions. Proportions expressed as ratios given as the mean followed by the range in parentheses and the proportion for the holotype in brackets.

Length of disk margin intermediate relative to range of variation for genus, 2.2(2.0–2.4)[2.4] in SL. Tail moderate in width, 1.8(1.6–2.1)[1.6] in length of disk margin; caudal peduncle slender, 2.7(2.4–2.9)[2.7] in head depth. Rostrum produced into a short cone in small specimens, becoming more shelflike in large specimens with the median horn extremely abbreviated, rostrum 6.1(3.7–8.0)[7.1] in length of disk margin. Aperture of illicial cavity almost diamond-shaped. Cranium well demarcated from disk, but head less deep than in other species in the genus, head depth 2.2(2.0–2.4)[2.2] in length of disk margin. Cranium relatively narrow, its width 3.5(2.7–3.9)[3.6] in length of disk margin (one specimen had this ratio 4.4). The following in width of cranium: eye 1.5(1.3–1.7)[1.5], lateral ethmoid width 1.6(1.5–1.8)[1.8]. Interorbital space slightly concave, its width moderate, 2.2(1.9–2.7)[2.4] in width of cranium, 3.4(2.8–4.1)[3.9] in head depth. Mouth small, its width 1.7(1.5–2.0)[1.8] in head depth, 3.8(3.1–4.4)[4.0] in length of disk margin; jaw 2.6(2.3–2.8)[2.7] in head depth. Upper lip fleshy, of an even width for its entire length; lower lip fleshy, very thickened medially. Dorsal fin 4.3(3.2–4.9)[4.5] in length of disk margin; anal fin 3.0(2.5–3.5)[3.4] in length of disk margin.

Integument. Dermal cirri sometimes present but never conspicuous. Large bucklers prominent, arranged as in generic description. In more than half the specimens studied, the ventral surface of tail with low bucklers making surface markedly coarse relative to smooth shagreenlike texture of ventral surface of disk. All fins with at least a few tubercles; dorsal with only a few tubercles at base, but pectoral, ventral, and anal fins with tubercles at their bases and running out along rays for a third to three-fourths their length. Caudal as in generic description. Skin covering eyeballs bearing tiny tubercles with rim

around cornea beaded by a row of small bucklers. Pectoral membranes thick, opaque, ventral surfaces of ends of rays with fleshy pads.

Color in preservative. Ground color of dorsal surface of body light tan to dark brown with round dark spots (occasionally rings) in an elongate cluster on either shoulder and in a band down either side of tail, each continuous with a cluster in axillae. Sometimes the same spotted pattern occurs on face. Ventral surface uniformly pale; lips pale. The small rostrum sometimes with a dusky tip, but no dark subterminal ring except in a few small specimens; iris golden or black. Basal portions of pectoral fins pale, occasionally with a few faint spots, darkening distally so that frequently a distinct black border is formed. Ventrals and anal the same pale ground color as ventral surface of body, anal with a dusky spot distally in a few small specimens. Dorsal dusky with faint splotches or simply pale. About one-half the specimens at hand have no dark markings on caudal, but remainder show pattern common for genus.

Color in life. The following description from three color transparencies of a freshly killed specimen captured in winter off North Carolina; one transparency shows a dorsal, one a lateral, and one a ventral view.

Ground color of dorsal surface of body medium brown with whitish patches where skin evidently abraded from protruding tops of bucklers. Darker mottlings of pigment in axillae. Fine black lines radiating from apices of large bucklers. An elongate cluster of round dark spots on either shoulder; among these spots are sprinkled a few smaller, intensely orange spots, about four on each side (cast shadows on the photographs may be obscuring other orange spots). Pectoral and caudal fins with mottled brownish basal portions fading to translucent white with pale tan striations on middle portions and terminating in broad, bright orangy-red borders blending to pure dark red and finally to narrow black distal margins.

Face the same brownish ground color as dorsal surface of body. Lips bright orangy red; iris a rosy-brass color with tan spots in a circle around pupil. Ventral operculum well extended in example and the same rosy-brass color as rest of iris.

Ventral surface of body with a transparent wash of pinkish orange over a pale gray surface.

DISTRIBUTION (Fig. 17).—Atlantic coast of the United States from Cape Hatteras, North Carolina, to the Florida Keys. (One specimen from Jamaica, USNM 160732, 150.0 mm SL, has the general shape of the head and the small mouth that characterize *rostellum*, but it differs from *rostellum* in other body proportions and has no diagnostic color markings; I am unable to assign this specimen.) Bathymetric range: 28–228 m.

NAME.—The name *rostellum* is the diminutive of the word rostrum, referring to the particularly small rostrum in this species.

MATERIAL EXAMINED.—Numbers in parentheses are numbers of specimens. For data from COMBAT stations (=C) and SILVER BAY stations (=SB), refer to Bullis and Thompson (1965); for data from PELICAN stations (=P), refer to Anderson (1956). **HOLOTYPE.** USNM 188809, C-336, Atlantic coast of Florida; a male 129.5 mm SL.

PARATYPES. **North Carolina:** FMNH 64338 (1), C-384; USNM 72288 (1), Cape Lookout; USNM 111848 (1), Beaufort; USNM 132093 (1), ALBATROSS sta. 2417, 33°18'30"N, 77°07'W, 174 m; USNM 148317 (2), ALBATROSS sta. 2600, 34°39'40"N, 75°35'30"W, 159 m; USNM 148320 (3), ALBATROSS sta. 2602, 34°38'30"N, 75°33'30"W, 227 m; USNM 151919 (1), ALBATROSS III sta. 35, 34°45.5–48'N, 75°28'–33'W, 77–88 m; USNM 151962 (1), ALBATROSS III, 31-B, sta. 14, 33°26'N, 77°03.5–06'W, 59 m; USNM 151971 (1), ALBATROSS III, 31-D, sta. 3, 34°11'N, 76°06'W, 82–119 m. **South Carolina:** CAS 23925 (3), SB-1782; FMNH 64100 (1), BOWERS sta. 50, 31°50'N, 79°45'W, 46 m; USNM 84510 (4), ALBATROSS sta. 2312, 32°54'N, 77°53'30"W, 161 m. **Georgia:** ANSP 103634 (1), P-178-10; CAS-SU 62117 (2), SB-1768; FMNH 66385 (15), BOWERS sta. 32, 30°14'N, 80°16'W, 73 m; UF 24189 (1), Brunswick; USNM 149959 (2); USNM 188810 (1), P-198-5. **Florida:** FMNH 66388 (2), SB-3442; MCZ 32940 (1), inlet near New Smyrna; MCZ 45088 (3), SB-3022; MCZ 45089 (1), SB-2775; MCZ 45090 (1), P-168-2; MCZ 45091 (1), Cape Canaveral Pier; MCZ 45092 (1), SB-2771; MCZ 45093 (1), P-169-3; USNM 18031 (1), St. Augustine; USNM 38026 (1), 3.2 km S of Mosquito Inlet, Hillsborough River; USNM 131628 (2), ALBATROSS sta. 2641, 25°11'30"N, 80°10'W, 110 m; USNM 188790 (1), P-208-8; USNM 188794 (1), P-171-2; USNM 188806 (L), P-169-8; USNM 188807 (1), C-334; USNM 188813 (2), C-336 (same haul as holotype). **Florida Straits:** CAS-SU 62123 (1), SB-2039; UF 24190 (1), C-455. **Florida Keys:** USNM 117004 (2), Tortugas; USNM 117005 (1), Tortugas.

OTHER: USNM 83785–83786 (3), ALBATROSS sta. 2311 and 2318, 32°55'N, 77°54'W (South Carolina) and 24°25'45"N, 81°46'00"W (Florida Keys), 145 and 82 m.

Ogcocephalus declivirostris new species

(Figure 24C–E)

Ogcocephalus sp.: HILDEBRAND 1954:322 [off Texas; partial description; stomach contents]; WALLS 1975:120 [N Gulf of Mexico; called *Ogcocephalus* sp. B; partial description; figs.]; HOESE AND MOORE 1977:144, fig. 100 [NW Gulf of Mexico; key; partial description; range].

DIAGNOSIS AND COMPARISONS.—An *Ogcocephalus* with rostrum generally sloping downward with respect to the long axis of the body instead of being horizontal or tilted upward. *O. declivirostris* differs from all its congeners except *pumilus* and *notatus* in lacking the development of fleshy pads on the ventral surfaces of the pectoral and pelvic rays. It may be separated from the long-nosed species, *pumilus*, *corniger*, and *vespertilio*, by the length of the rostrum (length of rostrum into length of disk margin 3.4–8.4 in *declivirostris*, 1.5–3.0 in the long-nosed species, Fig. 9) and from *notatus* by the width of the mouth (width of mouth into length of disk margin 2.8–3.7 in *declivirostris*, 1.8–2.5 in *notatus*). It is distinguished from all species except *pumilus*, *parvus*, and *corniger* by its low pectoral ray count (usually 11 in *declivirostris*, 12 or more in other species except *pumilus*, *parvus*, and *corniger*, Table 3). *O. declivirostris* is sympatric with *O. pantostictus*, both being species of the northern and western coasts of the Gulf of Mexico; besides the lower pectoral fin ray count in *declivirostris*, just mentioned, *declivirostris* has a lower count for the subopercular lateral-line series than *pantostictus* (modally 7 in *declivirostris*, 9 in *pantostictus*). The range of *parvus* overlaps with that of *declivirostris* in the northern Gulf of Mexico; *declivirostris* is distinguished from *parvus* by its flatter head (head depth into SL 4.3–5.1 in *declivirostris*, 3.1–4.2 in *parvus*) and larger mouth (width of mouth into head depth 1.4–1.9 in *declivirostris*, 2.0–2.8 in *parvus*).

DESCRIPTION.—Counts and measurements from 99 specimens, 39.6 to 137.0 mm SL (Table 1).

Counts. Counts given in Tables 2–6; in following description, counts for holotype given in brackets. In *declivirostris* all counts except vertebral count at low end of range of variation within genus. Pectoral fin ray count usually 11 [11,11]; range 9–12. Subopercular lateral-line scale count usually 8 [8,9]; range 7–9. Mean for lateral-line scale count 25 [25,27]; range 22–28. Vertebral count most frequently 20; range 18–20. [D. 5; A. 3.]

Proportions. Proportions expressed as ratios given by the mean followed by the range in parentheses and the proportion for the holotype in brackets.

Length of disk margin intermediate relative to range of variation for genus, 2.4(2.3–2.6)[2.4] in

standard length. Tail stout and broad, its width 1.6(1.3–2.0)[1.3] in length of disk margin, tapering slightly but rounding off more abruptly at caudal fin than in other species. Caudal peduncle thick, its depth 2.5(2.3–2.8)[2.5] in head depth. Rostrum a rod-shaped protuberance with a narrow base, generally pointing downward but sometimes horizontal relative to long axis of body; never tilted upward. Length of rostrum 5.7(3.4–8.4)[7.0] in length of disk margin; the series at hand shows that during ontogeny the rostrum becomes relatively shorter. Aperture of illicial cavity approximately oval to subtriangular, wider than high in medium- and large-sized specimens, higher than wide in specimens less than about 65 mm SL. Cranium when viewed from front rising in a gradual curve above disk, head depth 1.9(1.8–2.1)[1.9] in length of disk margin. Width of cranium 3.2(2.7–3.7)[3.3] in length of disk margin. The following in width of cranium: eye 1.4(1.1–1.6)[1.6], lateral ethmoid width 1.6(1.3–1.9)[1.6]. Interorbital space concave, narrow, its width 2.7(2.1–3.4)[3.2] in width of cranium, 4.5(3.3–5.7)[5.7] in head depth. Mouth average size, its width 1.6(1.4–1.9)[1.5] in head depth, 3.1(2.8–3.7)[2.8] in length of disk margin; length of jaw 2.4(2.1–2.7)[2.1] in head depth. Upper lip moderately fleshy, of an even width for its entire length; lower lip thickened medially, the thickening becoming a pronounced lobe in largest specimens. Dorsal fin relatively large, its length 2.8(2.4–3.4)[2.8] in length of disk margin; anal fin also large, its length 2.5(2.1–2.9)[2.6] in length of disk margin.

Integument. Dermal cirri well developed on lateral sides of tail and disk, more so than in other species of *Ogcocephalus*. Cirri present on tip of rostrum in small specimens. Large bucklers arranged as described in generic description. Dorsal fin devoid of tubercles, anal fin with only a few at base. Pectoral fins with tubercles at base on both dorsal and ventral surfaces, a few tubercles extending out along anterior and posterior rays. Pelvics with tubercles present on basal quarter of ventral surface but none on dorsal surface. Caudal as in generic description. Skin covering eyeballs bearing tiny tubercles with rim around cornea beaded by a row of small bucklers in small specimens, disappearing in large specimens. Pectoral membranes relatively thin and translucent; no fleshy pads on ventral tips of rays.

Color in preservative. Ground color of dorsal

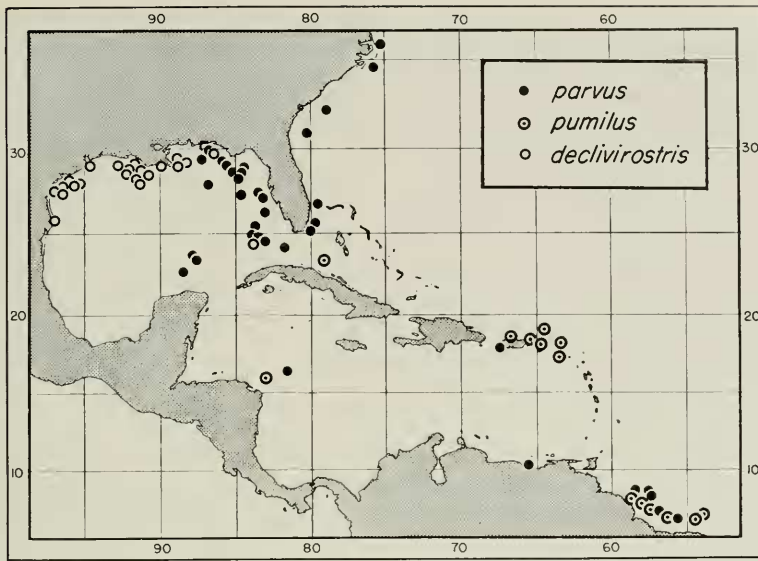


FIGURE 25. Localities for study material of *Ogcocephalus parvus*, *O. pumilus*, and *O. declivirostris*. *O. parvus* also known from Recife, Brazil (Günther 1880).

surface of body gray or tan, apices of bucklers paler than ground color. Dim rounded spots sometimes clustered on shoulders, face, in axillae, and along sides of tail, occurring mostly in small specimens. A few small specimens have these spots covering entire disk dorsally. Ventral surface of body uniformly pale; lips pale, occasionally with dusky splotches. Rostrum with a diffuse black tip in small specimens, this mark disappearing in larger specimens. Iris black or golden, sometimes golden with a ring of dim spots circling pupil. Pectoral fins dusky, sometimes darkened towards tips, but no pronounced dark borders except in some small individuals. Pelvics and anal the same pale ground color as ventral surface of body, anal sometimes with a dusky tip in small specimens. Dorsal dusky with inconspicuous splotches. Caudal as described in generic description except for a few specimens that have the caudal uniformly dusky.

Color in life. Unknown.

DISTRIBUTION (Fig. 25).—Northern and western coasts of Gulf of Mexico from longitude 86°W to latitude 26°N. One record from Florida Straits. Bathymetric range: 3.5–180 m except for Florida Straits record (388 m).

NAME.—The name *Ogcocephalus declivirostris* means an *Ogcocephalus* with rostrum sloping downward.

MATERIAL EXAMINED.—*HOLOTYPE:* FMNH 64136, off Texas, 28°02'N, 96°03'W, 40 m; a male 129.3 mm SL.

PARATYPES. Numbers in parentheses are numbers of specimens. For data from OREGON stations (=O), refer to Springer and Bullis (1956) and Bullis and Thompson (1965). **Gulf coast of Florida:** ANSP 103628 (1), O-331; FMNH 61579 (1), O-858; FMNH 64120 (2), O-944. **Florida Straits:** UMML 3897 (1), O-1550. **Louisiana:** CAS 23930 (1), O-2700; CAS 23931 (1), O-2704; CAS-SU 62119 (3), PELICAN sta. 84-3, 28°14'N, 91°41'W, 55 m; FMNH 46735 (1), O-72; FMNH 46736 (3), O-75; FMNH 46737 (3), O-283–284; GCRL 557 (2) and GCRL 559 (1), s of Grand Isle, 37 m; GCRL 558 (2) and GCRL 560 (1), s of Grand Isle, 27 m; MCZ 45072 (3), PELICAN sta. 74-3, 29°04'N, 88°44.5'W, 110 m; MCZ 45073 (1), PELICAN sta. 72-6, 29°11.5'N, 88°52'W, 73 m; MCZ 45074 (1), PELICAN sta. 69-6, 28°48'N, 89°51'W, 55 m; USNM 131166 (21), Morgan City, 3.7–9.1 m; USNM 188761 (1), sw of Eugene I. Beacon, Atchafalaya Bay; USNM 188764 (1), PELICAN sta. 85-4, 28°11'N, 91°24.5'W, 86 m; USNM 188765 (1), PELICAN sta. 85-3, 28°09'N, 91°27'W, 91 m; USNM 188767 (1), PELICAN sta. 81-8, 28°50'N, 91°29.5'W, 18 m; USNM 188771 (1) and USNM 188774 (1), ssw of Eugene I. Beacon, Atchafalaya Bay; USNM 188777 (1), PELICAN sta. 86-3, 28°28'N, 91°13.5'W, 40 m; USNM 188784 (2), PELICAN sta. 34, 28°33'N, 90°55'W, 26 m; USNM 188792 (2), PELICAN sta. 84-1, 28°22.5'N, 91°44.5'W, 59 m; USNM 188796 (1), PELICAN sta. 94-1, 28°27'N, 92°14'W, 53 m; USNM 188799 (1), PELICAN sta. 93-8, 28°33'N, 92°15.5'W, 44 m; USNM 188801 (2), PELICAN sta. 93-3, 28°55'N, 92°15.5'W, 26 m. **Texas:** CAS-SU 62140 (30), Galveston; FMNH 61576 (1), 27°04'N, 96°23'W, 55 m; FMNH 61577 (2), 28°02'N, 96°04'W, 40 m; FMNH 61578 (1), 28°02'N, 96°04'W, 37 m; FMNH 61580 (1), 27°22'N, 96°34'W, 49 m; FMNH 61582 (1), 27°30'N, 96°28'W, 73 m; FMNH 61583 (1), 27°39'N, 96°28'W, 68 m; FMNH 64135 (1), 27°49'N, 96°31'W, 40 m; FMNH 64137 (1), 27°34'N, 96°43'W, 42 m; FMNH 64138 (2), off Mustang I., 46–48 m; USNM

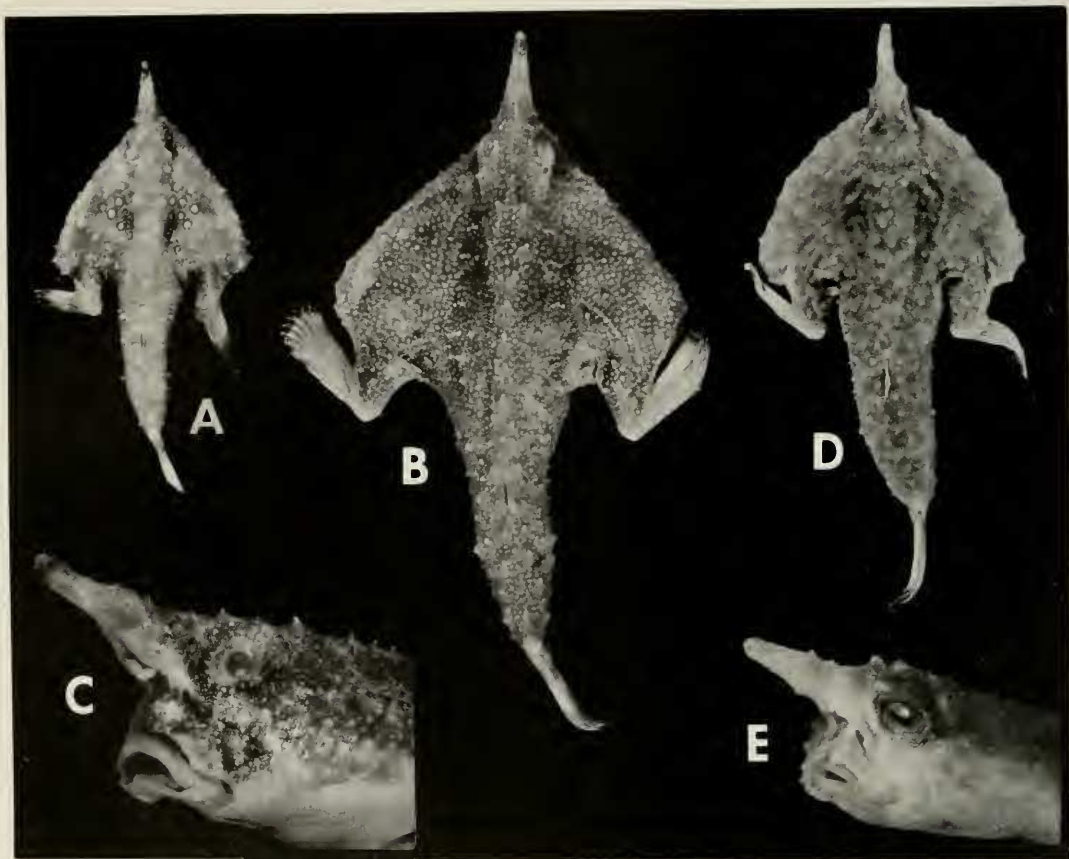


FIGURE 26. (A) Paratype of *Ogocephalus corniger* new species, 61.0 mm SL, UF 24183, from w of Andros I., Bahamas, 24°25'N, 79°13'W, showing color pattern of juvenile. (B) and (C) *Ogocephalus corniger* new species, holotype, 124.5 mm SL, USNM 188808, Gulf of Mexico, 29°00'–10'N, 85°01'W. (D) and (E) *Ogocephalus pumilus* new species, holotype, 57.5 mm SL, USNM 188812, Surinam, 7°05'N, 54°08'W.

118606 (23), Galveston; USNM 171763 (2), near Brownsville; USNM 188776 (1), SILVER BAY sta. 200, 27°59'N, 95°15'W, 79–84 m. **Material without exact locality:** USNM 188766 (1), Madame Canaia.

Ogocephalus pumilus new species

(Figure 26D–E)

DIAGNOSIS AND COMPARISONS.—A long-nosed *Ogocephalus* distinctive for its small size and lack of pigment markings. *Ogocephalus pumilus* is the smallest member of the genus; maximum standard lengths for specimens seen in this study are all under 70 mm (Table 1). *O. pumilus* differs from all its congeners except *declivirostris* and *notatus* in lacking the fleshy ventral pads on the tips of the rays of the pectoral and pelvic fins.

Ogocephalus pumilus is sympatric with *par-*

pus and *nasutus*, but as it does not occur on the coasts of the southeastern United States and Gulf of Mexico, its range is less extensive than that of *parvus*. It is distinguished from *parvus* by its long rostrum (length of rostrum into length of disk margin 2.0–3.0 in *pumilus*, 3.2–5.0 in *parvus*) and shorter disk margin (length of disk margin into SL 2.2–2.7 in *pumilus*, 1.9–2.2 in *parvus*) as well as its pale color contrasted with the mottlings and spotted patterns seen in *parvus*. *O. pumilus* is also distinguished from most examples of *nasutus* by its lack of color pattern as well as its diminutive size (*nasutus* being among the largest species in the genus). Also, many specimens of *pumilus* may be separated from *nasutus* by the pectoral fin ray count (modal 11 in *pumilus*, 12 or 13 in *nasutus*, Table 3).

Off the northern coast of South America, the range of *pumilus* overlaps that of *notatus*. The two species are separable on the basis of the pectoral fin ray count (11–12 in *pumilus*, 13–14, rarely 12, in *notatus*) and subopercular lateral-line scale count (range 5–7, modally 6, in *pumilus*, 7–10, modally 9, in *notatus*). *O. pumilus* also has a markedly smaller mouth than *notatus* (width of mouth into length of disk margin 2.6–3.4 in *pumilus*, 1.8–2.5 in *notatus*).

DESCRIPTION.—Counts and measurements from 63 specimens, 25.8 to 66.7 mm SL (Table 1).

Counts. Counts given in Tables 2–6. In following description, counts for holotype given in brackets. All counts in *pumilus* low compared to counts for genus as a whole. Pectoral fin ray count most often 11 [11,11]; range 10–12. Subopercular lateral-line scale count most often 6 [6,7]; range 4–7. Cheek lateral-line scale count most often 8 [8,8]; range 8–9. Mean for lateral-line scale count 21 [21,21]; range 19–24. Anal fin ray count 3 more than half the time [3], remarkable because count normally 4 throughout family. [D. 4.] Vertebral counts on 14 specimens all 19.

Proportions. Proportions expressed as ratios given as mean followed by range in parentheses and proportion for holotype in brackets.

Length of disk margin 2.3(2.2–2.5)[2.3] in SL. Tail moderately wide, its width 1.8(1.6–2.1)[1.8] in length of disk margin. Caudal peduncle 2.8(2.5–3.2)[2.6] in head depth. The grotesque rostrum thin and long, its length 2.4(2.0–3.0)[2.4] in length of disk margin, its long axis about horizontal with body axis rather than tilted upward. Aperture of illicial cavity subtriangular, higher than wide. Head depth 1.9(1.7–2.1)[2.1] in length of disk margin. Width of cranium 3.1(2.7–3.5)[3.3] in length of disk margin. The following in width of cranium: eye 1.3(1.1–1.5)[1.3]; lateral ethmoid width 1.7(1.5–1.9)[1.6]. Interorbital space slightly concave, narrow, its width 3.1(2.4–3.7)[2.8] in width of cranium, 5.1(3.8–6.2)[4.4] in head depth. Mouth moderate-sized, its width 1.5(1.4–1.7)[1.7] in head depth, 3.0(2.7–3.4)[3.2] in length of disk margin; length of jaw 2.4(2.1–2.6)[2.4] in head depth. Upper lip moderately fleshy, of an even width for its entire length; lower lip fleshy, no median lobe. Dorsal and anal fins about average in proportion to body size, length of dorsal fin 3.3(2.3–

4.3)[3.9] in length of disk margin; length of anal fin 2.9(2.4–3.7)[3.0] in length of disk margin.

Integument. Dermal cirri usually present on lateral sides of tail and disk margin. No cirri on tip of rostrum. Large bucklers arranged as described for genus. Dorsal fin devoid of tubercles, anal fin with only a few near base. Pectorals and pelvics with tubercles at base and running out on the fins for $\frac{1}{4}$ to $\frac{1}{2}$ their length. Caudal as in generic description. Skin covering eyeballs bearing tiny tubercles with rim around cornea often beaded by a row of small bucklers. Pectoral membranes thin, translucent; pectoral rays without fleshy pads on their ventral tips.

Color in preservative. Dorsal surface of body white to pale gray or grayish brown; in the latter case, apices of bucklers paler than ground color. Pigment markings usually absent; if present, they are dusky and ill-defined spots, occurring on shoulders, lateral sides of tail, and (very infrequently) face. Ventral surface of body uniformly pale; lips also pale. Rostrum with a dusky subterminal ring. Iris black or silvery. Pectorals colorless in white examples, dusky in gray ones; in the latter, the gray color may shade to a darker tone towards tips of pectorals. Pelvics and anal the same pale whitish color as ventral surface of body; anal sometimes with a dusky tip. Dorsal colorless in white specimens, dusky in others, sometimes with a faintly darker stripe or two. Caudal colorless to dusky in white examples; gray or brownish individuals with caudal as in generic description.

Color in life. From a color transparency taken shortly after capture: body pale bluish gray, ventral surface of body paler than dorsal surface, the whole suffused with a wash of translucent pinkish orange. Rostrum a deeper orange. Distal thirds of pectorals and caudal deep orange.

DISTRIBUTION (Fig. 25).—Known from the Bahamas just north of Cuba, from Puerto Rico, the Leeward Islands, the western Caribbean, and the northern coast of South America to Surinam. Bathymetric range: 35–348 m.

NAME.—The name *pumilus*, which is derived from a word meaning dwarf, is given in reference to the diminutive size and grotesque appearance of this species.

MATERIAL EXAMINED.—Numbers in parentheses are numbers of specimens. For data from OREGON (=O) and SILVER

BAY (=SB) stations, refer to Bullis and Thompson (1965). HOLOTYPE: USNM 188812, Surinam, O-2018, 57.5 mm SL.

PARATYPES. **Northern Bahamas:** USNM 188759 (2), SB-2455. **Puerto Rico:** FMNH 64843 (2) and FMNH 64844 (10), O-2626; FMNH 64845 (2), O-2627; MCZ 45085 (3), O-2668; MCZ 45087 (8), O-2626. **Virgin Islands:** CAS 23920 (1), O-2618; FMNH 64841 (4), O-2616; USNM 108353 (1), 18°25'30"N, 63°32'36"W. **Leeward Islands:** FMNH 64846 (5), O-2631; FMNH 64848 (2), O-2633; FMNH 64891 (33), O-2231; UMML 7488 (14), O-2632; USNM 190467 (1), O-2632. **Honduras:** CAS 23921 (1), O-1865. **Guyana:** ANSP 103632 (3), O-2231; ANSP 103633 (1), O-2262; CAS 23919 (1), O-2249; CAS-SU 62122 (3), O-2345; CAS-SU 62125 (1), O-2259; FMNH 64893 (3), O-2249; FMNH 65965 (1), O-2001; FMNH 65966 (1), O-2234; FMNH 65967 (3), O-2248; FMNH 65968 (1), O-2250; FMNH 65969 (3), O-2261; FMNH 65970 (4), O-2344; MCZ 45086 (3), O-2261; USNM 185984 (3), 8°33'N, 58°46'W. **Surinam:** FMNH 64899 (2), O-2330.

Ogcocephalus corniger new species

(Figure 26A–C)

Ogcocephalus vespertilio (non Linnaeus): LONGLEY AND HILDEBRAND 1941:311, 314 [Tortugas, Florida; key; description].
Ogcocephalus sp.: LONGLEY AND HILDEBRAND 1941:311, 315 [Tortugas, Florida; key; partial description by Hildebrand]; WALLS 1975:118 [northern Gulf of Mexico; partial description; figs.: called *Ogcocephalus* sp. A; color photograph].
Oncocephalus vespertilio (non Linnaeus): FOWLER 1952:14 [off southern Florida; partial description].

Probable references:

Lophius nostratus MITCHELL 1818:325 ["Straits of Bahamas"; a misspelling of *Lophius rostratus* Shaw].
Malthe vespertilio (non Linnaeus): UHLER AND LUGGER 1876:77 [southern Chesapeake Bay; partial description].
Oncocephalus vespertilio (non Linnaeus): GARMAN 1896:87 [off Key West, Florida; partial description].
Ogcocephalus vespertilio (non Linnaeus): H. M. SMITH 1907:401, figs. 185–186 [off Beaufort, North Carolina; partial description; figures the same as Jordan and Evermann 1898; pl. 392, figs. 958 and 958b (legend: *Ogcocephalus vespertilio*)].

DIAGNOSIS AND COMPARISONS.—A long-nosed *Ogcocephalus* distinctive for its dorsal color pattern, which consists of small pale round spots close together and evenly distributed over the darker background color of the dorsal surface of the body (specimens under about 65 mm SL lack this pattern; see sections on color below).

The long rostrum in *corniger* separates it from all other species of *Ogcocephalus* except *vespertilio*, *pumilus*, long-nosed morphs of *nasutus*, and small examples of *cubifrons* less than 50 mm SL (Fig. 9). The range of *corniger* (coasts of southeastern United States and eastern Gulf of Mexico) is widely separated from that of *vespertilio* (coast of Brazil) and, at this time, appears to be separated from that of *pumilus* (northern Bahamas, Caribbean, and coast of South America to Surinam). Besides separate

ranges, other aspects separate these long-nosed species. *O. corniger* differs from *vespertilio* in its lower number of pectoral rays (10–12 in *corniger*, 13–15 in *vespertilio*) and lower number of subopercular lateral-line scales (usually 5–7 in *corniger*, usually 8–9 in *vespertilio*, Table 6); it differs from *pumilus* in its larger body size (*pumilus* is less than 70 mm in SL) and in having fleshy pads on the ventral tips of the pectoral rays which *pumilus* lacks.

The range of *corniger* overlaps the ranges of *nasutus* and *cubifrons*, but long-nosed forms of *nasutus* and *cubifrons* may be distinguished from *corniger* by the pectoral fin ray count (modally 11 in *corniger*, usually 12 or 13 in *nasutus* and *cubifrons*, Table 3). *O. corniger* differs further from *nasutus* in the number of cheek lateral-line scales (usually 8 in *corniger*, modally 9 in *nasutus*, Table 5) and from *cubifrons* by its longer jaw (length of jaw into width of cranium 1.2–1.5 in *corniger*, 1.6–2.0 in *cubifrons*).

Two short-nosed species of *Ogcocephalus*, *parvus* and *rostellum*, occur within the range of *corniger* but are separable from *corniger* not only by the proportions of the rostrum but also by color pattern—neither ever has the pattern of small round pale spots on a darker background seen in *corniger*. Other characters that separate *corniger* from *parvus* include the smoother shagreenlike quality of the integument in *corniger* compared to the rough, lumpy surface of the integument in *parvus*, and the larger mouth in *corniger* (width of mouth into head depth 1.5–2.0 in *corniger*, 2.0–2.8 in *parvus*). An additional character separating *corniger* from *rostellum* is the pectoral fin ray count (modally 11 in *corniger*, modally 13 in *rostellum*, Table 3).

DESCRIPTION.—Counts and measurements from 57 specimens 26.2 to 134.0 mm SL (Table 1).

Counts. Counts given in Tables 2–6. In the following description, counts for holotype given in brackets, counts in *corniger* low compared to those of genus as a whole. Pectoral fin ray count usually 11 [11,11]; range 10–12. Subopercular lateral-line scale count usually 6 or 7 [6,6]; range 4–8. Cheek lateral-line scale count 8 [8,8] (the commonest count for genus); range 7–9. Mean for lateral-line scale count nearly 21 [20,20]; range 18–24. Majority of sample of *corniger* had 19 vertebrae, the most usual vertebral count for the genus. [D. 3; A. 4.]

Proportions. Proportions expressed as ratios given as mean followed by range in parentheses and proportion for holotype in brackets.

Length of disk margin intermediate relative to range of variation in genus, 2.3(2.1–2.5)[2.4] in SL. Tail narrow to moderately wide, the width 2.0(1.7–2.4)[1.7] in length of disk margin, tapering to a relatively thin caudal peduncle; depth of caudal peduncle 3.3(2.8–4.1)[3.3] in head depth. Rostrum with a wide base but becoming slender distally, upturned and very long, the length 2.0(1.7–2.3)[2.1] in length of disk margin. Aperture of illicial cavity triangular, always higher than wide. Cranium, when viewed from front, rising steeply above disk; head relatively deep, its depth 1.8(1.6–1.9)[1.7] in disk margin. Width of cranium 3.3(2.9–3.5)[3.2] in length of disk margin. Eye comparably large, 1.3(1.1–1.7)[1.5] in width of cranium. Lateral ethmoid width 1.7(1.5–2.0)[1.7] in width of cranium. Interorbital space flat to moderately convex, its width 2.1(1.7–2.5)[1.9] in width of cranium, 3.9(3.1–4.6)[3.6] in head depth (except one specimen, which has these proportions 2.9 and 5.7, respectively). Mouth average size, its width 1.6(1.5–2.0)[1.5] in head depth, 2.9(2.6–3.7)[2.6] in length of disk margin; length of jaw 2.4(2.2–2.6)[2.5] in head depth. Upper lip fleshy, of an even width for its entire length; lower lip also fleshy, thickly swollen medially. Dorsal fin small compared to other species in genus, its length 4.8(3.7–5.8)[5.8] in length of disk margin; anal fin also small, its length 3.0(2.5–3.5)[3.0] in length of disk margin.

Integument. Dermal cirri absent, or at least inconspicuous, except near tip of rostrum, where fairly long cirri occur in subterminal ring. Large bucklers arranged as in generic description. Dorsal fin devoid of tubercles; anal fin with tiny tubercles covering proximal third or half of fin. Pectorals and pelvics with tiny tubercles at base on both dorsal and ventral surfaces, running out along fin rays for a third to half their length. Caudal as in generic description. Skin covering eyeballs bearing fine tubercles with rim around cornea beaded by a row of slightly larger ones. Pectoral membranes thick, opaque, ventral surfaces of the ray tips with well-developed fleshy pads (pads not developed in small specimens).

Color in preservative. Dorsal surface of body uniformly covered with small pale spots on a darker ground color, the ground color generally

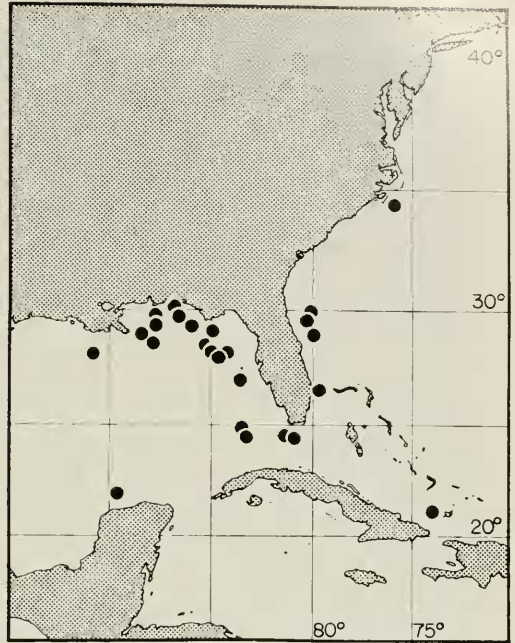


FIGURE 27. Localities for study material of *Ogocephalus corniger*.

brown or gray, becoming darker on shoulders in many examples; sometimes spots so close together that ground color may appear as a reticulum. The pale spots are unpigmented apices of bucklers. Specimens under about 65 mm SL generally lack this color pattern and are uniformly pale or dusky, but occasionally, dark rings occur clustered on shoulders. Ventral surface of body uniformly pale; lips pale. Rostrum with a diffuse dark subterminal ring, incomplete below. Iris black or golden, or golden with spots, but never with radiating lines. Pectorals pale to dusky proximally with broad dark brown or black margins; ray tips white, ventral pads of rays white. Pelvic and anal fins the same ground color as ventral surface of body; pelvics sometimes with darkened or blotched tips in dark specimens; anal most often with distal third very dark to black. Dorsal dusky, often with a pale diagonal stripe or two. Caudal as in generic description, the border always dark to black.

Color in life. The following description from three color transparencies made of a freshly killed specimen captured in winter off North Carolina. One transparency shows a dorsal view of the fish and one a ventral view; the remaining one shows a lateral view of the head.

Ground color of dorsal surface of body chocolate brown with fine, close-set pearl-gray spots completely covering the surface, including face and skin covering eyeballs. Even iris of eye has the spotted pattern, with a brassy highlight around pupil. Lips bright red-orange, with a translucent wash of red-orange pigment over lower face and lower edge of disk, where it becomes continuous with the same red-orange wash over ventral surface of body, including pelvic and anal fins. This red-orange coloration on ventral surface is more intense on chin, on a ring encircling anus, and on tail including anal fin, which also has a black tip. Pectoral fins with translucent red-orange color basally, the rays becoming deep red-orange distally and the fins each with a broad blackish margin. Caudal dark basally, becoming pale red-orange in middle portion with rays a darker shade than membranes, and black again distally in a broad margin.

Longley (Longley and Hildebrand 1941) stated for examples from off Tortugas (his *Ogcocephalus vespertilio*) that the pectorals and caudal were, "buff-yellow over basal half, passing through maroon-purple to prune purple at the tips, the contrast between the darker outer third and the yellow basal two-thirds being sharper on the under side of the pectorals; belly, maxillary membranes and buccal cavity coppery red." Walls (1975) presents a photograph of an example from the Gulf of Mexico (his *Ogcocephalus* sp. A) which shows the pectorals red-orange basally, succeeded by bright yellow, which gives way to more red-orange, which in turn gives way to black borders.

DISTRIBUTION (Fig. 27).—Known from the Atlantic coast of the United States from Cape Lookout, North Carolina, to Florida, Campeche Banks, and the northeastern Gulf of Mexico to Louisiana; one record from off Great Inagua I., Bahamas. Bathymetric range: 29–230 m.

NAME.—This form is named *corniger*, meaning horn-bearer, in reference to the long, upturned rostrum.

MATERIAL EXAMINED.—Numbers in parentheses are numbers of specimens. For data from early OREGON stations (= O), refer to Springer and Bullis (1956); for data from later OREGON stations and for COMBAT (= C) and SILVER BAY (= SB) stations, refer to Bullis and Thompson (1965). **HOLOTYPE**: USNM 188808, Gulf coast of Florida, O-729–730; a male 124.5 mm SL.

PARATYPES. **North Carolina**: CAS 23927 (1), SB-2930;

USNM 152030 (1). **Atlantic coast of Florida**: ANSP 103626 (1), C-101; CAS-SU 62124 (1), C-497; CAS-SU 62128 (1), SB-1931; USNM 161375 (1), Palm Beach. **Bahamas**: FMNH 66387 (1), SB-3496; UF 24183 (1), SB-2470. **Florida Straits**: CAS 23926 (1), SB-437; UF 24182 (1), SB-2362. **Florida Keys**: FMNH 64124 (6), O-1020; USNM 37853 (1), ALBATROSS sta. 2316, 24°25'30"N, 81°47'45"W, 91 m; USNM 74089 (1), s of Key West; USNM 117001 (1) and 117002 (3), Tortugas. **Gulf coast of Florida**: FMNH 64103 (1), O-603; FMNH 64104 (1), O-727–728; FMNH 64109 (1), O-732; FMNH 64113 (1), O-897; FMNH 64116 (2), O-917; FMNH 64119 (1), O-936; FMNH 64122 (2), O-945; 64126 (4), O-1021; FMNH 64129 (3), O-1022; MCZ 45070 (1), O-326; USNM 134087 (1), 28°47'30"N, 84°37'00"W. **Alabama**: FMNH 46744 (1), O-265; MCZ 45071 (1), O-2838; USNM 159159 (1), 29°47'N, 87°17'W. **Louisiana**: USNM 188793 (1), SB-175. **Yucatán**: USNM 188804 (1), SB-404.

Ogcocephalus parvus Longley and Hildebrand

(Figure 28)

Malthe vespertilio (non Linnaeus): GÜNTHER 1880:7 [Pernambuco (=Recife), Brazil].

Ogcocephalus parvus LONGLEY AND HILDEBRAND, 1940:283, fig. 28 [s of Tortugas, Florida; holotype USNM 109313]; 1941:311 and 314 [Tortugas, Florida; key]; ERDMAN 1956:338 [Joyuda, Puerto Rico; partial description]; BRIGGS 1958:301 [Florida, compiled]; MOE ET AL. 1966:120 [Florida; list of museum specimens]; BRADBURY 1967:417 [listed]; STARKS 1968:33 [Alligator Reef, Florida; composition of reef fauna]; WALLS 1975:116 [N Gulf of Mexico; partial description].

Oncocephalus parvus: FOWLER 1945:336 [Key West, Florida; listed]; 1952:15 [Sombrero Key Light, Florida; description of color].

Probable reference:

Ogcocephalus vespertilio: DAHLBERG 1975:45, fig. 93 [coast of Georgia; partial description; range, compiled].

DIAGNOSIS AND COMPARISONS.—An *Ogcocephalus* with exceptionally angular, craggy body contours and large, prominent bucklers. *O. parvus* differs from all its congeners except *cubifrons* in having a very small mouth relative to head depth (width of mouth into head depth 2.0–2.8 in *parvus*, 1.0–2.0 in all others except *cubifrons*). *O. parvus* may be separated from *cubifrons* by its narrower interorbital space (interorbital width into head depth 3.6–6.6 in *parvus*, 2.3–3.4 in *cubifrons*). It may be distinguished from all but *corniger*, *declivirostris*, and *pumilus* by its low pectoral fin ray count (usually 10–11 in *parvus*, 12 or more in all others except *corniger*, *declivirostris*, and *pumilus*). *O. parvus* is distinguished from *corniger* and *pumilus* by its short rostrum (length of rostrum into length of disk margin 3.2–5.1 in *parvus*, 1.7–3.0 in *corniger* and *pumilus*) and from *declivirostris*



FIGURE 28. *Ogcocephalus parvus* Longley and Hildebrand. *Left and center*: FMNH 46742, Gulf of Mexico, 75.0 mm SL. *Right*: FMNH 65957, Guyana, 64.0 mm SL.

by the fleshy ventral pads developed on the distal ends of the pectoral fin rays (absent in *declivirostris*).

DESCRIPTION.—Counts and measurements from 69 specimens, 27.3 to 84.7 mm SL (Table 1). Because specimens in the northern part of the range (coasts of southeastern United States and eastern Gulf of Mexico) differed in pigment pattern from those in the southern part (Caribbean Sea and Atlantic coast of South America), the two groups were analyzed separately with the expectation that samples would accumulate that were large enough to differentiate the groups well. However, too few specimens from the southern part of the range were obtained, so only the color patterns and counts are treated separately in the following description. Data for body proportions were combined for the two groups.

Counts. Counts given in Tables 2–6. Counts for *parvus* the lowest found in genus. Pectoral fin ray count usually 10 in northern *parvus* and

11 in southern *parvus*; range 10–12 for species. Subopercular lateral-line count usually 5 or 6; range 4–8. Cheek lateral-line scale count usually 8; range 7–9. Mean count for lateral-line scales 17; range 15–19. Vertebral count modally 19; range 18–20 (all vertebral counts are from holotype and paratypes).

Proportions. Proportions expressed as ratios given as mean followed by range in parentheses. Relative length of disk margin longest for the genus, its length 2.1(1.9–2.2) in SL. Tail moderately wide, its width 2.0(1.7–2.5) in length of disk margin. Caudal peduncle 3.1(2.5–4.0) in head depth. Rostrum variously finger- to cone-shaped, but always short, its length 4.2(3.2–5.1) in length of disk margin. Aperture of illicial cavity oval or subcircular. Cranium rising steeply above disk, head depth 1.8(1.6–2.0) in length of disk margin. Width of cranium 3.2(2.6–3.6) in length of disk margin. The following in width of cranium: eye 1.4(1.1–1.6); lateral ethmoid width 1.7(1.4–1.9). Interorbital space narrow, con-

cave, its width 2.7(2.1–4.1) in width of cranium, 4.8(3.6–6.6) in head depth. Mouth small and narrow, its width 2.3(2.0–2.8) in head depth, 4.1(3.4–5.2) in length of disk margin; jaw short, its length 3.1(2.8–3.5) in head depth. Upper lip fleshy, of an even width for its entire length; lower lip with a fleshy median lobe. Dorsal fin average size, its length 3.4(2.4–4.3) in length of disk margin; anal fin short, its length 3.1(2.4–3.6) in length of disk margin.

Integument. Dermal cirri usually sparse or absent, but a few examples have cirri well developed over dorsal surface of body. Most specimens from southern population have subterminal rostral cirri. Large bucklers arranged as in generic description. Dorsal fin devoid of tubercles; anal fin with only a few tiny ones at base. Pectorals and pelvics with tiny tubercles covering basal third or fourth of their length. Caudal as in generic description. Skin covering eyeballs bearing tiny tubercles with rim around cornea beaded by a row of small bucklers. Pectoral membranes thick, opaque; ventral surfaces of ray tips with well-developed fleshy pads.

Color in preservative. Northern examples: ground color of dorsal surface of body pale tan to medium brown. Markings variable but irregular or rounded dark brown spots, with or without whitish margins, clustered on shoulders, face, in axillae, and sometimes along lateral sides of tail. Occasionally some of these markings are rings instead of spots. Dark splotches, sometimes indistinct, may occur elsewhere on dorsal surface. A few specimens with minute dark spots scattered over dorsal surface in addition to other markings. Ventral surface of body uniformly creamy pale, sometimes becoming dusky on anterior part of head, particularly on chin, in which case two distinct white patches may occur, one on either side of mandible. Pectorals pale to nearly white with a broad black margin extending through all but the three shortest rays; ray tips white, ventral pads white. Pelvics and anal same pale ground color as ventral surface of body; anal often with a dusky or dark spot distally. Dorsal colorless or a little dusky basally. Caudal colorless in about half the specimens at hand, otherwise as in generic description. Iris black or golden, or golden with dark spots.

Southern examples: ground color of dorsal surface of body usually a much darker brown

than in northern specimens (this difference does not show well in Fig. 28 because photographed specimens were chosen to show pigment markings contrasted as well as possible with ground color; fish on right in Fig. 28 is relatively pale). Minute but very distinct black dots on lateral portions of disk and on top of cranium, continuing posteriorly along dorsal surface of tail. Large, sharply defined brown or black spots and rings on shoulders and face and also in axillae, extending from these on to sides of tail. A few specimens with an absolutely pigmentless white patch a little larger than top of cranium in area and located in middorsal region just posterior to cranium. Ventral surface of body, fins, and eyes as in northern examples.

Color in life. From an aquarium specimen newly captured in Gulf of Mexico off Mobile, Alabama, kindly shown me by Dr. Robert L. Shipp and his students at the University of South Alabama: ground color of face and dorsal surface of body dark brown, the large irregularly shaped spots on shoulders and axillae lavender separated by cream-colored reticula in approximately the pattern seen on the right in Figure 28; smaller pepperlike spots on tail and disk seen in figure are black in living specimen. Down face on either side from eye to angle of jaw a cascade of orange spots having dark brown rims and separated by white-colored reticula. Lips orange. Iris gold flecked with orange. Pectorals a translucent orange with broad black margins. Caudal dark brown basally, white in middle third, orange on distal third.

Several Kodachrome transparencies made from specimens immediately after capture have been available. From specimens from off the southeastern United States, the following notes are offered: ground color of dorsal surface of body bright tan suffused with red-orange in large patches; dark spots arranged as described for preserved specimens. Dorsal fin red-orange. Pectorals with a red-orange stripe just proximal to black margin; ray tips white.

From a specimen newly captured from off coast of Guyana: dorsal surface of body very dark, the markings difficult to discern except those on shoulders (the usual cluster of irregular spots). Skin surrounding gill pores tan. Tips of many bucklers faintly red-orange. Pectorals with red-orange stripe just proximal to black margins; ray tips white. Ventral surface of body, includ-

ing pectoral peduncles and bases of pectoral fins, entirely bright red-orange. Anal fin red-orange with white stripe through second quarter. Lips red-orange, corresponding to an observation by Erdman (1956) of a specimen from Puerto Rico with "bright red lips." A rectangularly shaped white patch on either side of mandible and an oblong white patch in median line about halfway between chin and bases of pelvics.

DISTRIBUTION (Fig. 25).—Known from the Atlantic coast of the United States from Cape Hatteras south to the eastern Gulf of Mexico, the Caribbean Sea, and the coast of South America to Recife, Brazil. Bathymetric range: 29–126 m.

MATERIAL EXAMINED.—Numbers in parentheses are numbers of specimens. For data from early OREGON stations (=O), refer to Springer and Bullis (1956); for data from later OREGON stations as well as COMBAT (=C) and SILVER BAY (=SB) stations, refer to Bullis and Thompson (1965).

Northern examples

North Carolina: CAS 23922 (1), SB-2927; CAS 23924 (1), SB-3339; FMNH 64336 (1), C-384; UF 24186 (1), C-385. **South Carolina:** MCZ 45082 (1), C-166. **Georgia:** FMNH 66383 (9), BOWERS sta. 32, 30°14'N, 80°16'W, 73 m; MCZ 45083 (1), PELICAN sta. 178-15, 31°20'N, 80°17'W, 38 m; UMML 114 (1), between Jacksonville, Florida, and Brunswick, Georgia. **Atlantic coast of Florida:** ANSP 103631 (1), SB-2721. **Florida Straits:** CAS-SU 62118 (2), C-457; UF 24187 (2), SB-2363; UF 24188 (1), SB-2382. **Florida Keys:** FMNH 64125 (6), O-1020; USNM 109313 (holotype) and USNM 109314 (12 paratypes), Tortugas, 134–201 m. **Gulf coast of Florida:** FMNH 46742 (1), 29°04'N, 84°23.5'W, 37 m; FMNH 46743 (2), O-35; FMNH 64105 (1), O-729–730; FMNH 64108 (2), O-732; FMNH 64112 (1), and FMNH 64114 (2), O-897; FMNH 64115 (1), O-916; FMNH 64117 (3), O-917; FMNH 64118 (2), O-936; FMNH 64127 (3) and FMNH 64128 (3), O-1021; FMNH 64130 (1), O-1022; GCRL (1), O-35; MCZ 45084 (1), O-1024; USNM 188795 (1), PELICAN sta. 153-3, 29°24'N, 85°54'W, 37 m. **Alabama:** USNM 188778 (1), PELICAN sta. 137-2, 29°36'N, 87°29'W, 66 m. **Yucatán:** CAS 23923 (1), SB-438; FMNH 46741 (1), O-222.

Southern examples

Puerto Rico: USNM 164504 (1), Joyuda. **Honduras:** ANSP 103630 (1), O-1874. **Guyana:** CAS-SU 62121 (1), O-2000; FMNH 64892 (2), O-2247; FMNH 64895 (3), O-2261; 65954 (1), O-2245; FMNH 65955 (1), O-2232; FMNH 65956 (1), O-2257; FMNH 65957 (4), O-2000; FMNH 65958 (1), 1999; MCZ 48081 (1), O-2262; USNM 188768 (2), O-2000. **Brazil:** BMNH 79.5.14.527 (1), CHALLENGER sta. 122, off Pernambuco (=Recife).

***Ogcocephalus darwini* Hubbs**

(Figure 29 [left])

Ogcocephalus darwini HUBBS, 1958:161 [Isla Isabella, Galápagos Islands; holotype SIO H51-214; photographs]; BRADBURY 1967:417 [listed]; McALLISTER 1968:161 [Tagus Cove, Albarmarle (=Isabella) I., Galápagos Islands; branchiostegals described].

DIAGNOSIS AND COMPARISONS.—An *Ogcocephalus* distinguished by the unique character of its smooth integument, likened to shagreen by Hubbs in the original description (1958); the bucklers are obscured by a covering of fine spinules in contrast to the prominent, coarse bucklers of other species. *O. darwini* is also distinguished from all its congeners except the single other eastern Pacific species, *O. porrectus*, by a pair of solid dark stripes on the dorsal surface of the disk which continue on to the lateral sides of the tail; all Atlantic species of *Ogcocephalus* either are spotted on the dorsal surface of the body or else lack markings altogether. Differences between *darwini* and *porrectus* include a shorter disk margin in *darwini* (Fig. 9) and a higher modal pectoral fin ray count (15 in *darwini*, 14 in *porrectus*; Table 3).

DESCRIPTION.—A detailed description and comparison with the two other eastern Pacific ogcocephalines is given in the original description of *Ogcocephalus darwini* (Hubbs 1958), but in order to keep the presentations of species in this revision strictly parallel for ease of reference, a description is given again below, including some new observations. Counts and measurements from 30 specimens 35.1 to 166.1 mm SL (Table 1).

Counts. Counts given in Tables 2–6. *O. darwini* has the highest mean for pectoral fin ray count of any in genus; range 14–15 (but Hubbs (1958) gives 14–16; however, his sample included three specimens I have not seen). *O. darwini* most often has 6–7 subopercular lateral-line scales but shows considerable variation in count; range 4–9. Cheek lateral-line count usually 8, as for most species in genus; range 6–9. Range for lateral-line scale count 19–30, which is about center of distribution for genus. Modal vertebral count 19; range 19–20.

Proportions. Proportions expressed as ratios given as mean followed by range in parentheses.

Disk margin shorter on the average than in any other species of *Ogcocephalus*, its length 2.6(2.3–2.9) in SL. Tail thin, its width 2.0(1.7–2.4) in length of disk margin, tapering evenly to caudal fin; caudal peduncle of moderate depth, 2.7(2.4–3.1) in head depth. Rostrum thick and blunt, moderately long, its length 3.1(2.8–3.6) in disk margin. Aperture of illicial cavity subtriangular, higher than wide or the two dimensions about equal. Cranium, when viewed from front,

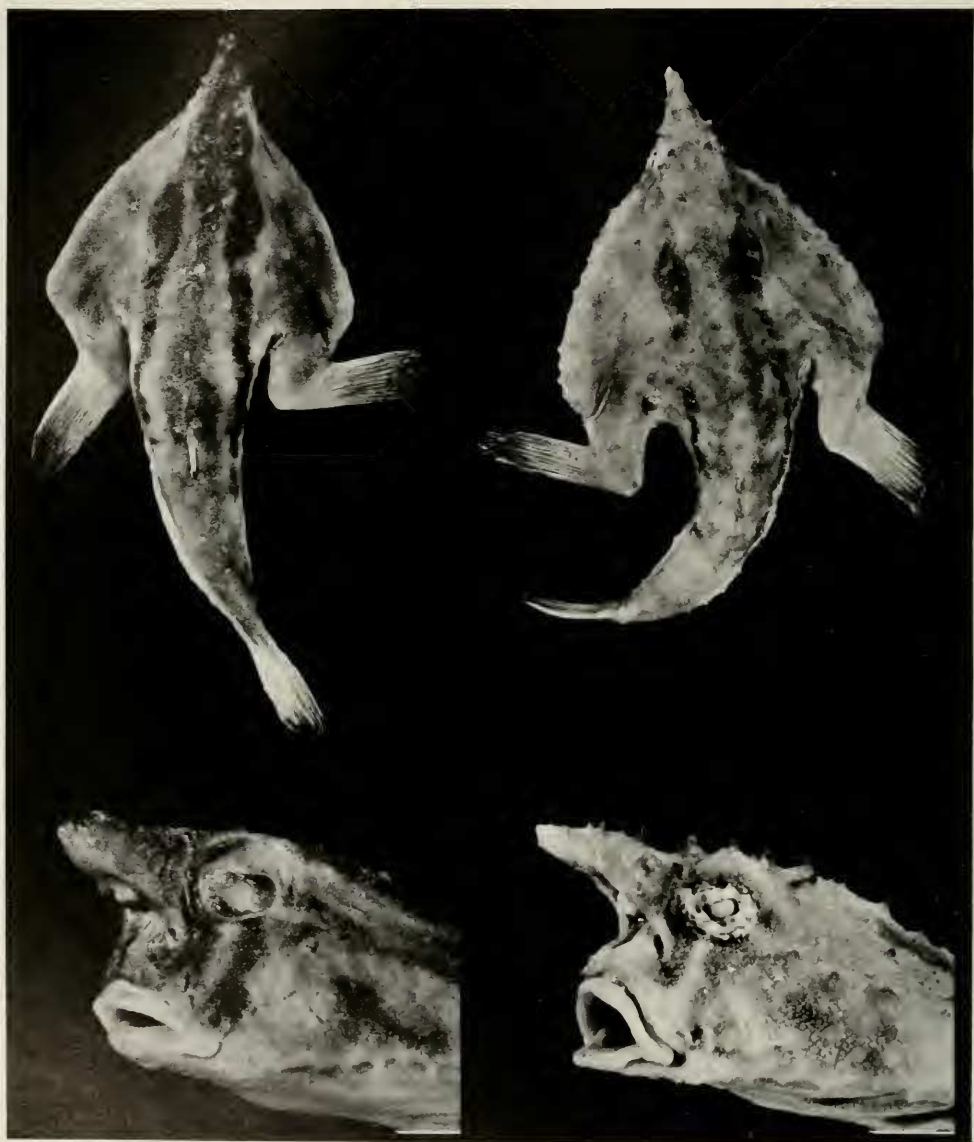


FIGURE 29. *Ogocephalus darwini* Hubbs, left, top and bottom, paratype 128.5 mm SL, CAS-SU 17112. *Ogocephalus porrectus* (Garman), right, top and bottom, paratype 108.0 mm SL, MCZ 28733.

rising steeply above disk, head depth 1.8(1.6–2.1) in length of disk margin. Width of cranium 3.2(2.9–3.5) in length of disk margin. The following in width of cranium: eye 1.3(1.3–1.5), lateral ethmoid width 1.6(1.4–1.8). Interorbital space wide, concave, the width 1.8(1.6–2.1) in width of cranium, 3.2(2.9–3.6) in head depth. Mouth average in width, the width 1.7(1.4–2.0) in head depth, 3.1(2.7–3.4) in length of disk margin;

length of jaw 2.4(2.0–2.6) in head depth. Upper lip moderately fleshy, of an even width for its entire length; lower lip fleshy, no median lobe. Dorsal fin average size, its length 3.8(3.0–4.3) in length of disk margin; anal fin comparatively long, 2.4(2.1–2.6) in length of disk margin.

Integument. Dermal cirri present or absent. Large bucklers present but inconspicuous because of their covering of skin embedded with

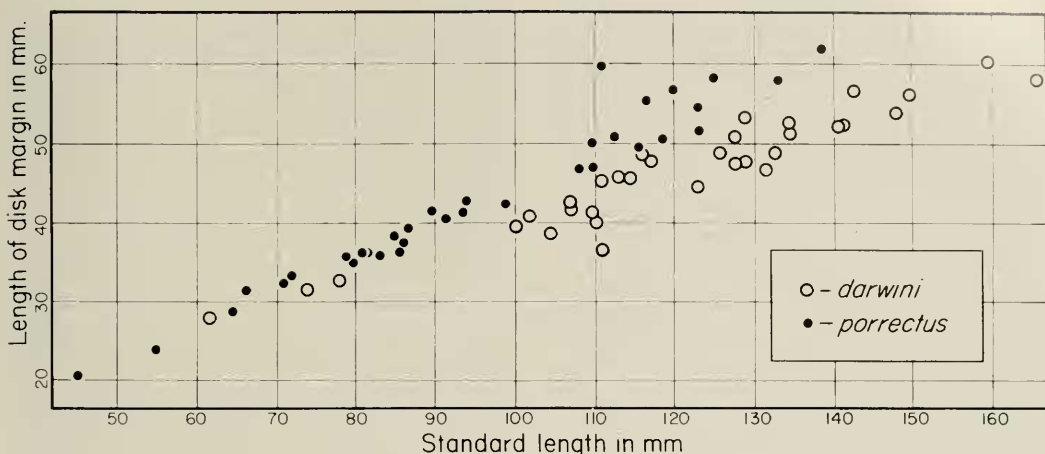


FIGURE 30. Comparison between *Ogcoccephalus darwini* and *O. porrectus* to show that length of disk margin is greatest in *O. porrectus* relative to standard length.

fine spinules (except small specimens 35 mm SL or less have perfectly visible bucklers not yet covered by the fine-grained, shagreenlike integument); bucklers arranged as in generic description. All fins with fine tubercles at their bases and extending out variable distances along fin rays. Caudal as in generic description. Skin covering eyeballs bearing tiny, densely set tubercles, with rim around cornea beaded by a row of somewhat larger ones. Pectoral membranes thick, opaque; ventral surfaces of ray tips with well-developed fleshy pads.

Color in preservative. Ground color of dorsal surface tan to brown, the conspicuous markings a pair of dark stripes, one on each side, originating behind eyes and extending posteriorly over disk and on to lateral walls of tail where they are sometimes interrupted to form a series of blotches. Top of head dark, from whence a median dusky stripe extends posteriorly, becoming wider and more intense around dorsal fin. Face also dark, marked by a narrow light stripe on either side extending obliquely from eye to lip just anterior to corner of mouth, a pattern very similar to that observed in *Ogcoccephalus porrectus*. Ventral surface uniformly pale except for chin, which is sometimes dusky; the pale shade extends up sides of tail to the lateral line or even a little above. Rostrum the same dark shade as face and head. Iris black or gold, or black with golden spots. Dorsal surfaces of pectorals pale basally, grading to black distally, the ventral pads near tips of rays pale or

white. Pelvics and anal the same ground color as ventral surface of body, anal sometimes dusky or black on distal third. Dorsal fin dusky to dark, sometimes blotched. Caudal fin pale basally with distal third dark except in one specimen, which displays color pattern described for genus.

Color in life. Hubbs (1958) states for one specimen which retained some color, "upper parts, purplish gray; rather blue-gray on tubercles and in an irregular blotch near each side of the disk; the two dark streaks, reddish brown; underparts, bright rose-red, becoming white or whitish on the lower (but not the upper) surface of the pelvics, on the outer tip of the anal, and, weakly, on the lower border of the caudal, also on the esca (but not the red stem) of the illicium; pectoral rays pink-gray, encroached by the widening, blackish interradiial streaks; the fin becoming almost solidly blackish inside the narrow red outer border."

I observed two live specimens in August 1968 which had been freshly taken from coral rubble in 25 m of water off Isla Isabela by pipe dredge. In these the dorsal surfaces of disk and tail medium brown, the two longitudinal stripes dark cocoa brown. Ventral surfaces of body creamy white, as were esca and tops of eyeballs, all contrasting sharply with brown head and brown rostrum. Lips cherry-red; striking white blotches along sides of disk posterior to mouth. Pelvics creamy white tipped with brown on dorsal surfaces. Pectorals brown on dorsal surfaces, grad-

ing to rich dark shade distally, creamy white on ventral surfaces.

DISTRIBUTION.—Galápagos Islands. Bathymetric range: 3.5–73.5 m.

MATERIAL EXAMINED.—Numbers in parentheses are numbers of specimens. All material from the Galápagos Islands. **Isla Isabela:** SIO H51-214 (holotype) and SIO 54-175 (1), Caleta Tagus; SIO H50-18 (1), Punto Moreno, shallow water near shore; SIO 55-16 (1), Punto Moreno, under 9 m; SIO H50-132 (1), Bahía Elizabeth, 5.5 m; SIO 54-199 (1) and SIO 58-116 (1), Bahía Elizabeth; SIO 57-20 (1), Bahía de Banks, approx. 00°01'S, 91°29'W; CAS-SU 14977 (1), Bahía de Banks, under 77 m; SIO H51-51 (1), just outside Caleta Webb; SIO 57-111 (1), Caleta Webb; CAS 39904 (13), TE VEGA cr. 17, sta. 91, 00°15'22"S, 91°22'26"W, Canal Bolívar; SIO 56-60 (1), 4.6–5.6 m; SIO 58-39 (1), w side I. Isabela or E side I. Fernandina. **Isla Fernandina:** SIO H53-196 (1), Punta Mangle. **Isla Santa Cruz:** USC (1), Allan Hancock Pacific Exped. 1935, sta. 345-35, 00°24'50"S, 90°21'40"W, 55 m.

Other material: SIO 57-166 (1), exact locality unknown; CAS-SU 17112 (1), exact locality unknown; CAS-SU 46654 (1), from stomach of shark (*Gyroleurodus quoyi*) taken in Caleta Tagus.

Ogcocephalus porrectus (Garman)

(Figure 29 [right])

Oncocephalus porrectus GARMAN, 1899:86 [5°32'45"N, 86°54'30"W; lectotype MCZ 28733].

Ogcocephalus porrectus: HUBBS 1958:161 [redescription of type-series; photographs; selection of lectotype]; BRADBURY 1967:417 [listed].

DIAGNOSIS AND COMPARISONS.—One of only two species of *Ogcocephalus* known from the eastern Pacific Ocean (the other is *O. darwini*). *O. porrectus* and *O. darwini* are morphologically distinguishable by the nature of the squamation, shagreenlike and relatively smooth in *darwini* but rough with prominent spiny bucklers in *porrectus*. Other differences include the relatively longer disk margin in *porrectus* (Fig. 9) and lower modal number of pectoral rays (14 in *porrectus*, 15 in *darwini*, Table 3).

Although a smaller species than *nasutus* (Table 1), *porrectus* most resembles *nasutus* in body proportions and quality of the squamation. However, the color pattern in *porrectus*, consisting of a longitudinal stripe on each side of the body, is unknown in *nasutus* or any other Atlantic species. The relationship in color pattern between Atlantic and Pacific species in this: the clusters of spots or reticulations where found in tracts in Atlantic species are represented in *porrectus* (and in *darwini*) by solid stripes.

DESCRIPTION.—Counts and measurements from 35 specimens 25.6 to 138.5 mm SL (Table 1).

Counts. Pectoral fin ray count relatively high

with modal number 14 in range of 10 to 15 for genus (Table 3). Lateral-line scale counts below average, however, with lateral-line count always under 30 (Table 4) and subopercular lateral-line count modally 6 (Table 6). Cheek lateral-line scale count usually 8 as in most species in the genus (Table 5) and vertebral count usually 19 (Table 2).

Proportions. Proportions expressed as ratios given as mean followed by range in parentheses. Disk outline subtriangular, length of disk margin 2.2(2.1–2.4) in SL. Tail thin to moderately wide, its width 2.0(1.6–2.4) in length of disk margin, tapering evenly to caudal fin; caudal peduncle of average thickness, its depth 3.0(2.6–3.4) in head depth. Rostrum moderately long with a thick base, its length 3.0(2.8–3.4) in length of disk margin; seen from side, rostrum arches slightly with its distal end pointing downwards except that terminal buckler is turned abruptly upwards (Fig. 29). Aperture of illicial cavity subtriangular in outline, higher than wide. Cranium, when viewed from front, rising steeply above disk; head depth 2.0(1.9–2.2) in length of disk margin. Width of cranium 3.2(2.3–3.9) in length of disk margin. The following in width of cranium: eye 1.6(1.3–2.0), lateral ethmoid width 1.7(1.5–1.9). Interorbital space flat, not convex as in *vespertilio*, of average width, the width 2.1(1.8–2.5) in width of cranium, 3.6(3.0–4.0) in head depth. Mouth moderate, its width 1.6(1.4–1.8) in head depth, 3.2(2.8–3.6) in length of disk margin; length of jaw 2.3(2.1–2.5) in head depth. Upper lip moderately fleshy, of an even width for its entire length; lower lip fleshy, thickened medially. Dorsal fin small, its length 4.4(3.4–4.8) in length of disk margin; anal fin relatively long, its length 2.6(2.4–3.0) in length of disk margin.

Integument. Dermal cirri inconspicuous, usually present on disk margin, chin, lateral sides of tail near lateral line, and on sides of large bucklers on dorsal surface of body. Large bucklers prominent, with coarse spines bristling from apex of each; bucklers arranged as in generic description. All fins except dorsal with fine tubercles running out for 1/3 to 2/3 length of fin rays; dorsal fin with none or only a few prickles on anterior edge of first ray. Caudal as in generic description. Skin covering eyeballs bearing fine tubercles with rim around cornea beaded by a row of small but prominent bucklers. Pectoral membranes thick, opaque; ventral surfaces of ray tips with well-developed fleshy pads.

Color in preservative. Freshest material has

dorsal surface of body uniformly brown except for darker brown longitudinal stripes, one on each side as in *darwini*, beginning anteriorly on dorsal surface of disk behind eyes as an elongate "shoulder" blotch which then narrows posteriorly and trails back along sides of tail where sometimes interrupted in one or two places. Garman's four specimens faded (Garman 1899), but holotype (Hubbs 1958) shows the longitudinal markings, and original description refers to markings.

Markings on faces of fresh specimens also resemble markings in *darwini*; suborbital space (between eye and mouth) dark except for a markedly pale stripe descending from eye to corner of mouth. Lips the same creamy-white shade as ventral surface of body; pelvics and ventral surfaces of pectorals also creamy white. Dorsal surface of pectorals dusky, grading distally to black tips. Anal often tipped with black, especially in small specimens. Dorsal dusky, occasionally blotched with dark pigment. Iris golden with very dark spots in a ring around the eccentrically shaped pupil (Garman described the iris as having "radiating bars of brown"). Caudal as in generic description.

Color in life. Two 35-mm color slides provided by Dr. Robert Lea show that, as in other species of *Ogcocephalus*, *O. porrectus* has considerable bright-reddish coloring. One slide shows entire ventral surface of body to be orange-red except for ventral surfaces of pelvic and anal fins, which are whitish. The other slide, a dorsal view of body, shows skin around gill openings to be reddish and fin rays nearest sides of pectoral and caudal fins to have their tips scarlet.

DISTRIBUTION.—Vicinity of Cocos Island from depths of 88–146 m. Hubbs (1958) erred in stating that the material described by Garman (1899) from ALBATROSS station 3368 was from "south of the Gulf of Panamá, in the vicinity of Cabo Corrientes, Colombia." The coordinates for this station (5°32'45"N and 86°54'30"W, correctly quoted by Prof. Hubbs) designate a locality near Cocos Island, not the coast of Colombia. But this small error may foreshadow things to come. A specimen from Peru, USNM 200363 (data given below) agrees fairly well with *O. porrectus* in squamation, color pattern, and morphometric characters. Whether a population of batfishes that properly may be assigned to *O. porrectus* occurs along the coast of western South America is a question that awaits future work.

MATERIAL EXAMINED.—Numbers in parentheses are numbers of specimens. Cocos Island: MCZ 28733 (lectotype) and MCZ 41594 (3 paralectotypes) both from ALBATROSS sta. 3368, 5°32'45"N, 86°54'30"W, 121 m. The following from R/V SEARCHER cruise 72-4: LACM 32263 (23), 5°33'32"N, 87°04'44"W, 110 m; LACM 32264 (6), 5°33'30"N, 87°05'50"W, 137–146 m; LACM 32268 (1), 5°31'10"N, 87°01'58"W, 88–91 m; LACM 32269 (1), 5°28'30"N, 87°04'00"W, 119–121 m.

Peru: USNM 200363 (1), Caleta Cruz (Tumbes), 37–55 m.

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