

A New Mesophotic Clingfish (Teleostei: Gobiesocidae) from the Bahamas

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A new species of clingfish belonging to the genus *Derilissus* is described from a deep coral wall in the Exumas, Bahamas. The new species is distinguished from congeners by a unique pigmentation pattern and coloration, the presence of 47 total pectoral-fin rays, a strongly convex posterior margin on disk region B, and by a unique arrangement of papillae on disk region C. The new species is characterized by bright orangish-red coloration on the flank, a yellow head, and a prominent black oval marking on the caudal peduncle. Like other members of the genus, the new species appears to be restricted to the mesophotic zone, and was collected at 286 fsw.

WHILE conducting a series of deep research dives in the Exumas, Bahamas, a diminutive and brightly colored clingfish (Gobiesocidae) was collected using rotenone on a wall dive at roughly 300 fsw. Based on small adult size, fusion of the gill membranes to the isthmus, and morphology of the sucking disk, it was immediately clear that the specimen represented a new species of the diminutive deepwater genus *Derilissus* Briggs, 1969.

Derilissus currently comprises four species, *D. nanus* Briggs, 1969, *D. vittager* Fraser, 1970, *D. kremnobates* Fraser, 1970, and *D. altifrons* Smith-Vaniz, 1971, and was described by Briggs (1969) to encompass a diminutive new species of clingfish collected in relatively deep waters of the Bahamas that differed from all other New World gobiesocids in having the gill membranes fused to the isthmus. Soon thereafter, three additional species of *Derilissus* were described (Fraser, 1970; Smith-Vaniz, 1971), all from deeper waters of the Western Atlantic.

Herein, we formally describe a new species of *Derilissus* from a deep coral wall in the Exumas, Bahamas, western Atlantic Ocean. Further, we discuss the apomorphic morphological features that distinguish the new species from congeners and other Bahamian gobiesocids.

MATERIALS AND METHODS

The holotype was collected using closed-circuit Trimix rebreather SCUBA systems at a small rotenone station in 280–300 fsw on Bock Wall (23°49′55.2″N, –76°9′10.44″W), near Lee Stocking Island, Exumas, Bahamas. The site is characterized by a fringing barrier reef beginning at 70 fsw, and dropping vertically to over 2000 fsw. The vertical ‘wall’ is comprised of a series of ledges and undercuts in roughly 30- to 50-foot intervals. A distinct overhanging ledge that created a notch from 280 to 300 fsw was identified as a target collection area. Rotenone was dispersed over this area, and after 15 to 20 minutes affected specimens were located with a compact light-emitting diode dive light, collected using a small hand net, and individually bagged for transport back to the surface. The specimens were immediately placed on ice to preserve coloration and photographed. The holotype of the new species, the only individual that could be collected, was one of a group of four or five of the same species living in very near proximity to a small coral head.

Osteological features of the new species and comparative gobiesocid taxa were analyzed using radiographs, high-resolution digital images, and via the examination of whole specimens under a dissecting scope. Point-to-point morphometric measurements were recorded to the nearest 0.1 mm using dial calipers. Measurements follow Briggs (1955), unless noted otherwise. Standard length (SL) is used throughout. Vertebral count excludes the ural centrum (=last half-centrum). Following Smith-Vaniz (1971), principal caudal rays are defined here as those attached to or articulating with the hypurals, and are presented in the formula ventral + dorsal. Disk width is measured at the widest point of the pelvic disk. Institutional abbreviations are as listed in Leviton et al. (1985) and Sabaj Pérez (2010).

Derilissus lombardii, new species

Figures 1, 2; Table 1

Holotype.—AMNH 251906, 10.9 mm SL, Exumas, Bahamas, Bock Wall, 23°49′55.2″N, –76°9′10.44″W, 286 fsw near a small coral head using Tri-mix mixed-gas closed-circuit rebreather SCUBA systems, M. Lombardi, J. Godfrey, D. F. Gruber, and J. S. Sparks, 4 May 2011.

Diagnosis.—A member of *Derilissus* distinguished from congeners (and all other Bahamian gobiesocids) by the presence of bright orangish-red coloration, a yellow head, and a prominent black oval patch on the caudal peduncle. The new species is further distinguished from congeners by the pattern of papillae in disk region C (Fig. 2). Anteriorly, two distinct medial clusters, each comprising 8–9 closely arrayed papillae plus a single papilla anterior of each cluster, are present (vs. 2–5 papillae in each central cluster and 4–5 papillae arranged in a distinct crescent posterolaterally in congeners). Posteriorly, papillae in disk region C are arranged in a crescent with a single additional papilla dorsal to its midpoint (vs. papillae arranged in an inverted V-shaped pattern in *D. nanus*, *D. altifrons*, and *D. kremnobates*, or clumped in *D. vittager*). Uniquely among members of *Derilissus*, the posterior margin of disk region B in the new species is strongly convex (vs. straight to weakly convex in congeners) with the rows of papillae arranged serially in a semi-circular pattern forming concentric crescents (vs. rows more or less straight). Lastly, the new species is unique

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Submitted: 8 September 2011. Accepted: 12 January 2012. Associate Editor: D. Buth.

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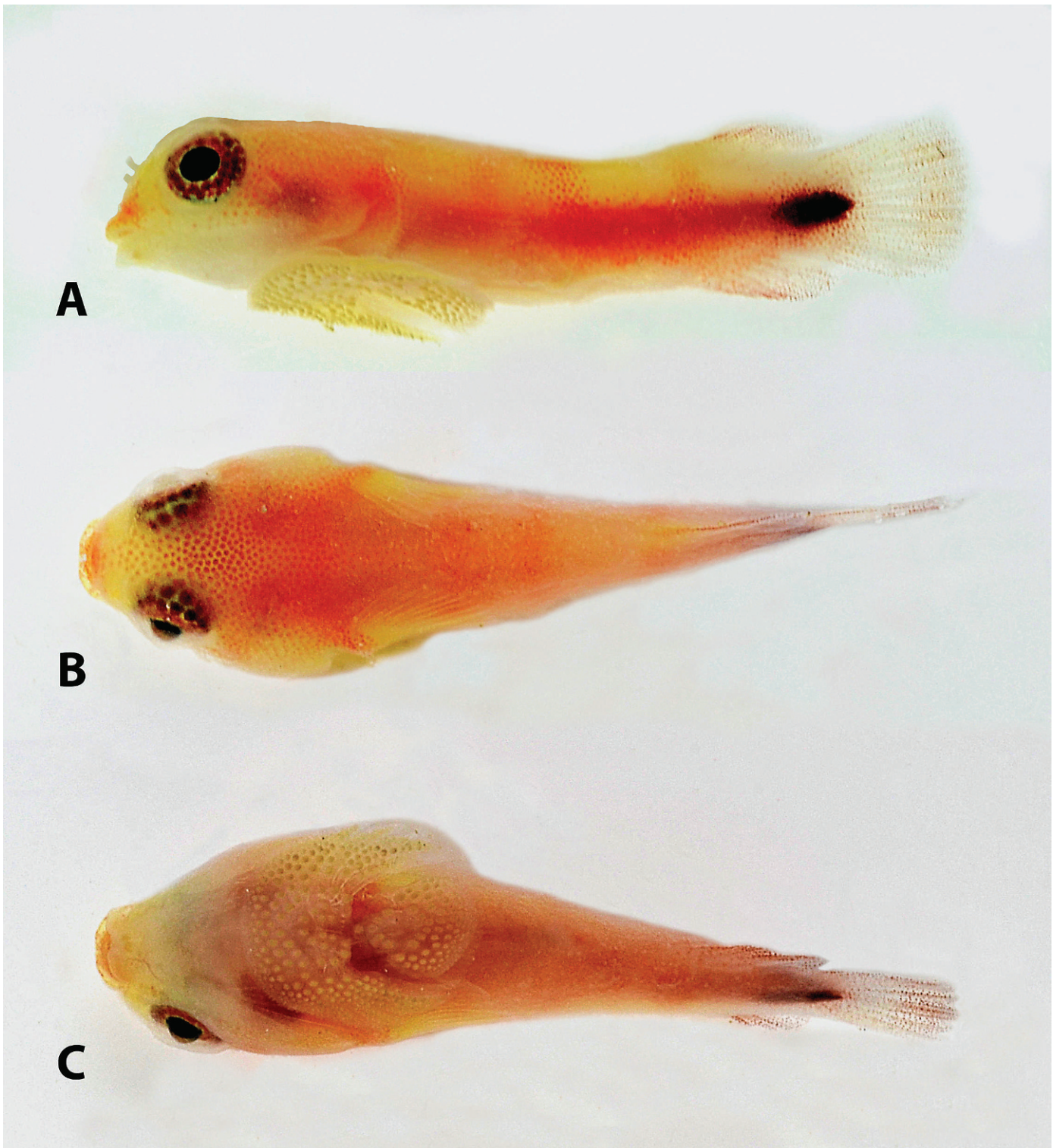


Fig. 1. *Derilissus lombardii*, new species, holotype, AMNH 251906, 10.9 mm SL, Exumas, Bahamas. Images taken immediately following capture illustrate live coloration. (A) Lateral view. (B) Dorsal view. (C) Ventral view.

among congeners in possessing a total of 47 pectoral-fin rays.

Description.—Selected proportional measurements and meristic data presented in Table 1. Comparatively, a very small gobiesocid. Body moderately wide and rounded anteriorly, becoming progressively laterally compressed posteriorly. Caudal peduncle strongly laterally compressed. Head deep and profile of snout strongly convex, not dorsoventrally

compressed, forming angle of about 75° in lateral view. Mouth small and rostroventrally oriented. Margin of lower jaw wider laterally, with moderate medial constriction at symphysis in ventral view. Eye large, with distinctive spotted ring. Anterior nostril tubular and elongate, without dermal flap. Posterior nostril tubular and short. Pore system on head well developed and as described by Fraser (1970:fig. 2) and Smith-Vaniz (1971) for other members of genus. Pore system lacking on flank. Body asquamate.

Table 1. Morphometric and Meristic Data for Holotype of *Derilissus lombardii*.

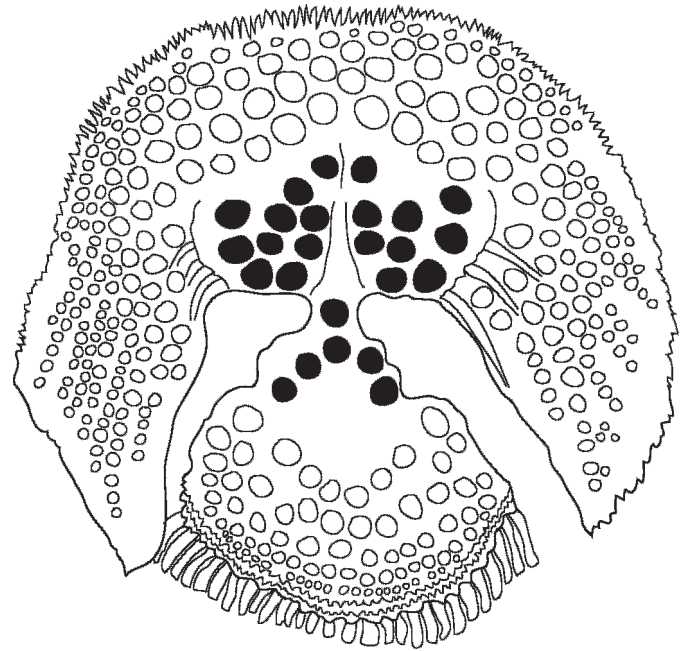
Character	
Standard length (mm)	10.9
Percentage of SL	
Head length	38.5
Head width	30.3
Body depth	24.8
Snout length	12.8
Eye length	11.9
Interorbital width (IOW)	10.1
Pelvic disk length	35.8
Pelvic disk width	25.7
Caudal peduncle depth (CPD)	11.0
Caudal peduncle length (CPL)	7.3
Percentage of HL	
Snout length	33.3
Eye length	31.0
Interorbital width (IOW)	26.2
Eye length %IOW	118.2
CPD %CPL	150.0
Meristics	
Dorsal fin	8
Anal fin	7
Pectoral fin	24(L) + 23(R)
Pelvic fin	1, 4
Principal caudal rays	7 + 6
Vertebrae	25

Upper jaw with two distinct rows of crowded, relatively strongly tricuspid and bicuspid teeth anteriorly, grading to a single row of weakly bicuspid and unicuspid teeth laterally and posteriorly. Teeth in a single row in lower jaw, and procumbently implanted. Lower jaw dentition strongly tricuspid medially, becoming bicuspid laterally, and unicuspid posteriorly. Teeth more closely arrayed anteriorly, and becoming more sparsely arranged posteriorly in both upper and lower jaw.

Fin-ray counts as follows: dorsal 8; anal 7; pectoral 24 (left) + 23 (right) = 47 total; pelvic 1,4; and principal caudal rays 7+6 (procurent rays could not be observed in radiographs). Gill membrane attached to isthmus, and with fleshy, dorsocaudally directed prong at about midpoint of opening. Upper attachment of gill membrane is opposite approximately 9th pectoral-fin ray, and lower attachment is opposite approximately 21st or 22nd pectoral ray. Membrane from last pelvic ray loosely attached to approximately 20th or 21st pectoral ray. Vertebral count 25.

Four gill arches present on each side, with feeble fourth arch closely aligned with lower pharyngeal bone. Gill arches 1–3 bear large, complex, brush-like filaments (which strongly resemble the sea pen, *Pennatula*), whereas none are present on fourth arch. Thin, relatively short and triangular gill rakers present on all four arches. Five branchiostegal rays present on each side, and arranged in two distinct groups (1+4). Arrangement and articulation of branchiostegals as described by Smith-Vaniz (1971:292).

Disk large, well developed, and single. Papillae numerous and distributed in unique pattern. Arrangement of papillae in disk region C appears to be phylogenetically informative within *Derilissus* as observed by Smith-Vaniz (1971). As

**Fig. 2.** Schematic of sucking disk of holotype of *Derilissus lombardii*, AMNH 251906, showing distribution of papillae. Papillae in disk region C are indicated by solid black circles.

shown in Figure 3, in *D. nanus*, *D. kremnobates*, and *D. altifrons* papillae on posterior portion of disk region C arranged in inverted V-shaped pattern (Smith-Vaniz, 1971:fig. 3a–c), whereas in *D. vittager*, papillae in region more or less clumped (Smith-Vaniz, 1971:fig. 3d). In contrast, in *D. lombardii*, new species, papillae on posterior portion of disk region C form a crescent with single additional papilla dorsal to its midpoint (Figs. 1C, 2). Anteriorly in *D. lombardii*, two distinct circular medial clusters, each comprising 8–9 closely arrayed papillae plus a single papilla anterior of each cluster, present (vs. 2–5 papillae in each central cluster and 4–5 papillae arranged in a separate and distinct crescent posterolaterally in congeners; Fig. 3). Posterior margin of disk region B strongly convex with rows of papillae in region serially arranged in semi-circular pattern forming concentric crescents (Figs. 1C, 2).

Coloration and pigmentation pattern in life.—Photographed while fresh and coloration in life represented in Figure 1. Overall, body bright yellow to orangish-red. Flank bright orangish-red along midline and ventrally. Yellow to light orange above midline. Faint orange vertical bars visible on flank, particularly dorsally. Jaws, snout, and head bright yellow. Throat light grayish-white to pale yellow. Dorsal aspect of body mostly bright orange from about mid-orbit to origin of dorsal fin. Distinctive orange spotting in interorbital region and extending slightly posterior to nape. Dark orangish-red patch posterior to orbit. Black eye ring with golden and orangish speckling. Distinctive black oval marking on caudal peduncle. Pelvic disk hyaline to pale yellow, and peppered with numerous bright orange papillae. Pectoral fin bright yellow. Dorsal, anal, and caudal fin hyaline with reddish spotting, particularly distally.

Coloration and pigmentation pattern in alcohol.—Similar to that described above for coloration in life, except that

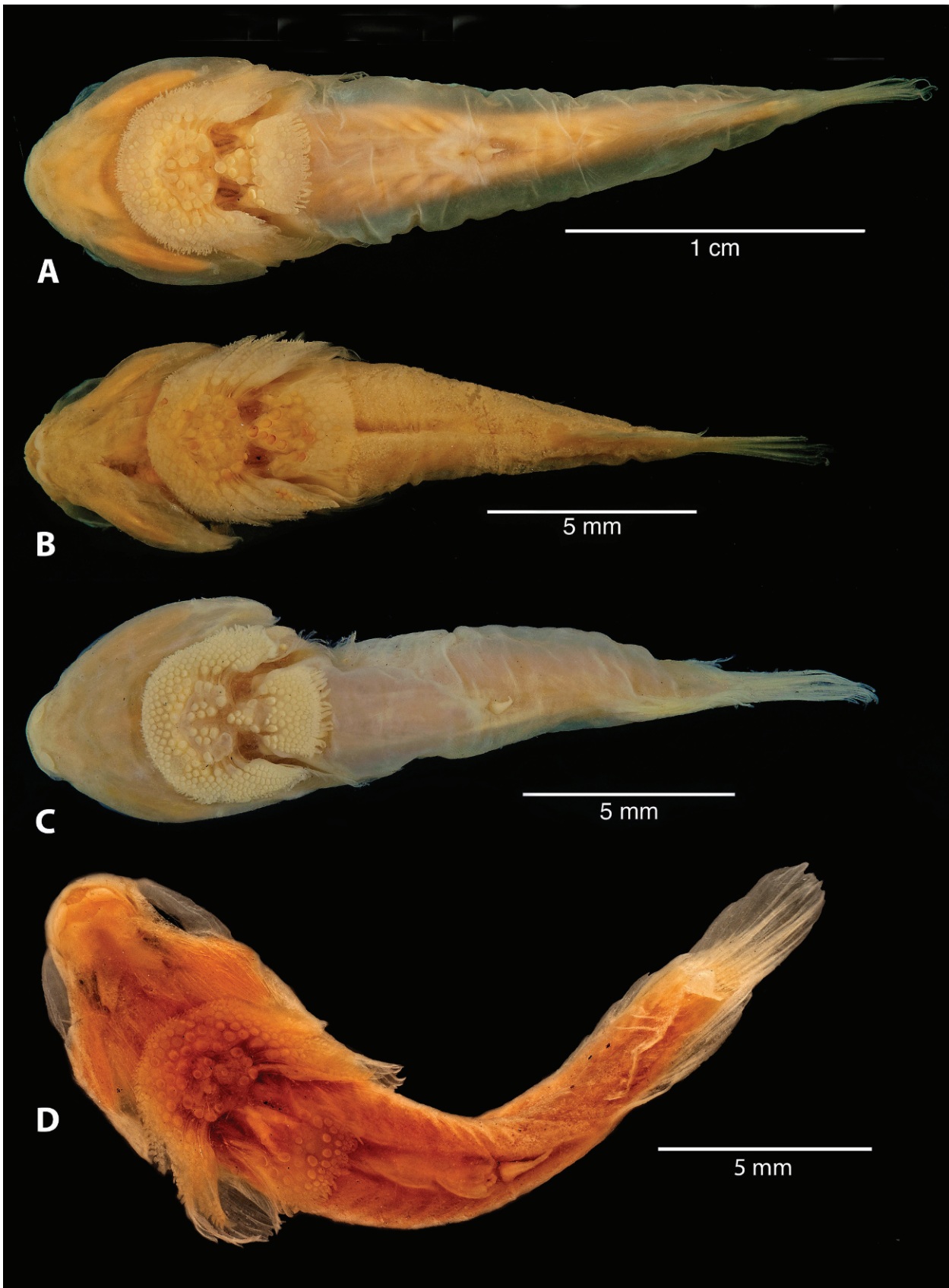


Fig. 3. Ventral view illustrating pattern of papillae on disk in: (A) *Derilissus kremnobates*, holotype, ANSP 109625; (B) *D. altifrons*, holotype, ANSP 112690; (C) *D. vittiger*, holotype, ANSP 109626; (D) *D. nanus*, holotype, UF 15932.

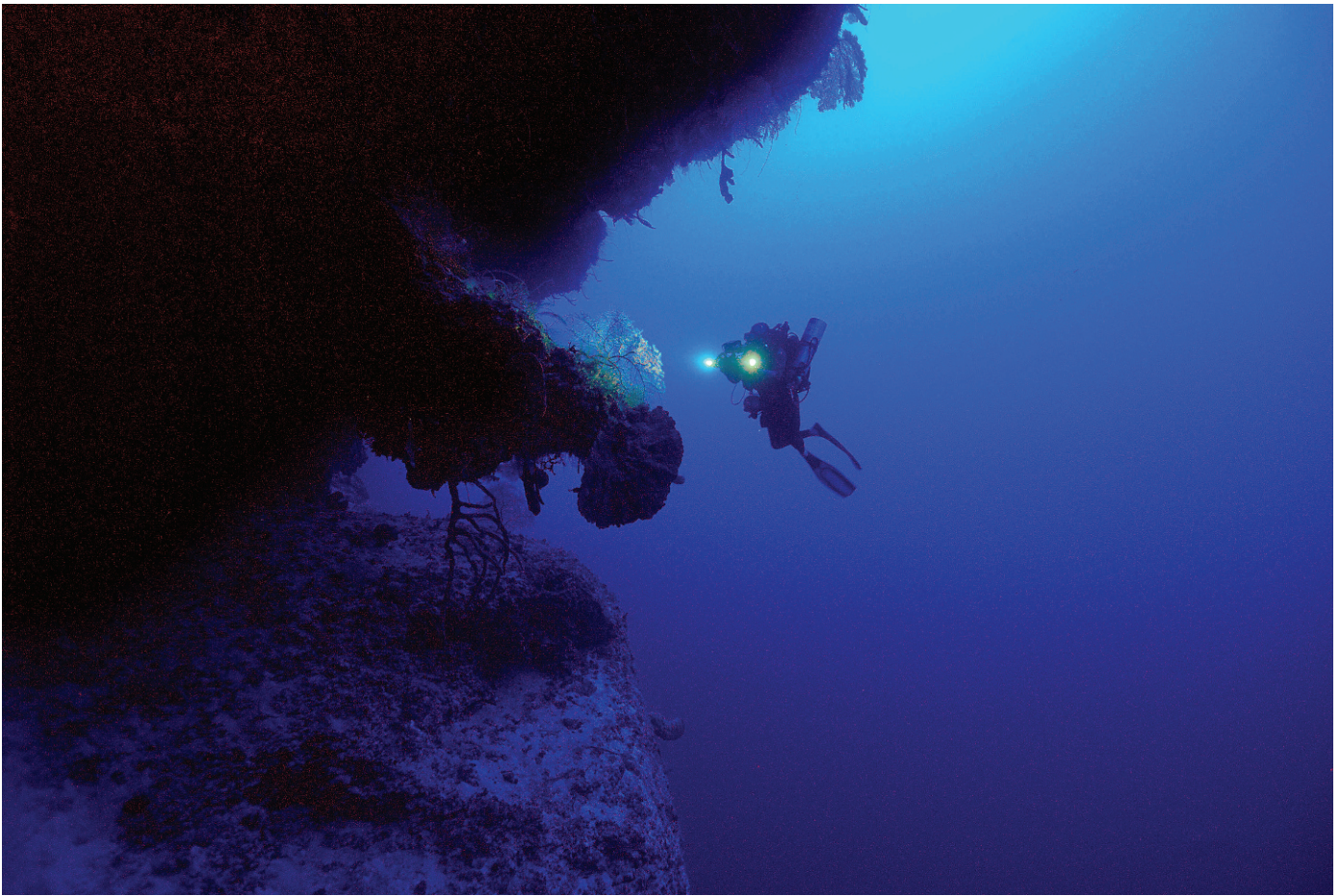


Fig. 4. Deep reef habitat on Bock Wall, Exumas, Bahamas. The holotype of the new species was collected from the outcrop near the top of the image (image taken at approximately 300 fsw). Image by Michael Lombardi.

yellow, orange, and reddish coloration fades significantly in ethanol. Prominent black oval blotch on caudal peduncle still detectable in preservation.

Habitat and distribution.—Although described from a single specimen collected on a deep, mesophotic reef near Lee Stocking Island in the Exumas, Bahamas, the holotype was one of a group of four or five individuals living proximate to a small coral head on an outcrop above an undercut and ledge in 286 fsw (Fig. 4); however, these additional specimens could not be collected. Additional images of the habitat of the new species can be observed on the Mesophotic Coral Ecosystems website (www.mesophotic.org/index.php?page=photos&photographerid=272). Given that deep mesophotic reefs have only recently become accessible via technical SCUBA, it is impossible at this time to speculate on the geographic range of the new species.

Etymology.—Named after the collector of holotype, Michael Lombardi, who was part of the deep diving team, along with Jeff Godfrey, on our Bahamas expedition. Specific epithet, *lombardii*, to be treated as a noun in apposition.

Remarks and comparisons.—Although it may seem somewhat surprising to find a new clingfish in the Bahamas, particularly near Lee Stocking Island, given the significant amount of ichthyological survey work that has taken place in the region (e.g., Böhlke, and Chaplin, 1968, 1993; Smith-Vaniz and Böhlke, 1991), small reclusive fishes on deep mesopho-

tic reefs are difficult to access and observe, and even more difficult to collect. Due to their frequent cryptic coloration, small size, and elusive behavior, gobiesocids are frequently overlooked and remain undetected even in easily accessible habitats, such as shallow intertidal regions (Craig and Randall, 2009). It is, therefore, not surprising that new species of deep water, reef-associated fishes continue to be discovered in regions that have otherwise been subjected to a significant amount of ichthyological survey work, given that mesophotic communities, light-dependent coral communities occurring in the lower reaches of the photic zone, have only recently become accessible via technical diving methods.

The new species seems to be closely associated with deep reefs, not straying far from the safety of a coral head. Other species of *Derilissus* have been captured in trawls, suggesting that they are more open water benthic taxa. All species in the genus are known only from relatively deep water (45–266 m; 148–873 fsw) compared to other gobiesocids.

In addition to apomorphic features of the pelvic disk discussed in detail above and the number of pectoral-fin rays, the new species is readily distinguished from congeners based on its vivid orangish-red coloration, yellow head, and prominent black oval marking on the caudal peduncle. Both *D. kremnobates* and *D. vittager* are characterized by chain-like patterns on the flank (vs. broad vertical bars and spotting in *D. lombardii*), and radiating streaks around the orbit in *D. kremnobates*, or dark lines on the head in *D. vittager* (vs. solid coloration or faint spotting in *D. lombardii*). *Deilissus nanus*

is reportedly black on the sides, grading to brownish above (Briggs, 1969). *Derilissus kremnobates* has two pale spots on the caudal membrane (Fraser, 1970:fig. 4), whereas *D. vittiger* possesses dark blotches anteriorly on both the dorsal and anal membranes (Fraser, 1970:fig. 5). In contrast, these regions are hyaline in *D. lombardii*. The new species is unique in possessing a large black oval marking midlaterally on the caudal peduncle.

Although coloration in life is unknown for *D. altifrons*, some faint, diffuse pigmentation can be seen in the caudal region of the holotype (ANSP 112690), particularly dorsally (also see Smith-Vaniz, 1971:fig. 1). After several months in ethanol the black caudal marking in *D. lombardii*, new species, is still visible, although much of the remaining pigmentation in this specimen has faded. Given the persistence of the caudal marking in the new species in preservation and the distribution of what little pigment remains in the holotype of *D. altifrons*, it seems likely that *D. altifrons* did not possess a large, prominent black midlateral marking spanning the length of the caudal peduncle in life (Fig. 1). Regardless, the new species is readily distinguished from *D. altifrons* by a number of features already discussed, including a lower pectoral ray count (47 vs. 52 in *D. altifrons*), two distinct rows of teeth in the upper jaw (vs. single row in *D. altifrons*), and tricuspid teeth in both upper and lower jaws (vs. bicuspid in *D. altifrons*).

MATERIAL EXAMINED

Gobiesocids used in comparative analyses arranged alphabetically, with additional relevant information presented for other members of *Derilissus*.

Acyrtops beryllinus: AMNH 34410, 6 ex., Bahamas; AMNH 87230, 1 ex., Florida; AMNH 225258, 1 ex., Bahamas.

Acyrtus artius: AMNH 18568, 3 ex., Bahamas; AMNH 30005, 1 ex., Bahamas; AMNH 31186, 2 ex., Bahamas.

Acyrtus rubiginosus: AMNH 23998, 32 ex., Bahamas; AMNH 24990, 54 ex., Bahamas; AMNH 34248, 69 ex., Bahamas; AMNH 249672, 2 ex., Bahamas; AMNH 250336, 1 ex., Bahamas.

Arcos macrophthalmus: AMNH 239026, 2 ex., Bahamas; AMNH 249673, 1 ex., Bahamas.

Derilissus altifrons: ANSP 112690, holotype, 17.1 mm SL, Dominica Channel, western Atlantic, 15°13.0'N, 60°56.9'W, depth 68–69 m.

Derilissus kremnobates: ANSP 109625, holotype, 27.6 mm SL, Arrowsmith Bank, Caribbean Sea, 21°05'N, 86°23'W, depth 80–145 fm.

Derilissus nanus: UF 15932, holotype, 13.5 mm SL, off West Plana Cay, Bahamas, depth 48–51 m.

Derilissus vittiger: ANSP 109626, 18.6 mm SL, Venezuela, 11°01.8'–11°01.0'N, 65°34.2'–65°36.3'W, depth 37 fm.

Gobiesox lucayanus: AMNH 21270, 2 ex., Bahamas.

Gobiesox punctulatus: AMNH 19962, 1 ex., Bahamas; AMNH 28970, 1 ex., Bahamas; AMNH 30939, 1 ex., Antigua; AMNH 33232, 1 ex., Bahamas.

Tomicodon cryptus: AMNH 237341, 1 ex., Venezuela; AMNH 238924, 1 ex., Curacao.

Tomicodon fasciatus: AMNH 249671, 4 ex., Bahamas; AMNH 249710, 1 ex., Bahamas.

Tomicodon reitzae: AMNH 237345, 1 ex., Venezuela; AMNH 249277, 1 ex., Venezuela.

Tomicodon rupestris: AMNH 239048, 1 ex., Curacao; AMNH 239051, 1 ex., Curacao.

ACKNOWLEDGMENTS

We offer our sincere gratitude to our deep-diving team on the expedition, M. Lombardi (Ocean Opportunity) and J. Godfrey (UCONN), who generously collected for us on their exploratory dives and, as a result, discovered the new species. We are grateful to the Lee Stocking Island Marine Institute for logistical support and for assistance with permits. Thanks to K. Conway (TAMU) for generously sharing his knowledge of gobiesocids and confirming the generic placement of the new species, and to R. Schelly and R. Arrindell (AMNH) for assistance with radiographs. For the loan of specimens in their care, digital images, and radiographs, we are grateful to K. Luckenbill, M. Sabaj, and J. Lundberg (ANSP), and Z. Randall and L. Page (UF). All research was conducted in accordance with American Museum of Natural History (AMNH) IACUC guidelines. This study was supported by Waitt awards from the National Geographic Society (W140-10) to M. Lombardi and (W101-10) to D. Gruber, Ocean Opportunity, Inc., the AMNH, New York, and the National Science Foundation through an award to JSS (IOS-0749943).

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