



## Descriptions of a new genus and two new species of Caribbean deep-water jawfishes (Teleostei: Opistognathidae)

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### Abstract

A new genus and species of deep-water jawfish, *Anoptoplacus pygmaeus*, n. gen. n. sp., is described on the basis of two specimens collected off Arrowsmith Bank, Yucatán, Mexico, trawled in 240–267 m. Although only 20.5–22.5 mm standard length, they exhibit sexual dichromatism, appear to be adults, and have a number of reductive characters generally characteristic of miniaturization in fishes. Other characters of this new species of jawfish include single rows of straight and slender teeth in both jaws, a caudal fin that is not lanceolate and with the middle 10 rays branched, 20–23 body scale rows, and 2–4 infraorbitals which are plate-like and broadly open laterally. A second new species of jawfish, *Opistognathus schrieri*, n. sp. is described based on two specimens collected off Curaçao in about 152 m. This species shares a unique combination of characters with *O. melachasme*, known only from Arrowsmith Bank, and *O. nothus*, from off North Carolina and the Gulf of Mexico. Both color pattern and the distribution of cephalic pores in adults distinguish the new species. All Atlantic jawfishes that occur in depths greater than 150 m are discussed and compared.

**Key words:** taxonomy, systematics, ichthyology, coral-reef fishes, Atlantic Ocean, Arrowsmith Bank, Curacao.

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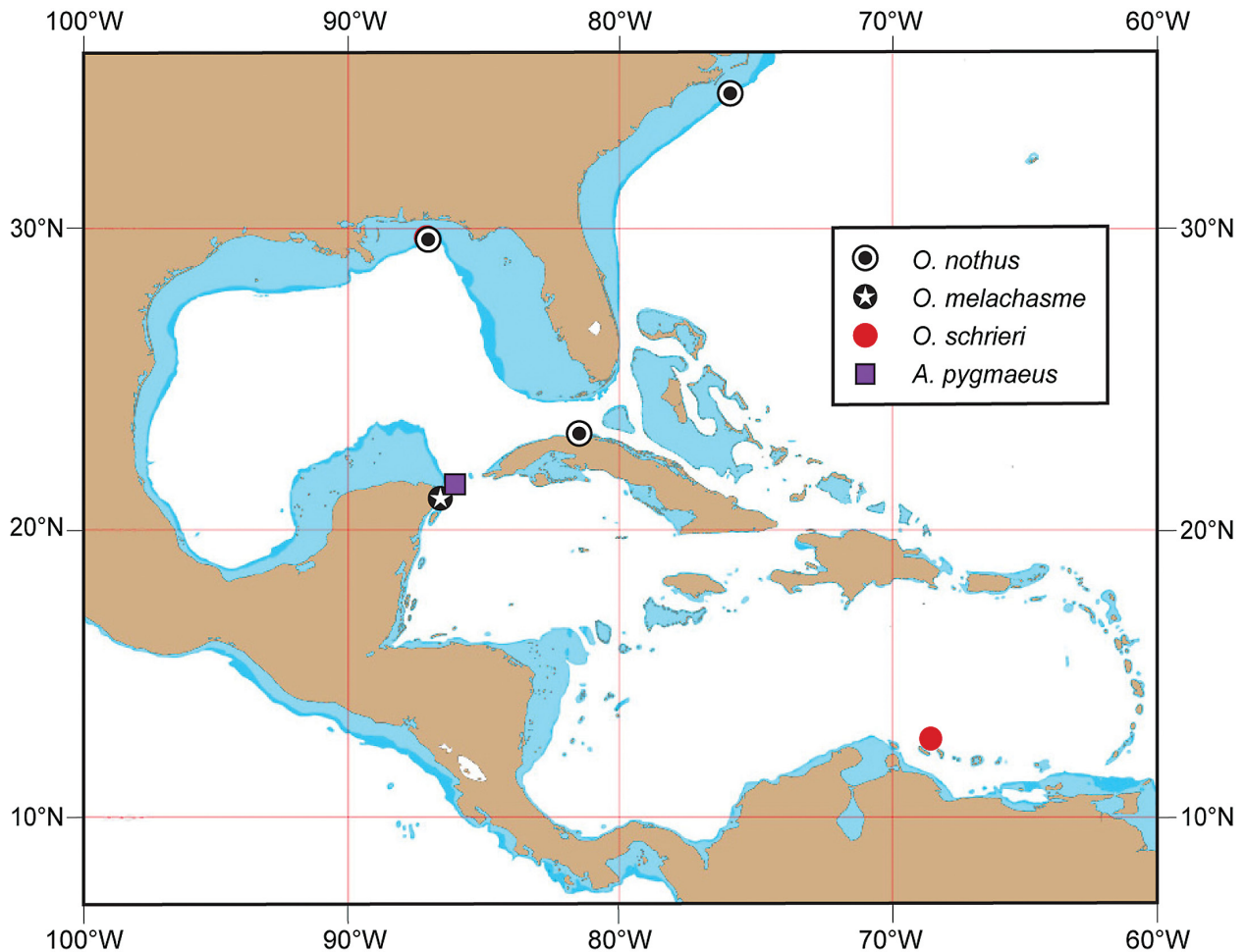
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## Introduction

Many years ago David G. Smith kindly brought to my attention two specimens (20.5–22.5 mm SL) of an enigmatic new species of jawfish that had been trawled in 240–267 m off Yucatán, Mexico. Sexual maturity of these specimens could not be determined by gross examination of their gonads and histological preparations were not attempted. Despite their small sizes, these miniature jawfish appear to be adults, an opinion reinforced because they exhibit obvious sexual dichromatism. They also showed other indications of miniaturization, including reduction of the laterosensory canal system and reduced numbers of fin rays, vertebrae, and body scales, both phenomena of miniaturization frequently reported in other families of fishes (Hanken & Wake 1993). Because these and other morphological features were not useful for assessment of relationships, I was uncertain about the correct generic designation and delayed the formal description until now. Assignment to the largest of the three currently recognized genera of jawfishes, *Opistognathus* Cuvier, is problematic because the genus has not been defined on the basis of synapomorphies, and included species show a wide range of meristic and morphological characters. Assignment to a monotypic genus has the advantage of calling attention to several characters of this species of jawfish that are unique within the family.

Western Atlantic jawfishes of the genus *Opistognathus* include 14 currently recognized species (Smith-Vaniz 1997). Most of these jawfishes occur in relatively shallow depths, with only three previously described species known from depths exceeding 150 m. *Opistognathus megalepis* Smith-Vaniz has been trawled in 146–265 m off Arrowsmith Bank, Yucatán, and in 198–223 m and 274–301 m in the Bahamas (Smith-Vaniz 1972). A single specimen (UF 229148) from the Lesser Antilles between Grenada Island and the Gulf of Paria, was trawled in 79 m. As discussed in the original description, in addition to its shallower depth, this specimen differs from other *O. megalepis* in several characters, including more longitudinal scale rows and fewer gill rakers, but in the absence of



**Figure 1.** Distributions of selected deep-water Caribbean jawfishes; base map by Robert F. Myers, Coral Graphics, used with permission.

more Lesser Antilles comparative material, is tentatively considered to be conspecific. *Opistognathus leprocarus* Smith-Vaniz has been collected in the Bahamas during submersible dives from depths of 249 m, 268 m, 275 m, 292 m, 308 m, and 300–379 m, and from two trawl stations in the Lesser Antilles in 165 m and 201–238 m (Smith-Vaniz 1997).

Another new species of relatively deep-water jawfish recently collected by submersible in about 152 m off Curaçao is also described herein. *Opistognathus schrieri* Smith-Vaniz is the third member of a triad of closely related allopatric Caribbean species (Fig. 1) that also includes *Opistognathus melachasme* Smith-Vaniz, known from two specimens trawled in 146–265 m and 155–205 m, off Arrowsmith Bank, Yucatán, and *Opistognathus nothus* Smith-Vaniz, known from off North Carolina and the Gulf of Mexico in 92–100 m (Smith-Vaniz 1997).

## Materials and Methods

Type specimens are deposited in the Academy of Natural Sciences of Drexel University, Philadelphia, Pennsylvania (ANSP), Florida Museum of Natural History, University of Florida, Gainesville (UF), and the National Museum of Natural History, Washington, D.C. (USNM). Methods and format of descriptions follow Smith-Vaniz (1997). The formula for the insertion pattern of supraneurals and anterior dorsal-fin pterygiophores (with anterior to left) includes the presence of supraneurals indicated by “S” or their absence by a dash, neural spines indicated by slashes, and pterygiophores by Arabic numerals. The upper and lower jaws and suspensorium of the holotype of *Opistognathus schrieri* were removed, cleared, and stained, and then drawn with the aid of a camera lucida. The position of the fifth cranial nerve was determined by dissection prior to clearing and staining. Detection of cephalic sensory pores was facilitated by temporary staining with cyanine blue solution (Saruwatari *et al.* 1997).

## *Anoptoplacus*, new genus

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Figures 2–3, 4A, 5A.

**Type species.** *Anoptoplacus pygmaeus*, n. sp.

**Diagnosis.** An opistognathid with a reduced laterosensory canal system; oblique body scale rows in longitudinal series 20–23; caudal-fin rays: procurrent 2 + 2, segmented 14 (7 + 7) with middle 10 branched; anal-fin rays II, 9; total dorsal-fin elements 20 or 21; premaxilla and dentary with single rows of slender, straight teeth (see Fig. 4A). Infraorbital bones distinctively shaped with lachrymal tubular; infraorbitals 2–4, plate-like, broadly open laterally (see Fig. 5A); and 3<sup>rd</sup> infraorbital without a suborbital shelf.

**Comparisons.** All other opistognathids typically have caudal fins with 16 (vs. 14) segmented rays, the middle 11–14 (vs. 10) branched, and procurrent rays 6–11 (vs. 4); anal-fin elements II–III, 10–20 (vs. II, 9); total dorsal-fin elements 21–31, exceptionally 21 (vs. 20–21); lateral line extending below at least penultimate dorsal-spine X (vs. dorsal-fin spines I–III); infraorbitals not plate-like (vs. infraorbitals 2–4, plate-like, broadly open laterally). Several Atlantic and Indo-West Pacific deep-water species of *Opistognathus* have infraorbital bones consisting of open troughs (as in Figs. 5B & C), which may represent a convergent character correlated with their relatively deep-water habitat and thus not useful for phylogenetic inference. The only New World jawfishes that have slender premaxillary and dentary teeth like those of *Anoptoplacus* are species of the genus *Lonchopisthus* Poey, which differ in having lanceolate caudal fins and the maxilla with a posterior hook or notch.

**Etymology.** *Anoptoplacus* is a combination of the Greek *anoptos* (unseen) and *plakos* (flat round plate) in allusion to the externally hidden and plate-like infraorbital bones. The gender is masculine.

## *Anoptoplacus pygmaeus*, n. sp.

### Pygmy Jawfish

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Figures 2–3, 4A, 5A.

*Opistognathus* species 1 Smith-Vaniz 1997: 1094 (included in identification key).

**Holotype.** ANSP 138391, presumed female, 22.5 mm SL, Mexico, Quintana Roo, Arrowsmith Bank off Yucatán, near Cozumel Island, 20°20.5' N, 87°19.4' W, trawled in 240–267 m, sta. MBI 168, 11 April 1976.

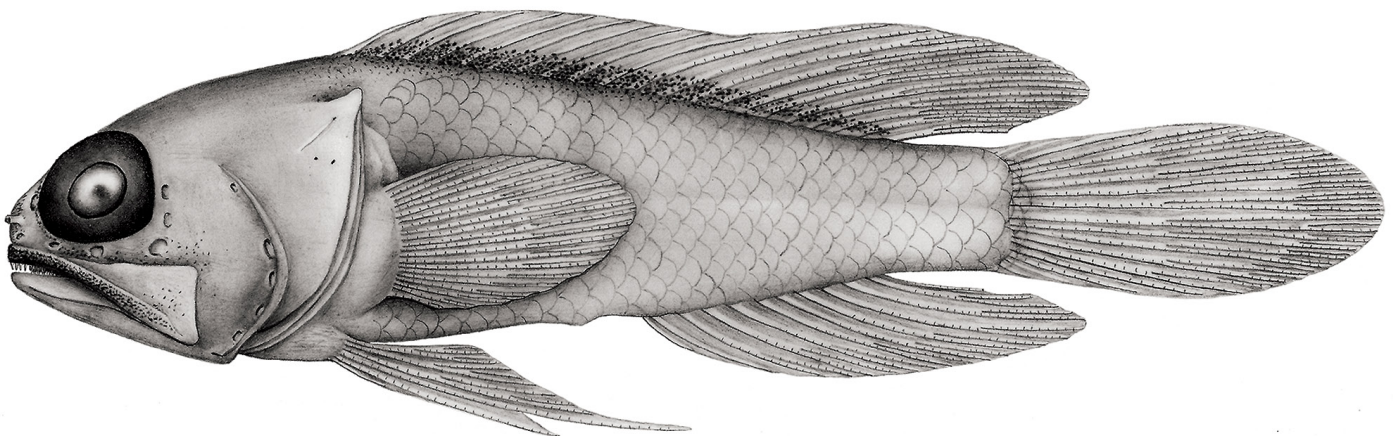
**Paratype.** ANSP 138392, presumed male, 20.5 mm SL, C&S, same data as holotype.

**Diagnosis.** As for the genus. A miniature (20.5–22.5 mm SL) species of jawfish distinguished from all others by the following reductive character states: reduced laterosensory canal system of head and body; oblique scale rows in longitudinal series 20–23; low number of caudal-fin rays (14 segmented, middle 10 branched, 4 procurrent); anal-fin rays I, 9; total dorsal-fin elements 20 or 21. A darkly pigmented upper lip in combination with a black stripe on basal third to fourth of dorsal fin also distinguishes *A. pygmaeus* from other western Atlantic jawfishes.

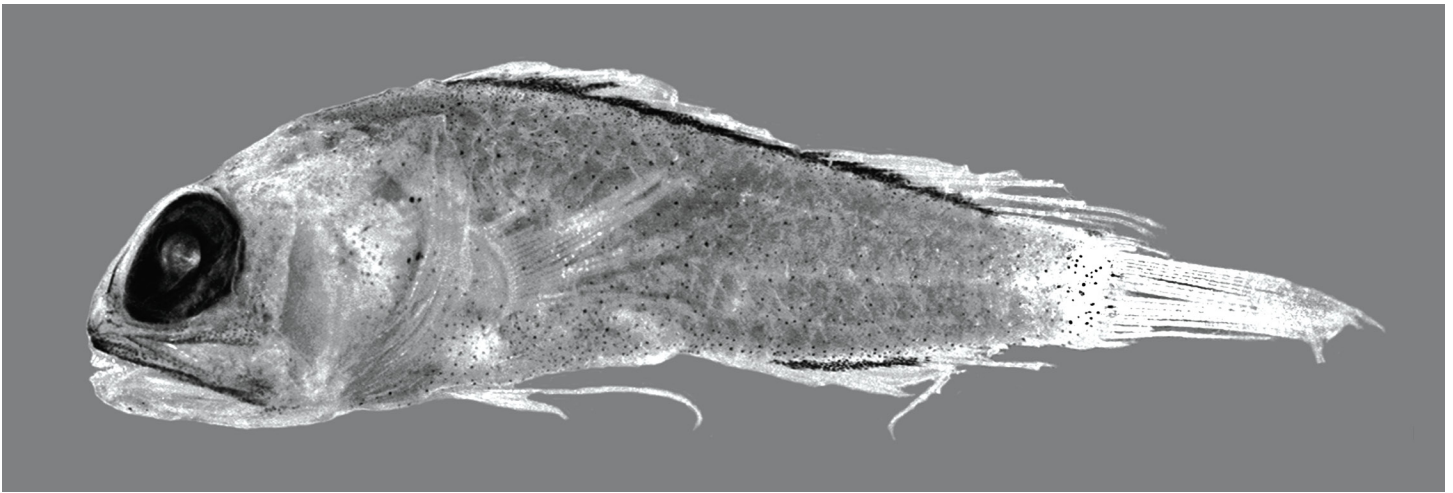
**Description.** (counts for paratype given in parentheses if different from those of holotype; when bilateral counts vary, presented as left/right) Dorsal-fin elements X (XI), 11; anal-fin elements II, 9; pectoral-fin rays 22/21 (22/22); caudal-fin procurrent rays 2+2, segmented rays 7+7 (middle 10 branched); hypural 5 present. Vertebrae 10+16 (10+15); last rib on vertebra 9; epineurals ? (10). Supraneural and anterior dorsal-fin pterygiophore insertion pattern (–/–/1/1+1/1/1). Gill rakers 11+21 (9+18) = 27 or 32.

Scales absent from head, nape, pectoral-fin base, and breast; belly completely scaly; scales on body extend anteriorly to a vertical below 3<sup>rd</sup> dorsal-fin spine. Body with 20–23 oblique scales in longitudinal series. Lateral line extending to below dorsal-fin spine I (III). Cephalic sensory pores sparse; dentary, preopercular and infraorbital pore positions all occupied by simple pores.

Anterior nostril consisting of a simple tube without a cirrus, positioned closer to posterior nostril than to dorsal margin of upper lip and not reaching margin of posterior nostril when depressed. Dorsal fin moderately high, gradually increasing in height to about middle of spinous dorsal fin; profile with noticeable increase in height at origin of segmented rays. Dorsal-fin spines slender and relatively straight with pungent tips; all segmented dorsal- and anal-fin rays branched distally. Outermost segmented pelvic-fin ray not tightly bound to adjacent ray, interradiation membrane incised distally; pelvic fin not very elongate in adults, tip of depressed fin extends to about base of first segmented anal-fin ray.



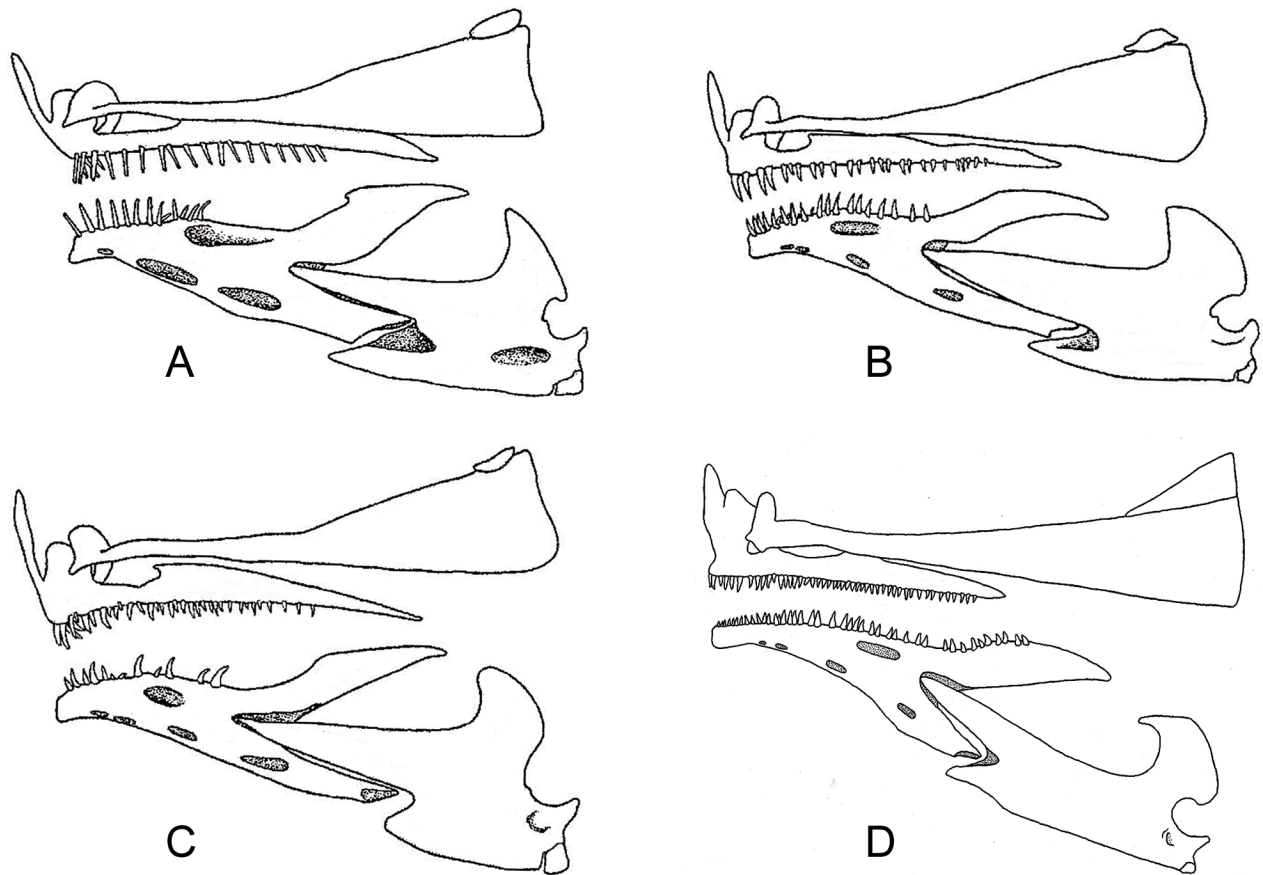
**Figure 2.** *Anoptoplacus pygmaeus*, holotype, ANSP 138391, presumed female, 22.5 mm SL, off Yucatán, Mexico (drawing by J.R. Schroeder).



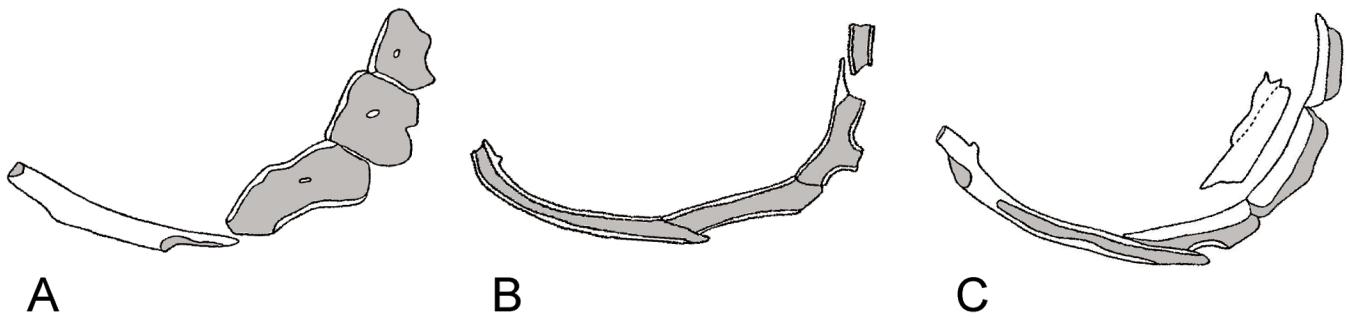
**Figure 3.** *Anoptoplacus pygmaeus*, paratype, ANSP 138392, presumed male, 20.5 mm SL, off Yucatán, Mexico.

Upper margin of subopercle straight, slightly rounded posterodorsally, not consisting of a broad truncated flap; opercle moderate size, without an elongate upper spine; posterior margin of preopercle indistinct, with only a slight posterior groove. No papillae on inner surface of lips. Fifth cranial nerve passes under A1 $\beta$  section of adductor mandibulae muscle.

Upper jaw extends about 0.3–0.4 eye diameters behind posterior margin of orbit; maxilla widest at end and truncate, without flexible lamina posteriorly; supramaxilla present, relatively small and terminally positioned. Premaxilla and dentary with single rows of slender, straight teeth with slightly pointed tips (Fig. 4A). Vomerine



**Figure 4.** Jaws and dentition in selected species of Caribbean opistognathids. A: *Anoptoplacus pygmaeus*, paratype, ANSP 138392, 20.5 mm SL; B: *Opistognathus megalepis*, paratype UF 220955, 26.4 mm SL; C: *O. leprocarus*, paratype, ANSP 159269, 53 mm SL; D: *O. schrieri*, holotype, UF 185355, 48.0 mm SL (right side reversed).



**Figure 5.** Infraorbital bones in selected species of Caribbean opistognathids. A: *Anoptoplacus pygmaeus*, paratype, ANSP 138392, 20.5 mm SL; B: *Opistognathus megalepis*, paratype UF 220955, 26.4 mm SL; C: *O. leprocarus*, paratype, ANSP 159269, 53 mm SL.

teeth absent. Coronoid (ascending) process of articular tapered to a blunt point with posterior margin nearly straight (Fig. 4A). Infraorbital bones distinctively shaped, lachrymal tubular and infraorbitals 2–4 plate-like, broadly open laterally, and 3<sup>rd</sup> infraorbital without a suborbital shelf (Fig. 5A). Postcleithra consisting of two well separated bones; dorsal postcleithrum an oval disk and ventral postcleithrum slender and rod-shaped with pointed ends.

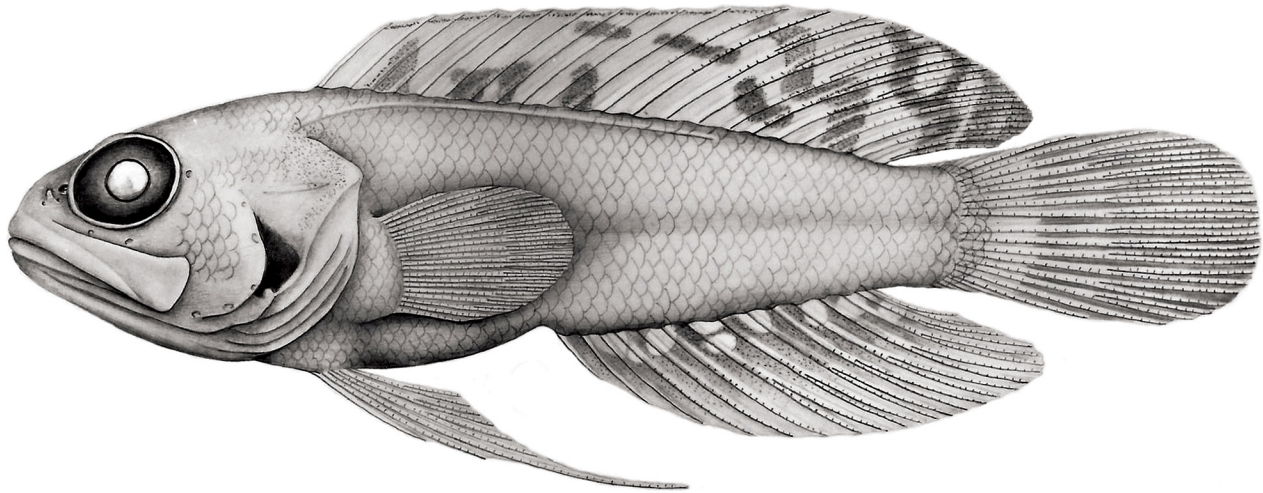
Measurements of the 22.5 mm SL female holotype followed, in parentheses, by the 20.5 mm male paratype (as percent of SL): predorsal length 39.6 (43.4); preanal length 60.9 (57.6); dorsal-fin base 53.3 (57.1); anal-fin base 24.0 (26.3); pelvic-fin length 30.2 (33.2); caudal-fin length 32.0 (34.1); depth at anal-fin origin 20.9 (21.5); caudal-peduncle depth 11.3 (11.7); head length 38.2 (41.2); postorbital-head length 20.7 (22.7); upper-jaw length 20.7 (21.7); postorbital-jaw length 5.3 (5.6); orbit diameter 14.4 (16.6); (following as percent of head length) upper jaw length 54.1 (52.7); postorbital jaw length 13.9 (13.6); orbit diameter 37.8 (40.2).

**Color pattern in preservative.** (color in life unknown) Both specimens have a darkly pigmented upper lip and a black stripe on basal third to fourth of dorsal fin, body and fins mostly unmarked except for the male, which also has a narrow black stripe along base of anal fin and head and body with scattered tiny melanophores.

**Comparisons.** *Anoptoplacus pygmaeus* differs from all known opistognathid species by the combination of characters given in the diagnosis; in other jawfishes the lateral line typically extends posteriorly at least to below the penultimate dorsal-fin spine and there are typically 16 segmented and 12 branched caudal-fin rays. The only western Atlantic species that even superficially resembles the new genus is *O. megalepis* (Fig. 6),



**Figure 6.** *Opistognathus megalepis*, paratype, UF 229148, male, 36.5 mm SL, Lesser Antilles (drawing by J.R. Schroeder).



**Figure 7.** *Opistognathus leprocarus*, paratype, ANSP 138163, male, 76.6 mm SL, Lesser Antilles, off St. Lucia (drawing by J.R. Schroeder).

which further differs in having anal-fin rays III, 11 (vs. II, 9); total gill rakers 33–36 (vs. 28–32); vomerine teeth 2–4 (vs. absent); a longer upper jaw, 23.1–27.9% SL (vs. 20.7–21.7% SL); the posteroventral margin of maxilla rounded (vs. forming an acute angle in *A. pygmaeus*); more oblique scale rows in the longitudinal series, 26–42 (vs. 20–23); the dorsal and ventral postcleithra articulated (vs. widely separated); and no dark pigment on the upper lip (vs. present). *Opistognathus leprocarus* (Fig. 7) also shares with *O. megalepis* more total gill rakers (46–53), oblique scale rows (38–44), and anal-fin rays (III, 11 or 12), as well as a longer lateral line (terminus below dorsal-fin rays 2–5). It further differs from *A. pygmaeus* most noticeably in having the nape completely and cheeks partially covered with scales, the vomer with 1–3 large teeth, the dentary with moderately strong canines, the opercle with a dark blotch that abuts the posterodorsal margin of preopercle, and long pelvic fins that, when depressed, extend distinctly behind the anal-fin origin. All three of these species have simple nasal tubes without a cirrus and relatively simple cephalic pore patterns.

**Etymology.** The Latin name *pygmaeus* (dwarf or pygmy-like) refers to the diminutive size of this species. The common name of Pygmy Jawfish is suggested for this species.

**Distribution and habitat.** Known only from the type locality, Arrowsmith Bank off Yucatán, Mexico, near Cozumel Island, where the types were trawled in 240–267 m.

**Remarks.** The presumed sexual dichromatism exhibited by the two available specimens strongly suggests that they are both adults. Unfortunately, positive sex determination by visual or histological examination was considered to be impractical. The pronounced reduction in meristic features of this species is a common trend associated with miniaturization that has occurred repeatedly in many other families of marine and freshwater fishes. The skeleton of the cleared-and-stained paratype is almost completely ossified, unlike that typical of most progenetic fishes. The smallest known jawfish, a relatively shallow-water, undescribed Indo-West Pacific species (*Opistognathus* 4; p. 356 of Allen & Erdmann [2012]) with gravid females as small as 18.9 mm SL, exhibits few of the reductive character states exhibited by *A. pygmaeus* and does not have either uniquely shaped infraorbital bones or slender and straight teeth; this is another reason for my decision to assign the Caribbean jawfish to a monotypic new genus.

## *Opistognathus schrieri*, n. sp.

### Curaçao Jawfish

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Figures 8–10, 13A, 14A & 15A.

**Holotype.** UF 185355, male, 48.0 mm SL, Curaçao, Willemstad, near Curaçao Sea Aquarium, off aquarium submersible downline, ca. 12°5.078' N, 68°53.788' W, collected with quinaldine spray nozzle and suction device from mini-submarine, precise depth not recorded, but approximately 152 m (500 ft.), J. Schrier, 30 May 2012.

**Paratype.** USNM 413977, male, 42.8 mm SL, Curaçao, off substation Curaçao downline, precise locality and depth unrecorded, 21 February 2013.

**Diagnosis.** A species of *Opistognathus* with anterior nostril a simple tube without cirrus; maxilla truncate posteriorly with a slightly flexible lamina; supramaxilla large, triangular-shaped and terminally positioned; dorsal-fin elements X, 13–14; anal-fin elements II, 13; vertebrae 10+18; oblique scale rows in longitudinal series 47–50; coronoid (ascending) process of articular hatchet-shaped with dorsal margin straight; dorsal fin with a large ocellus centered between spines 1–6, followed by four dark blotches with the posterior two larger and extending diagonally further onto the fin, and all of them separated by irregular narrow white stripes.

**Description.** (counts for paratype given in parentheses if different from those of holotype; when bilateral counts vary, presented as left/right) Dorsal-fin elements X, 13 (X, 14); anal-fin elements II, 3; pectoral-fin rays 20, both sides (17/18); caudal-fin procurrent rays 3+4, segmented rays 8+8, middle 12 branched; hypural 5 present. Vertebrae 10+18. Insertion pattern of supraneural and anterior dorsal-fin pterygiophores (–/–/1/1+1/1/1). Gill rakers 8+22 (9/8+23/25 = 32/33).

Scales absent from head, nape, above lateral line, pectoral-fin base and breast; belly completely scaly; scales on body extend anteriorly to a vertical below 2<sup>nd</sup> dorsal-fin spine. Body with 47–50 oblique scales in longitudinal series. Lateral-line terminus below vertical from 3<sup>rd</sup> segmented dorsal-fin ray. Anterior lateral-line pores relatively sparse, arranged in unbranched series and positioned very close to lateral-line tubes, all of which are embedded in skin. Dentary, preopercular and infraorbital pore positions all occupied by simple pores.

Anterior nostril consisting of a simple tube without a cirrus, positioned closer to posterior nostril than to dorsal margin of upper lip and just reaching margin of posterior nostril when depressed. Dorsal fin moderately high anteriorly with a slight notch in fin height at junction of spinous and segmented rays; dorsal-fin spines slender and relatively straight with pointed tips; skin covering spine tips pale, but not consisting of swollen fleshy tabs as in some species, e.g. *Opistognathus maxillosus* Poey; segmented dorsal- and anal-fin rays all branched distally.



**Figure 8.** *Opistognathus schrieri*, holotype, UF 185355, male, 48.0 mm SL, fresh (immediate postmortem), off Curaçao (Z.S. Randall).





**Figure 9.** *Opistognathus schrieri*, paratype, USNM 413977, 42.8 mm SL, off Curaçao (D.R. Robertson & C.C. Baldwin).

Outermost segmented pelvic-fin ray not tightly bound to adjacent ray, interradiial membrane incised distally; pelvic fin not elongate in adults, tip of depressed fin in front of anal-fin origin. Upper margin of subopercle straight, slightly rounded posterodorsally, not consisting of a broad truncated flap; opercle moderate size, without an elongate upper spine; posterior margin of preopercle indistinct, with only a slight posterior groove. No papillae on inner surface of lips. Fifth cranial nerve passes under A1 $\beta$  section of adductor mandibulae muscle.

Upper jaw moderately long, extending 0.9 eye diameters behind orbit in paratype and holotype; posterior margin of maxilla slightly flexible and truncate; supramaxilla terminally positioned and triangular-shaped (Figs. 4D & 13A). Premaxilla and dentary with narrow, inner patch of small teeth anteriorly and single row of larger conical teeth laterally (Fig. 4D). Vomerine teeth absent. Infraorbital bones mostly tubular and third infraorbital with a moderate suborbital shelf. Coronoid (ascending) process of articular hatchet-shaped with dorsal margin straight (Fig. 15A). Postcleithra closely approximated to each other and shaped like that of *O. nothus* (see Smith-Vaniz 1997, Fig. 7b3).

Measurements of the 48.0 mm SL male holotype followed, in parentheses, by the 42.8 mm paratype (as percent of SL): predorsal length 36.2 (36.7); preanal length 56.3 (57.7); dorsal-fin base 65.0 (64.8); anal-fin base 32.5 (35.7); pelvic-fin length 24.7 (28.7); caudal-fin length 23.3 (22.5); depth at anal-fin origin 17.0 (16.4); caudal-peduncle depth 9.6 (9.6); head length 35.8 (36.7); postorbital head length 11.0 (11.7); upper-jaw length 26.7 (25.6); postorbital jaw length 11.0 (11.7); orbit diameter 12.1 (13.0); (following as percent of head length)

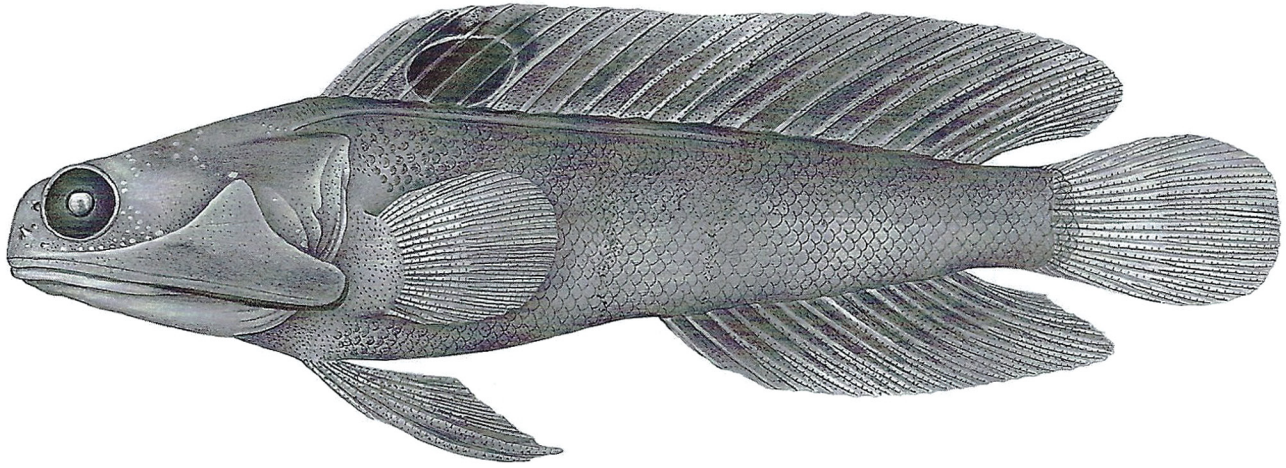


**Figure 10.** *Opistognathus schrieri*, holotype, UF 185355, inner jaw pigmentation (Z.S. Randall).

postorbital head length 56.8 (60.2); upper-jaw length 74.4 (69.7); postorbital jaw length 30.7 (31.8); orbit diameter 33.7 (35.3).

**Color when fresh.** Holotype and paratype as in Figs. 8–10. Intensity of blotches on dorsal fin varies from brown to black; when observed in an aquarium, the blotches on the live holotype were solid black. The holotype had a prominent white spot on the base of the pectoral fin which is hidden from view in the photograph of the paratype.

**Color pattern in preservative.** Dorsal fin with a large ocellus centered between spines 1–6, followed by four dark blotches with the posterior two larger, tapered diagonally and extending farther onto the fin anteriorly, and all of them separated by irregular narrow white stripes; other fins without obvious markings; sides of body with four, irregular, lighter blotches that each extend onto dorsum below dorsal-fin blotches, plus another one on caudal peduncle; head tan with several brown spots smaller than pupil diameter. Lips without bands and inside of mouth pale, except inner lining of upper jaw and adjacent membranes black (as in Fig. 10).



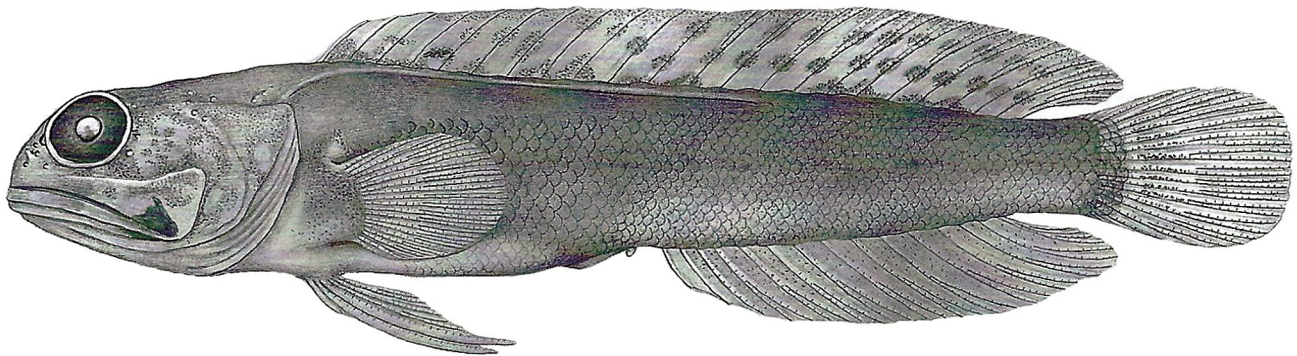
**Figure 11.** *Opistognathus melachasme*, holotype, ANSP 114763, male, 77 mm SL, Yucatán, Arrowsmith Banks (drawing by J.R. Schroeder, after Smith-Vaniz [1997]).

**Etymology.** Named in honor of Adriaan (Dutch) Schrier, owner of Substation Curaçao in Willemstad and the “Curasub” submersible.

**Distribution and habitat.** Known only from the type locality off Curaçao, where collected in about 152 m. A colony of three individuals of *O. schrieri* was also observed by Jonathan Schrier at the same vicinity at the end of a sand bed where it went to pea-size rubble and in approximately the same depth.

**Comparisons.** *Opistognathus schrieri* in a member of a triad of closely related, apparently allopatric species that also includes *O. melachasme* (Fig. 11) and *O. nothus* (Fig. 12). These are the only Atlantic species of *Opistognathus* that have the combination of dorsal- and anal-fin elements X,13–14 and II,12–13, respectively; no vomerine teeth; vertebrae 10+18 (*Opistognathus gilberti* Böhlke is the only other Atlantic species typically with the same vertebral count); and the anterior nostril a simple tube without a cirrus. The triad also agree in having overlapping total numbers of gill rakers (26–33) and oblique scale rows in the longitudinal series (44–51), as well as having the membrane connecting the maxilla and premaxilla black posteriorly with the inner membrane covering the posterior part of the dentary also black, behind which is an area of yellow.

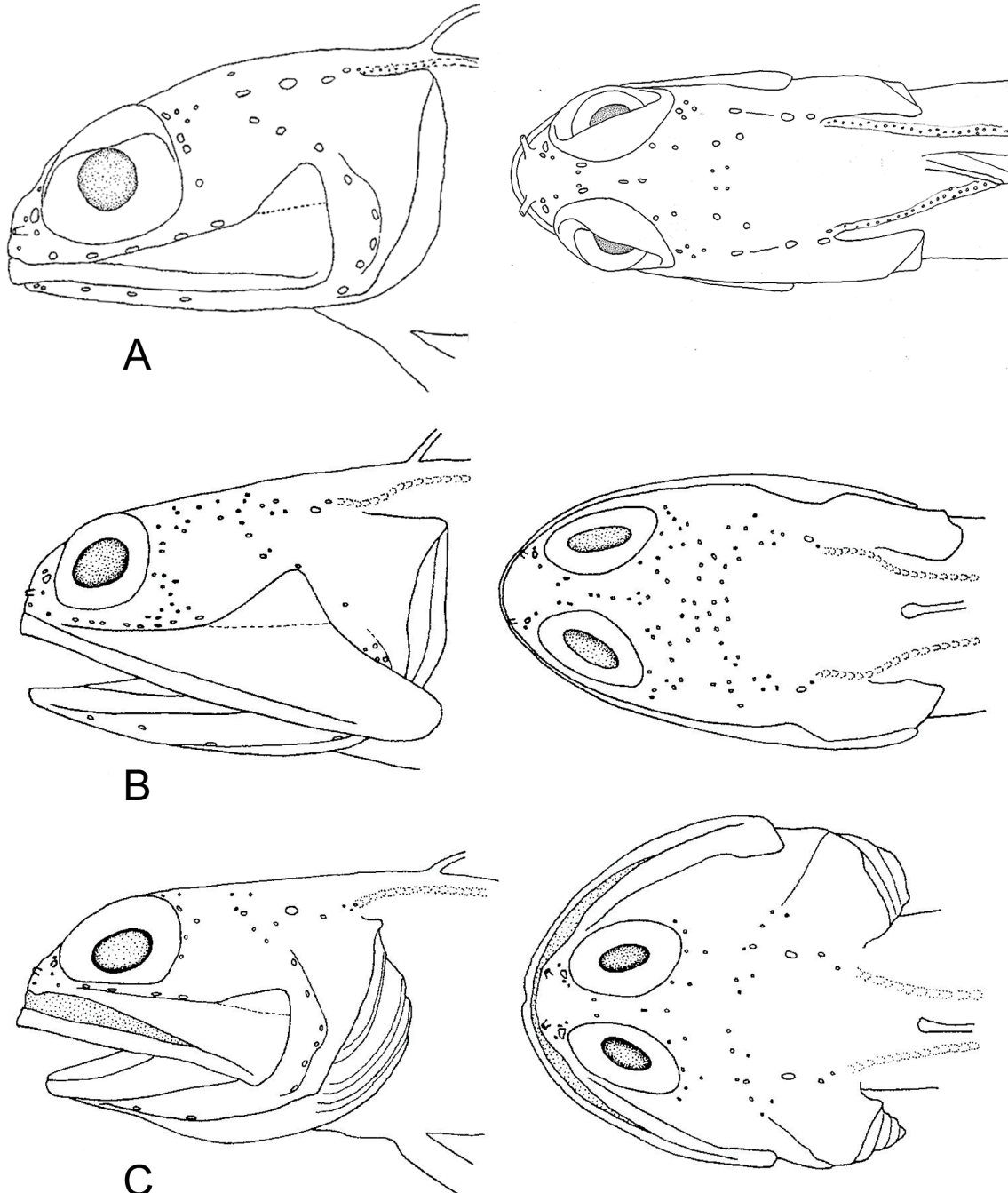
*Opistognathus schrieri* differs from the other two species in having, in addition to the black ocellated spot in the spinous part of the dorsal fin, four large, dark blotches separated from each other by irregular white stripes. The female *O. nothus* holotype differs from males of the other two species in having the soft dorsal-fin rays with dark spots, slightly smaller than the pupil diameter, arranged in two parallel rows along the fin (Fig. 12). Although not apparent after storage in ethanol, color notes of the specimen made by William D. Anderson, Jr., 12 days after initial collection, record a larger, almost black, rectangular area of pigment on the membrane between the fourth



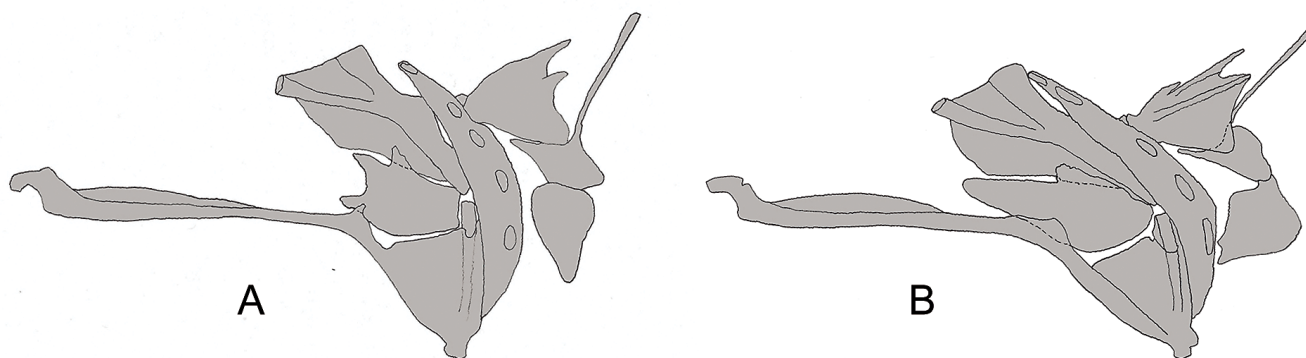
**Figure 12.** *Opistognathus nothus*, holotype, ANSP 127058, female, 79.3 mm SL, North Carolina, off Cape Lookout (drawing by J.R. Schroeder, after Smith-Vaniz [1997]).

and fifth dorsal-fin spines and on fifth spine. Based on color notes of Carter R. Gilbert, the sides of body of the holotype of *O. melachasme* were lavender with three red spots, one above pectoral-fin base, the second beginning just past the end of the pectoral fin, and the third above and behind the origin of the anal fin, and the pelvic fins blackish with a slight reddish tinge.

The arrangement of cephalic sensory pores in adults appears to be another useful character to distinguish the three species (Fig. 13), being most dissimilar in *O. melachasme*. The suspensorium of *O. melachasme* (Fig. 14B) also differs from *O. schrieri* (Fig. 14A) and *O. nothus* primarily in having an elongate metapterygoid and the hyomandibula canted forward such that the angle between it and the palatine is more acute. The coronoid (ascending) process of the articular of *O. schrieri* and *O. nothus* is hatchet-shaped with the dorsal margin straight (Fig. 15A & B), while in *O. melachasme* it is club-shaped with the dorsal margin smoothly convex (Fig. 15C). Upper-jaw lengths of the 31.0 mm SL unsexed paratype and the 77 mm SL male holotype of *O. melachasme* are

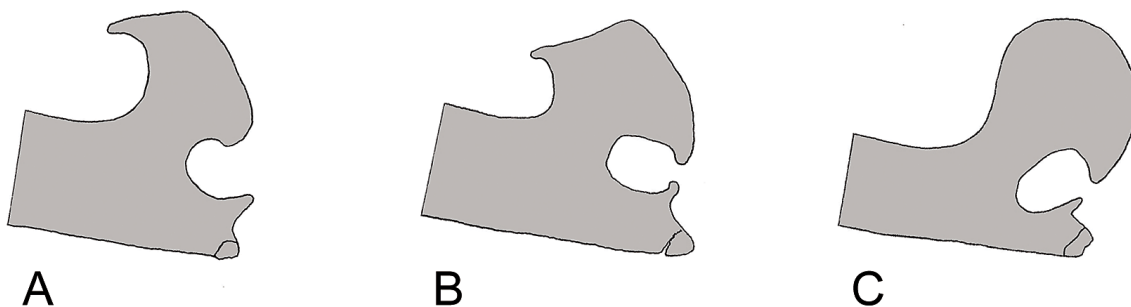


**Figure 13.** Cephalic sensory pores in holotypes of three closely related species of *Opistognathus*. A: *O. schrieri*, UF 185355, 48.0 mm SL; B: *O. melachasme*, ANSP 114763, male, 77 mm SL; C: *O. nothus*, ANSP 127058, female, 79.3 mm SL (figures B & C from Smith-Vaniz [1997]).



**Figure 14.** Supensorium (right side reversed) in holotypes. A: *O. schrieri*, UF 185355, 48.0 mm SL; B: *O. melachasme*, ANSP 114763, male, 77 mm SL.

25.1% and 34.7% SL (vs. 25.6% and 26.7% SL in the 42.8 mm SL male paratype and 48.0 mm SL male holotype of *O. schrieri*); the jaw length is shorter, only 22.2% SL, in the 79.3 mm SL female holotype of *O. nothus*, but, in the absence of confirmed males, this difference in jaw length could be due to sexual dimorphism, as occurs in several other species of *Opistognathus* (see Smith-Vaniz 1997; Figs. 15 & 16).



**Figure 15.** Coronoid process of articular (right side reversed) in of three closely related species of *Opistognathus*. A: *O. schrieri*, UF 185355, male, 48.0 mm SL; B: *O. nothus*, ANSP 127058, female, 79.3 mm SL; C: *O. melachasme*, ANSP 114763, male, 77 mm SL.

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