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Review of the glass blennies (Teleostei: Chaenopsidae: *Emblemariopsis*) with two new species from the Caribbean Sea

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Abstract

The glass blennies of *Emblemariopsis* are found only in the tropical western Atlantic Ocean and the genus is composed of 13 species in the Greater Caribbean region and one species from Brazil. The identity and ranges of the various species are poorly documented and the available keys and species lists are unreliable, mainly due to species descriptions based on few specimens and the very different appearances of immature phases, females, males, and territorial males. The combination of extensive underwater photography and mtDNA sequencing (uniting the phases and delineating species boundaries) clarifies the taxonomy and biogeography of the glass blennies. There are several complexes composed of regional mtDNA lineages, typically with corresponding morphological differences. The red-bannered species complex with orbital cirri has males with red-banded anterior spinous-dorsal fins, and is composed of 7 mostly allopatric species that divide up the Caribbean Sea and Brazil. A complex without orbital cirri or red bands contains 4 allopatric species dividing up the Greater Caribbean. Two other complexes are single species composed of genetically divergent allopatric populations ("genovariants") with wide ranges in the central Caribbean Sea; the fourteenth species is a Venezuelan endemic. Two new species are described: *Emblemariopsis lancea* Victor, from the Windward Lesser Antilles, previously misidentified paratypes of *E. occidentalis*; and *Emblemariopsis falcon* Victor & Rodríguez, an endemic species to northwestern Venezuela. Two species are synonymized with previously described species: *E. arawak* with *E. leptocirris* and *E. ramirezi* with *E. tayrona*. A phenetic tree of COI mtDNA barcode sequences of the genus shows deep divergences between most species, except for two pairs of species which share lineages, as well as genovariants also showing deep divergences. Florida, the Gulf of Mexico, and the ABC Netherlands Antilles, have only a single glass blenny species, while other locations, such as Belize and the U.S. Virgin Islands, have as many as 4 species.

Key words: taxonomy, ichthyology, coral-reef fishes, cryptic, biogeography, DNA barcoding, tropical, Atlantic.

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Introduction

The glass blennies of the genus *Emblemariopsis* Longley, 1927 are endemic to the tropical western Atlantic region, where they constitute one of the larger genera of coral-reef fishes in the region, with 14 species (including one from Brazil). The group is nonetheless poorly known and not well represented in museum collections, leaving their taxonomy and biogeography mostly unresolved until now. The primary reasons for their obscurity includes their tiny size (most less than 30 mm long), mostly transparent bodies (Fig. 1) and hole-dwelling habits, which make them difficult to collect with traditional rotenone sampling, where small and transparent fishes are mostly overlooked. Furthermore, they are fragile and typically have damaged fin rays in museum collections and lose most (or all) of their diagnostic colors and markings after long periods in preservatives. It is only with the advent of extensive underwater macrophotography, in combination with DNA barcoding, that the range of life appearances can be documented and the various forms and life history phases can be united by mtDNA-sequence matching. These methods have helped resolve the taxonomy of a number of hitherto obscure blennies and gobies in the Greater Caribbean in recent years: e.g. *Bathygobius* (Tornabene et al. 2010), *Enneanectes* (Victor 2013, 2017, 2019), and *Starksia* (Baldwin et al. 2011, Victor 2018).

The genus was known from a single species for many years: *Emblemariopsis diaphana* Longley, 1927 from the Florida Keys. Subsequently, *Emblemariopsis signifer* (Ginsburg, 1942), with a holotype from Brazil, was added, and, for about two decades, most Caribbean glass blennies were assigned to that species (often as "*signifera*", but *signifer* is a noun and not declined [Fricke et al. 2020]). In the 1960s and 1970s, several more species were added following the reviews of the genus by Stephens (1961, 1963, 1970). Unfortunately, species were often described from small samples and several from territorial adult males only, and the degree to which life-history phases differ was not recognized. Since then, it has become apparent that the females and immature fish of some species have elongated dorsal-fin spines, even when the mature males do not. The available keys (Stephens 1970, Williams 2003) included couplets that applied only to territorial males and/or morphometric differences based on small samples and, as a result, fish were frequently misidentified and females and immature males with elongated dorsal-fin spines were often automatically assigned to the entity "*E. signifer(a)*". More recently, the Caribbean sibling species of *E. signifer* was shown to be 13.3% divergent in the mtDNA COI sequence from the Brazilian species, which has some marking and meristic differences, and thus was described as *Emblemariopsis carib* Victor, 2010.

The authors of species descriptions based solely on mature males (Stephens 1961, 1970, Greenfield 1975, Greenfield & Johnson 1981, Acero 1987, Tyler & Hastings 2004), or based on immature fish (*Emblemariopsis arawak* Victor, 2010), were often puzzled by the absence of females (or adults in the latter case). For example, *Emblemariopsis dianae* Tyler & Hastings, 2004 was described from Belize based on 35 male specimens and the authors noted that even after repeated searches for females, none were found; however, they did note that "*E. signifera*" were ubiquitous in the area and suggested they might not have hole-dwelling territorial males. However, subsequent DNA sequencing shows that there are no *E. carib* (= "*E. signifera*") in the western Caribbean Sea, and female *E. dianae* were likely subsumed in that category. Likewise, recent DNA sequencing has shown that *E. arawak* is the immature phase of *Emblemariopsis leptocirris* Stephens, 1970; not coincidentally Victor thought *E. leptocirris* was the only species he did not collect at the type location (of both species) in Puerto Rico in 2010.

Figure 1. *Emblemariopsis leptocirris*, female, UF 246137, 13.3 mm SL, Panama, DNA-confirmed (Jordan Casey & Simon Brandl).

With the recent collections, DNA surveys, and underwater photographs, it appears that the number of species remains stable (two synonymized and two new species). The new data clarify the biogeography of *Emblemariopsis* and help reverse local "taxonomic inflation", i.e. the accumulation of various incorrect species records for a particular site. Indeed, members of species complexes are found to be mostly allopatric and many species are shown to have more limited ranges than reported. The number of co-occurring *Emblemariopsis* species now ranges from one (in Florida, the Gulf of Mexico, and the ABC Netherlands Antilles) up to 4 (at Belize and the Virgin Islands).

Materials and Methods

Live specimens were collected by hand from the Florida Keys, Cayman Islands, Belize, Honduras, Panama, Puerto Rico, St. Thomas (USVI), and Dominica between 1981 and 2016 and placed into 95% ethanol. Type specimens of new species are deposited at the Florida Museum of Natural History, University of Florida, Gainesville, FL, USA (UF), the Academy of Natural Sciences of Drexel University, Philadelphia, PA, USA (ANSP), and the American Museum of Natural History, New York, NY, USA (AMNH). Other material referred to is from the National Museum of Natural History, Smithsonian Insititution, Washington DC, USA (USNM); Museo Marina de Margarita, Isla de Margarita, Nueva Esparta, Venezuela (MMM); Coleção Ictiológica da Universidade Federal do Espírito Santo, Vitória, Brazil (CIUFES); Museo Oceanológico Hermano Benigno Román at the Estación de Investigaciones Marinas de Margarita, Fundación La Salle de Ciencias Naturales, Margarita Island, Nueva Esparta, Venezuela (MOBR-EDIMAR or MHNLS); Universidad de Carabobo, Carabobo, Venezuela (CPC); Marine Vertebrate Collection, Scripps Institution of Oceanography, La Jolla, CA, USA (SIO); and The Field Museum of Natural History, Chicago, IL, USA (FMNH).

Tissue samples were sequenced at the Canadian Centre for DNA Barcoding (CCDB), Centre for Biodiversity Genomics, University of Guelph, Ontario, Canada (Ward et al. 2005). DNA extractions were performed using the NucleoSpin96 (Machery-Nagel) kit and a Biomek NX liquid-handling station (Beckman-Coulter). A 652-bp segment was amplified from the 5′ region of the mitochondrial COI gene using a variety of primers (Ivanova et al. 2007). PCR amplifications were performed in 12.5 µl volume including 6.25 µl of 10% trehalose, 2 µl of ultra pure water, 1.25 µl of 10× PCR buffer (10mM KCl, 10mM $(NH_4)2SO_4$, 20mM Tris-HCl (pH8.8), 2mM $MgSO_4$, 0.1% Triton X-100), 0.625 µl of $MgCl_2$ (50mM), 0.125 µl of each primer (0.01mM), 0.0625 µl of each dNTP (10mM), 0.0625 µl of Taq DNA polymerase (New England Biolabs), and 2 µl of template DNA. The PCR conditions consisted of 94°C for 2 min., 35 cycles of 94°C for 30 sec., 52°C for 40 sec., and 72°C for 1 min., with a final extension at 72°C for 10 min. Data were compiled using BOLD, i.e. the Barcode of Life Data Systems (Ratnasingham & Hebert 2007). The sequence data is publicly accessible in BOLD and GenBank. Sequence divergence was calculated with the BOLD Kimura 2-parameter (K2P) model generating a mid-point rooted neighbor-joining (NJ) phenogram, a graphic representation of species divergence (pairwise distances are also calculated for comparisons).

Measurements were made to the nearest 0.1 mm using an ocular or digital micrometer and small features measured from photomicrographs. Counts and morphometrics are presented as the value for the holotype followed by the range for the paratypes in parentheses, if different. Fish lengths are mm standard length, from the front tip of the snout to the base of the caudal fin (posterior end of the hypural plate); body depth is the maximum vertical distance under the anterior dorsal fin; body width is the maximum width side-to-side just posterior to the gill opening (unsqueezed); head length (HL) is the horizontal distance from the tip of the snout to the most posterior end of the opercular flap; snout length is the horizontal span from the snout tip to the anterior edge of the bony orbit; orbit diameter is the horizontal distance from edge to edge of the bony orbit; interorbital width is the least bony width; upper-jaw length is the full oblique length; predorsal, prepelvic, and preanal lengths are measured along the oblique line from the tip of the snout to the insertion of the first fin element; caudal-peduncle depth is the least depth and caudal-peduncle length is the horizontal span from the base of the last anal-fin ray to the middle of the caudal-fin base; caudal-fin length is the horizontal span from the base of the fin to a vertical at the tip of the longest ray; pectoral-fin length is the length of the longest ray; pelvic-fin length is from the body junction to the stretched tip of the longest soft ray.

Family Chaenopsidae

Emblemariopsis Longley, 1927

Emblemariopsis Longley, 1927 (fem) Longley 1927: 222; Longley & Hildebrand 1940: 269.
Emblemaria [*non* Jordan & Gilbert] (in part) Böhlke 1957: 49.
Coralliozetus [*non* Evermann & Marsh] (in part) Acero 1987: 8.

Type species: *Emblemariopsis diaphana* Longley, 1927 [Dry Tortugas, FL, USA]; by original designation.

Diagnosis: Small chaenopsid blennies (<40 mm SL) with marked sexual dimorphism: females and immature fish transparent, thin, with pointed snouts; mature territorial males hole-dwelling, with a blunt snout, stout body, and blackened head and anterior body; no scales or lateral line; no head spines; a single unbranched orbital cirrus present or absent; a single unbranched nasal cirrus present; cephalic sensory-canal pores present, no cephalic sensory papillae; body very elongate; no long, sail-like dorsal fin; a long and continuous spinous and soft dorsal fin with XVIII–XXII slender spines, 10–15 unbranched soft rays, first three spines rooted closer together and a gap to fourth, first one to three spines elongated or not, in one gender or both; dorsal fin of mature males with an anterior red distal band and/or a white edge or neither, with a flap along first spine or not; a long anal fin with two short slender spines, 19–24 unbranched soft rays; dorsal and anal-fin membranes attached to caudal-fin base; caudal fin short and truncate, 13 unbranched segmented caudal-fin rays, 2–5 upper and 2–4 lower procurrent rays; a short pectoral fin with 12–15 segmented rays (usually 13 or 14), all unbranched; pelvic fin shorter than pectoral fin, I,3, soft rays all unbranched, second longest, third shortest and attached to second for some length; penultimate vertebra with truncated neural spine followed by a single elongated epural.

Limited to the western Atlantic Ocean, with 13 species in Greater Caribbean region, plus one from Brazil.

Taxonomic History

The taxonomic history of the genus shows the difficulty in deciding which characters are phylogenetically informative in species radiations in the face of substantial variation in morphology. Various species have been assigned to different genera on the basis of a supposedly diagnostic feature that later breaks down as additional species are examined. Longley (1927) described the first species of the genus, *Emblemariopsis diaphana*, without orbital cirri and with short dorsal-fin spines. Ginsburg (1942) described the second species, *E. signifer*, but placed it in *Emblemaria*, because it has the orbital cirri and elongated dorsal-fin spines of the sailfin blennies. Böhlke (1957) synonymized the two genera under *Emblemaria*, but suggested that the erstwhile *Emblemariopsis* group might end up split off from the sailfin species of *Emblemaria*.

Stephens (1961, 1963) resurrected *Emblemariopsis* for *E. diaphana* and two new species, leaving only sailfin species in *Emblemaria*. While the split was warranted, Stephens' (1963) diagnostic characters for *Emblemariopsis* would mostly evaporate as additional species were described, i.e. absent orbital cirri, uniformly low dorsal fin, no flap along the first dorsal-fin spine (see description of red-bannered species), and, most curiously, no sexual dimorphism. The last conclusion resulted from the small samples on which descriptions were based: 4 large male specimens of *E. diaphana*; two mature males of *E. signifer*, 4 immature or female fish for *Emblemariopsis bahamensis* Stephens, 1961, and a single black adult male for *Emblemariopsis bottomei* Stephens, 1961. Stephens (1961) erected the new genus *Pseudemblemaria* for *E. signifer*, because he defined *Emblemariopsis* as having no orbital cirri and low dorsal fins: *Pseudemblemaria* was differentiated primarily by having an orbital cirrus and an elongated first dorsal-fin spine. The genus was noted to have no sexual dimorphism other than in jaw length, meaning pale or transparent males were clearly mistaken for females. Several years later, Stephens (1970) added two more new species and, since they bridged the prior putative diagnostic features, synonymized his genus *Pseudemblemaria* back into *Emblemariopsis*. His updated diagnosis of the genus discarded orbital cirri and short dorsal-fin spines as defining characters, but maintained two incorrect characters, i.e. absence of sexual dimorphism and no flap on the first dorsal-fin spine, and added a third incorrect character: the membrane deeply incised between the first and second dorsal-fin spine.

Acero (1987) added another species and placed the new species in a different genus based on a presumed generic-level character. He assigned *Emblemariopsis tayrona* (Acero, 1987) to *Coralliozetus* Evermann & Marsh, 1900 (type species: *Coralliozetus cardonae*) and broadened its definition to encompass all *Emblemariopsis* (Acero 1987: 8). He suggested the genera are bridged by *E. tayrona* having the flap on the first dorsal-fin spine (a presumed feature of *Coralliozetus*), as well as *Coralliozetus springeri* Stephens & Johnson, 1966 sharing the short orbital cirri and body shape of *Emblemariopsis*. However, none of those characters appear to be generic level and several other morphological features unite *Coralliozetus* and exclude *E. tayrona* (Hastings 1997). The conclusion that *Emblemariopsis* is distinct from *Coralliozetus* has been confirmed by a phylogenetic study by Lin & Hastings (2011, 2013), which showed that *Coralliozetus* forms a monophyletic clade well-separated from the *Emblemariopsis* clade and that *C. springeri* was actually the trans-isthmian sibling to *C. cardonae*, rather than a bridging species to *Emblemariopsis*.

Hastings (1997) also discovered a diagnostic morphological synapomorphy for *Emblemariopsis*: a truncate neural spine on the penultimate vertebra with a single elongated epural (Fig. 2 and Tyler & Tyler [1997]). In other chaenopsids, the neural spine of the penultimate vertebra is long and thin and resembles those on the more anterior vertebrae.

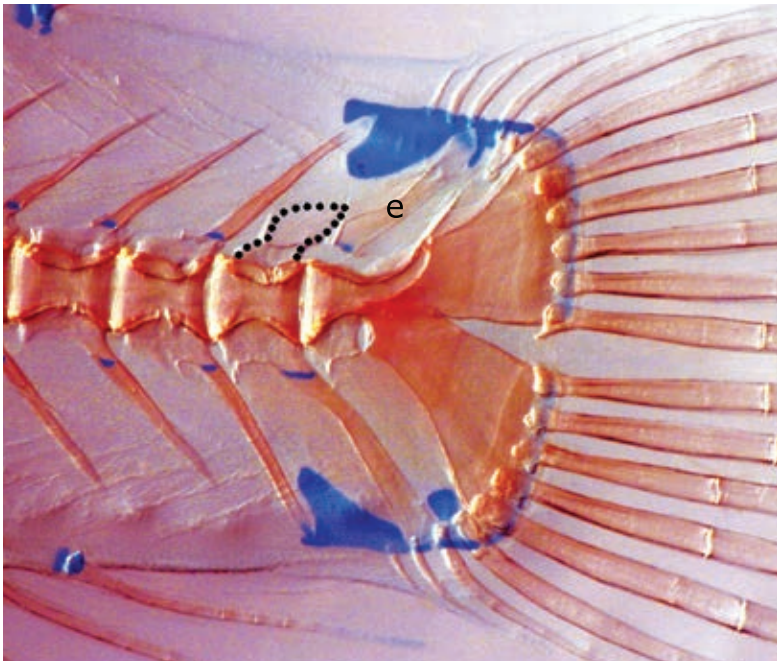

Figure 2. *Emblemariopsis signifer*, caudal osteology: black dots= truncated neural spine; e=epural last vertebra; blue=cartilage (B. Victor).

Species Characters

Describing species of glass blennies is complicated by extensive morphological, marking, and color variation between genders, state of maturity, and male territorial status. Furthermore, marking patterns and colors vary substantially with substrate, mostly to match the background, but also likely reflect behavioral interactions. The degree of variation first became apparent when literally thousands of underwater photographs of these tiny glass blennies became available with the development of equipment and techniques for underwater macrophotography. The photographs were taken in a variety of Greater Caribbean locations, mainly well-visited locations with mostly pristine reefs and extensive diving facilities, such as Bonaire, Cayman Islands, Roatan, and the Lesser Antilles, but also South Florida, where the density of avid photographers outweighs the less-than-ideal water conditions. There is now a tireless cadre of expert underwater photographers, including the pioneers of Caribbean underwater macrophotography and the authors of photographic guides to reef fishes, i.e. Paul Humann, Ned and Anna DeLoach, and Keri, Kris, and Les Wilk (Humann & DeLoach in 4 editions and the ReefNet interactive electronic field guide by the Wilks in 4 editions). The most-photographed location is Bonaire, in the Netherlands Antilles– the result of idyllic water conditions, pristine reefs, easy shore access, a well-developed tourist and diving infrastructure, and excellent resident and visiting photographers.

Reviewing a set of many hundreds of photographs of glass blennies from Bonaire, it became apparent that only a specific subset of appearances were present. None had an orbital cirrus or a red banner on the dorsal fin. All black individuals were large and all smaller fish were transparent with a set of head spots. The black fish typically resided in holes and none had elongated dorsal-fin spines (and all black glass blennies examined anywhere are male). All smaller individuals had an elongated first dorsal-fin spine, but less elongated in the smallest juveniles and less elongated in some large fish showing incipient mature characteristics, such as a blunt snout, dark head shading, and reduced head spots. Also a key observation was that fish on dark substrates had intensified dark head spots, while those on lighter substrates tended to have smaller spots and fewer than the full complement. These observations led me to conclude that only a single species with different life-history phases was represented. This inductive conclusion was supported by the results of mtDNA sequencing surveys, which, thus far, have showed only a single mtDNA lineage for the genus present in the ABC islands (Aruba, Bonaire, and Curaçao).

Life history phases. Documenting the different stages within a species is critical to identifications, since some species differ from closely related species primarily in one phase or another. There are a number of phases that need to be recognized: juvenile, female, immature male, transitional male, pale male, and territorial male. Territorial males occupy holes which they defend aggressively and always have dark or black heads. Some large males do not occupy holes and are pale, or even mostly transparent, and can be observed challenging dark males for their holes (Figs. 3 & 4). Presumably, as soon as they occupy a hole, they become dark. The occasional

Figure 3. *Emblemariopsis bottomei*, pale male challenging black TP male (with white parasite), Bonaire (Frank Krasovec).

Figure 4. *Emblemariopsis leptocirris*, pale male challenging black TP male driven out of his hole by a finger, Cayman Islands (Everett Turner).

photograph shows a pale or spotted male in a hole, but they are typically more dusky than normal and likely newly arrived in the hole. Immature males look like females, and, thus far, my observations do not reveal a noticeable difference underwater. However, their recognition is important, because they transition to a mature male and then can exhibit a baffling appearance in mid-transition, when they can show characteristics intermediate between female/immature individuals and mature males, especially in species with marked differences between the mature males and other phases. The transition is likely rapid, because photographs of transitional fish are uncommon.

Naming the phases follows the long-standing practice for labrid fishes (Warner & Robertson 1978), which similarly have territorial males with more conspicuous colors and markings, called terminal phase (TP), as well as a different, more drab, female and immature-male appearance, named initial phase (IP). Interestingly, the labrids typically have large males who fight for territories at optimal locations for spawning success, somewhat analogous to the glass blennies who defend a hole where females are enticed and eggs are brooded. Both families of fishes have IP males (by definition, since all TP males are already large), although labrids often have IP males that remain IP and some who develop into TP males. In addition, labrids have IP females that change sex into TP males when it is advantageous, forming complex mating systems. It is doubtful that there is any sex change in glass blennies, although the subject has not been fully explored. Both sets of fishes have transitional males, where IP males start to develop TP markings and colors and present a variety of intermediate appearances.

Anterior dorsal fin. The most useful character for distinguishing glass blenny species is the shape and color of the anterior dorsal fin: spines elongated or not, and with red-and-white banding or all black, with or without a white rim. Since the fin is a prominent feature of the male display and part of mate recognition, it would be expected to be one of the first characters to diverge during speciation. A similar pattern of closely related species diverging primarily in male display colors and markings is found in many labrids (e.g. Victor & Edward 2016) and some other Caribbean blennies, such as *Starksia* (Baldwin et al. 2011, Victor 2018) and *Enneanectes* (Victor 2013, 2019). The combination of color of the anterior dorsal fin and the relative lengths of the first three dorsal-fin spines for TP males distinguishes most species of *Emblemariopsis*. Some species in the smoothhead complex

Figure 5. *Emblemariopsis bottomei*, variation in IP spot intensity, Bonaire: (left, André de Molenaar; (right, Ned DeLoach).

(without orbital cirri and TP without elongated spines) differ mainly in whether the IP have elongated anterior dorsal-fin spines or not: e.g. *E. bottomei* have the first two dorsal-fin spines elongated in the IP (Fig. 5).

Head spots. There is a complex pattern of dark spots on the head and pectoral-fin base of IP glass blennies. Despite the complexity, most species share the basic complement of spots, and often differ only in which of the spots are present. Some spots are diagnostic, such as a long bar on the pectoral-fin base for three southern species, but most are not. There is generally much more variation within species than between species, with individuals on lighter substrates showing smaller and fewer spots and those on darker substrates having larger and more prominent spots. Several species have only a few spots regardless of the background and that feature can be useful in identification. Rare individuals can show expanded, very prominent spots, almost looking like a different species (e.g. Fig. 5), typically when living on a dark substrate. The head spots are mostly lost in transition to TP, and some transitional males can have various combinations of spots and shading that can appear perplexing.

Color. All but one of the glass blenny species share the basic colors of red, orange, yellow, and pink along with an array of leucophores and brown and black melanophores (Fig. 6 left). Colors are concentrated over the cranium and abdomen and in a line of red-orange alternating with white along the vertebral column, likely shielding the vulnerable brain, spinal cord, and organs from the damaging effects of ultraviolet light. One species, *Emblemariopsis ruetzleri* Tyler & Tyler, 1997, has a prominently different, and diagnostic, color palette, predominantly greenish blue and gold (Fig. 6 right).

Figure 6. *Emblemariopsis leptocirris* (left), IP, Cozumel, Mexico (J.D. Haines); *E. ruetzleri* (right), IP Cayman Islands (E. Turner).

Cephalic pores. The pattern of sensory-canal pores on the head of chaenopsid blennies has been a focus for some time. Stephens (1963) emphasized them as an important feaure of higher-level taxonomy within the family. They have proven to be more variable in practice, and, along with inconsistencies in the naming of various pores, have often served to add more confusion than clarity– indeed, subsequent taxonomists have noted they cannot reconcile their patterns with that of Stephens (e.g. Smith-Vaniz & Palacio 1974). Most discrepancies can be explained by trying to use the same names for pores on different genera that have different basic patterns of pores. Nevertheless, there are differences between glass blenny species that can be useful in identifications, although some caution is warranted because larger individuals tend to have more pores and some fish are missing occasional pores usually found in their species, or have tiny pinpoint holes that can be ambiguous.

Stephens (1963: 91) included "no postorbital or temporal pore series" in his diagnosis of *Emblemariopsis* (and *Pseudemblemaria*) and illustrated the pore patterns with a drawing of the pattern on *Ekemblemaria*, which is not the same as the pattern on *Emblemariopsis*. Nevertheless, on the very next pages, he diagnoses *E. diaphana* as having three postorbital and two temporal pores and *E. bahamensis*, *E. bottomei*, and *E. signifer* with three postorbital and no temporal pores. Subsequently, Stephens (1970) reported *E. occidentalis* had two temporal pores but yet the "identical pore pattern" to *E. signifer*. He also then listed "no postorbital series" and "one or two temporal pores" in his diagnosis of *Emblemariopsis*. Stephens apparently used the term "postorbital" for the three posterior infraorbital pores and then "postorbital series" for additional pores beyond the circumorbital ring (and not present on *Emblemariopsis*). Later studies have not used "postorbital" for any pores on *Emblemariopsis* (Tyler & Tyler 1997, Tyler & Hastings 2004, Victor 2014). As for what a temporal pore is, it is not certain: other authors do not single them out and they apparently assign those pores to a posttemporal or supratemporal series. Frontal pores have been variously defined, Stephens includes anterofrontal and the two supraorbital (at least in 1963) in his frontal total and excludes the commissural; Tyler & Hastings (2004) do not include anterofrontal or supraorbitals; and Tyler & Tyler (1997) do not use the term at all. Clearly, these ambiguous labels are not that useful.

Fortunately, the main variation in pore patterns in the genus is confined to the interorbital region between the upper-orbital bony rims (Fig. 7). All species share the single (per side) nasal and anterofrontal pores, plus a midline commissural pore, as well as 8 circumorbital pores. The variation is in the presence or absence of the anterior interorbital pair in front of the commissural and the two pairs of posterior interorbital pores behind the commissural. At the risk of coining a new term, I just count the variable pores as lateral interorbital pores (LIO), which simply range from 0–3 (per side, excluding the anterofrontal, commisural, and all of the circumorbital ring).

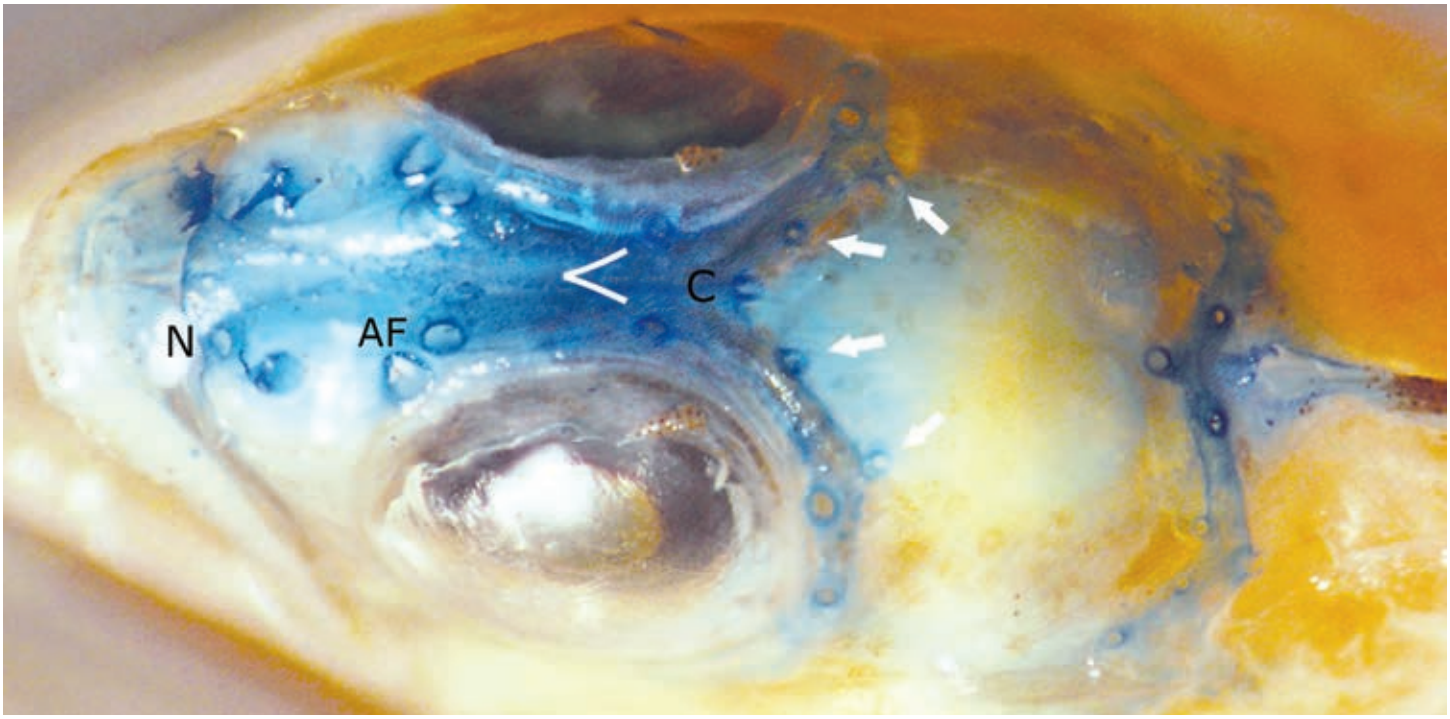

Figure 7. *Emblemariopsis signifer*, preserved and stained with methylene blue; the cephalic sensory-canal system with the full complement of three lateral interorbital pores (LIO). Black labels to the left of pores, N=nasal, AF=anterofrontal, and C=commissural; white arrows=posterior interorbital pairs 1 & 2; white angle legs=anterior interorbital pair; Brazil (B. Victor).

Cranial pattern. There is a complex pattern of colored bands and spots over the top of the head of IP glass blennies that varies among species and can be useful in identifying underwater photographs. These colors do not persist in preservative, especially over time. There is an array of melanophores among and under the colored bands that can obscure the color pattern to an increasing degree when the melanophores are fully expanded (e.g. Fig. 4), although a large majority of underwater photographs of IP fish do show identifiable cranial patterns. As the fish transition into TP, the cranial pattern is progressively obscured and becomes uniformly dark or black.

The basic pattern is composed of 5 colored bands (see Fig. 8); usually pink to reddish, sometimes lavender, starting with band 1 usually as an anterior midline spot; then band 2 is V- or Y-shaped; band 3 is U-shaped and often broken at the center (either band 2 or 3 is typically the most prominent); then band 4 is a long, bracket-like band usually pale or white (often turning red proximally) and broken at the midline into spot(s); and finally band 5 usually a short segment, often split into two on each side, at the rear margin of the cranium, often flanking a white midline spot. The pattern of the bands plus their colors can be diagnostic for a species or group of species. The variation in color is mainly which bands, or parts of bands, are pink or reddish vs. pale or white. In general, bands 1, 3, and 5 are reddish and bands 2 and 4 are pale or whitish.

Typical species-specific patterns include a Y-shaped band 2 with band 3 reduced or broken up (Fig. 9 left). Others have a broad U-shaped band 3 broken near the midline into one or a pair of central spots, with band 2 reduced (Fig. 8 middle). Other species have variations: band 1 forming reticulations, or band 3 breaking up into a chain (Fig. 9 right). Uncommonly, all bands are prominent (Fig. 8). In some species, the bands progressively break up into spots (Fig. 9 right) and/or have extra spots fill in between bands, eventually covering most of the cranium in a distinctive mosaic pattern.

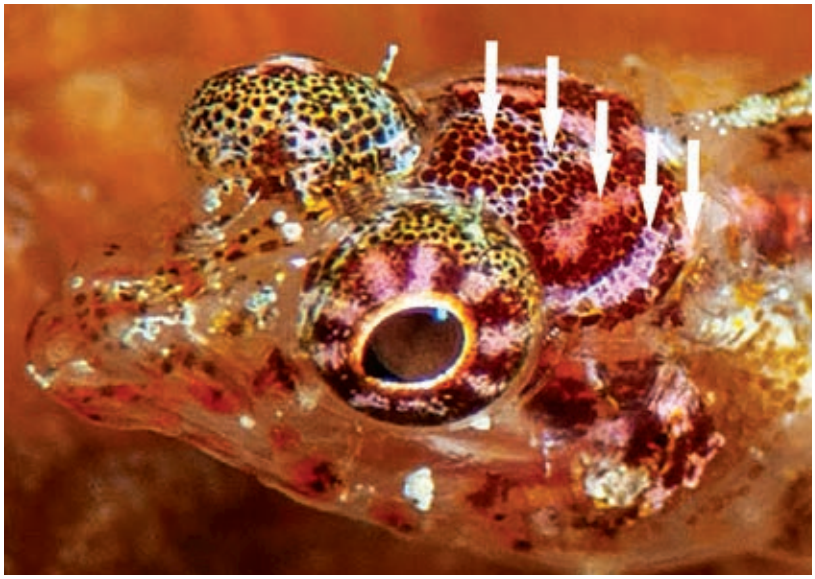

Figure 8. *Emblemariopsis leptocirris*, cranial patterm with color bands 1 to 5 indicated by white arrows, Cayman Islands (Frank Krasovec).

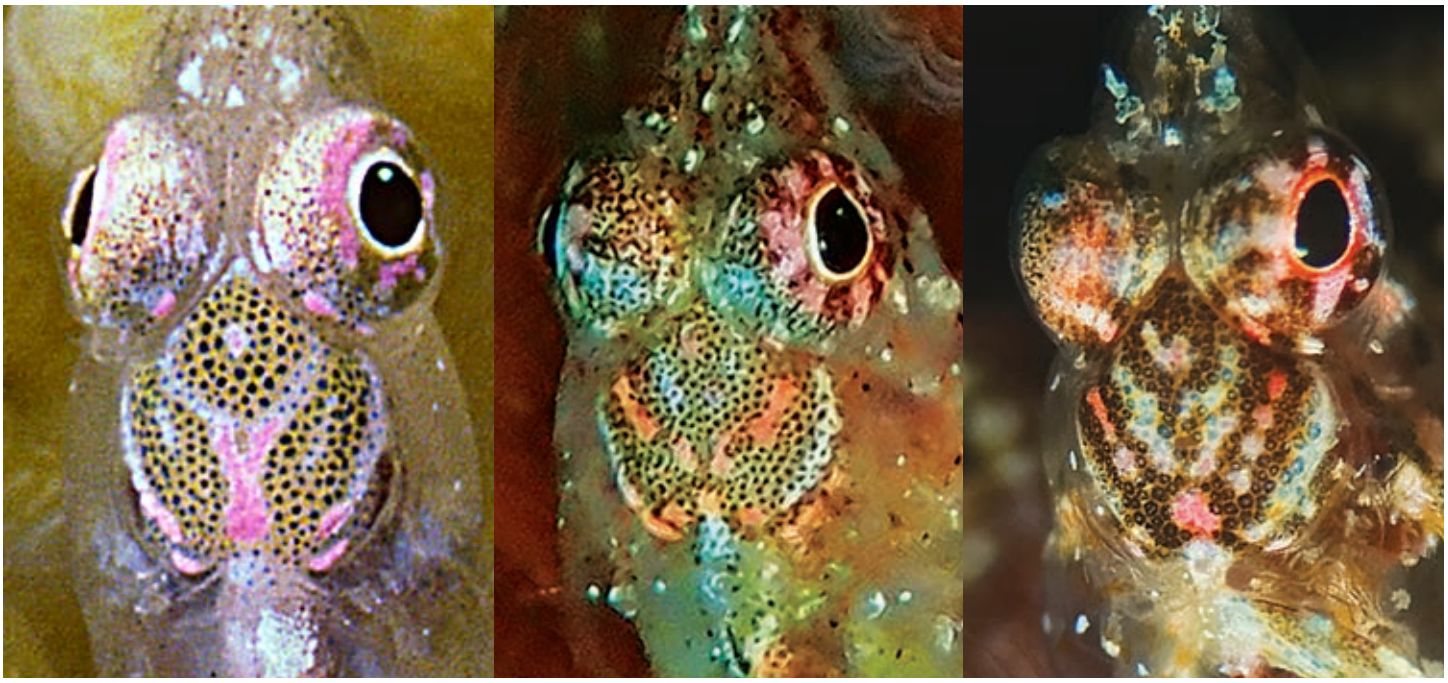

Figure 9. Cranial patterns: *Emblemariopsis bahamensis* (left) Y-shape, Bahamas (Doug Perrine); *E. leptocirris* (middle) broken, wide U-shape, Corn Island, Nicaragua (Ellie Place); *E. diaphana* (right) early chain-like developing mosaic pattern, Key West, Florida (Rob McCall, Eco-Dives of Key West).

Fin-ray counts. In general, fin-ray counts for glass blenny species broadly overlap and are thus not very useful for species identifications (Table 1). There are some exceptions, such as 14 pectoral-fin rays in three species, and, to a lesser degree, the shift of the mode and range between some otherwise similar species.

Common Names

Although common names are not a scientific decision, but usually a consensus by the community, the review of a genus would be the time to cement common names when there are multiple names being used or none available. This genus is particularly prone to proliferation of common names, for example *E. carib* (="*E. signifera*") has been called flagfin, highfin, spikefin, or carib blennies by various authors. The same name is often used for different species or even novel names invented, e.g. blackhead and smallhorn, respectively (by Dennis 2000). Most proposed names thus far are non-specific and add no information and would apply broadly to the group (glass, blackhead, or flagfin) or even misleading ("flag" for a spike, and shorthead). In this review, when needed, I propose common names that highlight the diagnostic feature, thus adding information for observers.

TABLE 1

Fin-ray counts for the *Emblemariopsis* species of the western Atlantic Ocean

	Dorsal-fin spines					Dorsal-fin soft rays						Dorsal-fin total elements						Anal-fin total elements [1]					Pectoral-fin rays [2]			
	18	19	20	21	22	10	11	12	13	14	15	30	31	32	33	34	35	21	22	23	24	25	12	13	14	15
E. lancea, n. sp.[3]		4	37	7		1	21	25	1			1	16	31				2	36	10			1	90	6	
E. falcon, n. sp.[4]			5	10			4	11						9	6				4	11			2	15	4	
E. tayrona [5]		1	14	19			15	15	4				3	21	10			2	12	15	4		2	64	2	
E. dianae [6]	1	2	32			1	22	12				+	+	+				4	29	1				63	7	
E. occidentalis [7]		2	3	1				4	2				1	3	2				1	5				7	3	
E. carib [8]		7	27	2		3	25	8				6	25	5				7	27	2				59		
E. signifer [9]			11	25			9	24	3				1	17	16	2			5	30	1			+		
E. randalli [10]			10	21		1	1	20	9				1	5	22	3			5	23	3			2	42	1
E. leptocirris [11]		4	14	2				8	11	1			2	6	12				4	10	7		1	35		
E. leptocirris L[12]		9	20	2		1	17	12				2	22	6				9	21	1			3	39	1	
E. ruetzleri [13]		5	43	12		3	45	11	1			3	20	9				13	46	3				9	111	3
E. bottomei [14]		9	33	2				22	22				1	26	17				4	35	5			86	1	
E. diaphana [15]			16	18				14	15	1				1	23	6				8	19	3		60		
E. bahamensis [16]		1	20	24	1		1	12	26	4	2			3	22	18	2			10	26	9		77	4	
E. pricei [17]			16	65	3			5	62	17					11	65	9			1	33	47		9	158	2

[1] some papers report anal-fin segmented (soft) rays; if so, two was then added to arrive at total elements.
[2] total both sides.
[3] 40 new specimens from Dominica; 8 Antillean paratypes of "*E. occidentalis"* from Stephens (1970) with corrections [counts from table 3, not 4].
[4] 6 types, 9 Venezuela from Rodríguez.
[5] 22 types Colombia from Acero (1987) (one A-20 not shown); 3 types of *C. ramirezi* NE Venezuela from Cervigon (1999); 9 NE Venezuela UF.
[6] 35 Belize from Tyler & Hastings (2004); total dorsal-fin-element counts not available.
[7] from TP only, all Bahamas: 4 ANSP, 1 UF, 1 transitional photograph (putative IPs have same counts).
[8] 33 Puerto Rico, USVI & Barbados from Victor (2010a); 3 Saba photographs from Jeff Williams.
[9] 36 Brazil from Victor (2010).
[10] 7 Venezuela from Cervigon (1966); 0 Cervigon (1965 & 1994) data inconsistent, text; 7 Venezuela from Tyler & Tyler (1999); 17 VZ Rodríguez.
[11] 4 Antillean types from Stephens (1970), 8 Puerto Rico *E. arawak* types from Victor (2010a); 3 Belize; 7 Utila.
[12] low-count populations: 6 Cayman Island paratypes from Stephens (1970); 17 Cayman Islands; 9 Panama.
[13] 33 Belize from Tyler & Tyler (1997); 1 USVI from UF; 4 USVI; 2 PR; 12 Cayman Islands; 1 Utila; 12 Panama.
[14] 3 Venezuela from Stephens (1970); 41 Dominica.
[15] 4 types + 20 Florida from Stephens (1970); 6 Florida.
[16] 3 Bahamas types, 11 Antilles/Bahamas, 4 Cayman from Stephens (1970); 2 Bahama + 10 USVI UF; 3 USVI; 7 Puerto Rico; 6 Cayman Islands
[17] 10 (Greenfield) + 59 Belize from Tyler & Tyler (1999) [pectoral-fin overcount error of 100]; 9 Utila; 7 Belize (one A-26 not shown).

TABLE 2

Emblemariopsis species characters

	TP df bands[1]	TP 1 sp[2]	IP 1 sp[2]	TP df spots[3]	TP lat spots[4]	TP sp 1.2.3	TP 1 sp to #[5]	TP 1sp in HL	TP 10sp vs. 1sp	IP sp 1.2.3	IP 1 sp to #[5]
E. lancea, n. sp.	red/w	=	+/t	1 or 2	+	1=2=3	5-6	~50%	=	1>2>3	6-8
E. falcon, n. sp.	red/w	=	+/t	1 or 2	–	1=2=3	5-6	~50%	=	1>2>3	6-9
E. tayrona	red/w<7	++	+/t	1 or 2	–	1>2>3	7-10	>75%	~50%	1>2>3	6-8
E. dianae	red /<4	~	~	–	–	1>2<3	~5	35-50%	>	1~2~3	5-6
E. occidentalis	red/w	+	+	–	–	1>2>3	6-7	60-70%	65-75%	1>2>3	6-8
E. carib	red/w	+++	+	+/-	–	1>>2>3	8-15	>100%	<50%	1>2>3	6-8
E. signifer	red/w	+++	+/t	~1	–	1>>2>3	7-11	>100%	<50%	1>2>3	5-7
E. randalli	red/w/>7	=	+/-	–	–	1~2~3	5-6	~50%	>	1=2=3	4-5
E. leptocirris	w rim	=	+	–	+/-	1~2~3	5-6	35-50%	>	1>2>3	6-8
E. ruetzleri	w tip	=	+	–	–	1~2>3	5-6	35-50%	~ =	1=2>3	5-8
E. bottomei	w rim	=	+	2	+/-	1~2~3	~4	35-50%	>	1>2>3	5-8
E. diaphana	w rim	=	+	1	+/-	1~2~3	~5	35-50%	>	1>2>3	4-7
E. bahamensis	none	–	–	–	–	1~2~3	4	~25%	>>	1<2<3	3-4
E. pricei	none	–	–	+/-	–	1~2~3	~5	~25%	>>	1<2<3	4-5

	orb cirri	basic color[6]	operc lines[7]	head spots	mode LIO pores	caudal pro-current[8]	pect rays[9]	cranial pattern[10]	max mm SL	range[11]
E. lancea, n. sp.	+	red	+	full	3	4/4	13	V3, -4, X	24.3	S. Lesser Antilles
E. falcon, n. sp.	+	red	+	full	3	4/4	13	~ "	25.2	NW Venezuela
E. tayrona	+	red	+	full	3	4/3	13	~ "	31.0	Colombia & NE Venezuela
E. dianae	+		–	<	0	3/3	13		21.1	Belize & Honduras
E. occidentalis	+	red	–	full	3	3-4/3	13/**14**	wide-U/m	18.6	Bahamas
E. carib	+	red	–	full	2	3-4/3-4	13	wide-U/m	17.5	Hispaniola to Upper Lesser Antilles
E. signifer	+	red/br	–	full	3	4-5/3-4	13	wide-U/mV	27.8	Brazil
E. randalli	–	pink/y	–	0	3		**14**	pale 2 & 4	32.4	Venezuela
E. leptocirris	+	red	–	full	3	3-4/3	13	wide brk-U	21.2	BZ, Hon, Cay, Gr + Up L Ant
E. ruetzleri	+	gn/blue	–	<	3	4/3	**14**	blue spots	19.6	Pan, BZ, Hon, Cay, Gr + Up L Ant
E. bottomei	–	red	–	full	0	4/3-4	13	wide-U 3.4	29.6	ABC, VZ, S. Lesser Antilles
E. diaphana	–	red/br	–	full	2-3	4-5/3-4	13	wide-U/c/m	25.4	Florida, GOM
E. bahamensis	–	red	–	<	0	3-4/2-3	13	Y	26.0	Bahamas, Cay, Gr + Upper L Ant
E. pricei	–	red	–	<	1	4/3-4	**14**	Y	28.6	Yucatan, Belize, Honduras

[1] bands, tips, and rims are on the basic black anterior dorsal fin of TP males; /w indicates species with a white band below the red band; (all red bands also have a thin white rim), #=spine membrane red extends to, if relevant; w rim=black fin with anterior thin white rim

[2] first dorsal-fin spine: + is longer than the next few spines; - is shorter; ~ is barely or variable; t= tip orange.

[3] medium-sized dark spots on the membranes of the mid to rear spinous dorsal-fin in one or two irregular rows.

[4] row of small dark spots along the anterior body lateral midline.

[5] to the base of which dorsal-fin spine does the first spine reach when adpressed.

[6] most prominent color on IP head and body (occasional red-dominant individuals can be dark or purple when on a dark background).

[7] TP with white lines across operculum and branchiostegal membranes; IP with vertical bar on pectoral-fin base.

[8] modal count of dorsal/ventral procurrent caudal-fin rays.

[9] modal count of pectoral-fin rays.

[10] basic elements of IP cranial pattern (all TP with dark cranium); Y, V, U, and X shapes; c=chain; m=mosaic, # is band, - = reduced.

[11] ABC=Aruba, Bonaire, Curaçao; Gr=Greater; L=Lesser; Up=upper (north); Ant=Antilles; BZ=Belize; Hon=Honduras; Cay=Cayman

Emblemariopsis lancea, n. sp.

Lancer Red Banner Blenny
Tubícola Lancer

urn:lsid:zoobank.org:act:C86C10A1-5771-44B9-A5DA-96F0E3DEA5C8

mtDNA COI sequence BIN https://doi.org/10.5883/BOLD:ABA4170 (in part)

Figures 10–20; Tables 1 & 2

Emblemariopsis signifera [*sic*] [*non* Ginsburg] (in part) Stephens 1970: 286–287 (non-type IP material from Little St. Vincent and Bequia only).

Emblemariopsis occidentalis [*non* Stephens] (in part) Stephens 1970: 288–289, table 4 in part (all 8 paratypes [TP]: St. Vincent, Little St. Vincent, Bequia, and Martinique); Smith 1997: 597 (Antilles); Williams 2003: 1767 (Lesser Antilles); Robertson & Van Tassell 2015: online guide (Lesser Antilles records and range only).

Emblemariopsis ramirezi [*non* Cervigón] (in part) Humann & DeLoach 2014: 342, 1 fig. (Dominica only); Robertson & Van Tassell 2015, 2019: online guide (Lesser Antilles records and range only).

Holotype. UF 246130, 23.1 mm SL, male, Soufriere, Dominica, 15.22°, -61.37°, 3 m, B.C. Victor, 13 July 2011.

Paratypes. UF 246131, 39 specimens, 9.7–24.3 mm SL, 3–10 m, same data as holotype; ANSP 113982, 20.0 & 21.2 mm SL, males, St. Vincent, north end of Anse Mahaut Bay, 13.261°, -61.267°, 11–13 m, (TE-24), J.C. Tyler & W.N. Eschmeyer, 1 July 1965 ("♀" in Stephens [1970, table 4]); ANSP 113984, 18.2 mm SL, male, Martinique, harbor west of Point Caracoli, 14.75°, -60.88°, 1 m, (TE-38), J.C. Tyler & W.N. Eschmeyer, 7 July

Figure 10. *Emblemariopsis lancea*, black TP male, St. Vincent (Keri Wilk).

Figure 11. *Emblemariopsis lancea*, dark-shaded TP male with white opercular lines, Dominica (Ned DeLoach).

1965 ("♀" in Stephens [1970, table 4]); ANSP 113999, 17.6 & 20.3 mm SL, males, Grenadines, Little St. Vincent, off northeast point, 12.540°, -61.379°, 2–5 m, (TE-14), J.C. Tyler, W.N. Eschmeyer & G. Koven, III, 27 June 1965 ("♀" in Stephens [1970, table 4]); ANSP 114004, 18.5 & 18.9 mm SL, males, Grenadines, Bequia, off Devil's Table at north end of entrance to Admiralty Bay, 13.012°, -61.239°, 11–15 m, (TE-17), J.C. Tyler & W.N. Eschmeyer, 29 June 1965 ("♀" in Stephens [1970, table 4], called "Bequir"); ANSP 114011, 19.0 mm SL, male, Martinique, harbor west of Point Caracoli, 14.75°, -60.88°, 8–10 m, (TE-34), J.C. Tyler, W.N. Eschmeyer & G. Koven, III, 6 July 1965 ("♀" in Stephens [1970, table 4]).

Non-type IP material. ANSP 113986, (1), same collection as ANSP 113999; ANSP 113992, (1), Grenadines, Little St. Vincent, off NW point, 12.54°, -61.39°, 12–13 m, J.C. Tyler & W.N. Eschmeyer, 27 June 1965 (T-13) ("*E. signifera*" material in Stephens [1970: 286]); ANSP 114002, (3), Grenadines, Bequia, 500 ft S of entrance to Admiralty Bay, 13.010°, -61.25°, 6–10 m, (TE-19), J.C. Tyler & W.N. Eschmeyer, 29 June 1965 ("*E. signifera*" material in Stephens [1970: 287], called "Bequir"); ANSP 114006, (1), same collection as ANSP 114004; ANSP 168607, (2), same collection as ANSP 113984.

Diagnosis. A species of *Emblemariopsis* with an orbital cirrus and a red banner (a set of 7 spp.); TP territorial males in holes with a black head and blackened anterior dorsal fin with a distal red band over a narrow white band and a thin white margin, red band extending posteriorly to 5–7th spinous membrane, curved down at front when erected in displaying TP, a narrow anterior flap variably present along first spine; first 10 dorsal-fin spines relatively short and about equal-length, first spine reaching to 5–6th spine base when adpressed, about half of HL, 12–14% SL.

Dark-shaded and pale TP with a red-banded dorsal fin with irregular rows of larger dark spots along membranes of mid and posterior spinous-dorsal fin, lower operculum and branchiostegal membranes with prominent thin white lines alternating with wider dark bands (=banded-operculum group of 3 spp.), a variable-length row of small dark spots along anterior lateral midline, no row of dark spots along anterior upper body; transitional males with variably elongated anterior dorsal-fin spines with a distal red band over reticulated brown to orange bands on first three membranes.

Figure 12. *Emblemariopsis lancea*, ethanol-preserved holotype, TP male, right side (image reversed), UF 246130, 23.1 mm SL, Soufriere, Dominica (Benjamin Victor).

IP with elongated first two dorsal-fin spines, often slightly orange-tipped membranes, first spine reaching to base of 6–8th spine base when adpressed, second slightly shorter, third about 1/2 of first (earlier IP and juvenile with less elongate spines); live colors include red, orange, and pink; cranial pattern with undeveloped bands 1 and 2, a red V-shaped band 3, an inconspicuous pale band 4, and band 5 a short red segment; red V-shape connects to red midline spot and red inner ends of band 4 and band 5 to form an X-shape; IP head spots usually full complement, can form opercular lines; melanophores near pectoral-fin base typically form a long, thin, slightly oblique bar, often followed by one or more spots.

Dorsal-fin elements XIX–XXI,10–13 (total 30–32); anal-fin elements II,19–21; pectoral-fin rays usually 13; caudal-fin procurrent rays usually 4/4; LIO pores 3 (2–3); largest specimen 24.3 mm SL.

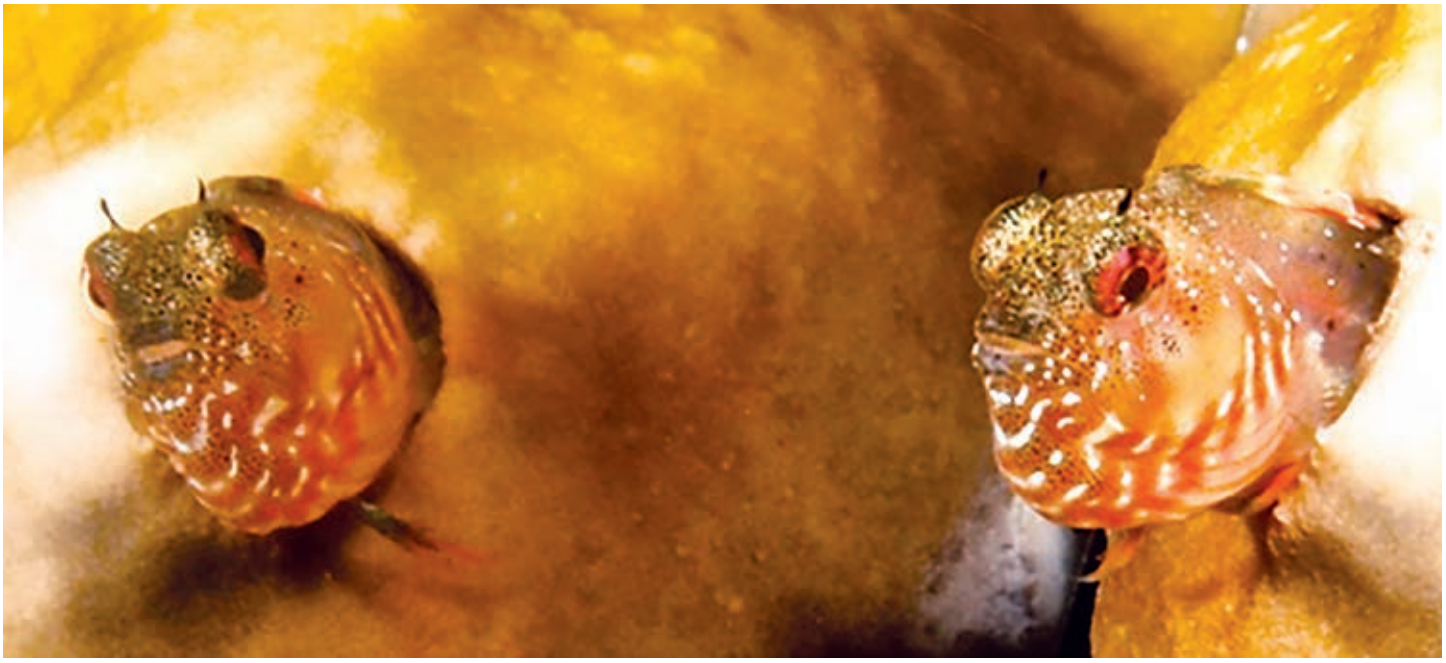

Figure 13. *Emblemariopsis lancea*, pale TP male confrontation with extensive head banding, St. Vincent (Ray Haberman).

Description. (counts from 40 specimens; morphometrics for 8 Dominica male type specimens over 20 mm SL and, when IP indicated, for 4 type specimens 14–16 mm SL) Dorsal-fin elements XX,12 (XIX–XXI,10–13), total 32 (30–32); anal-fin elements II,20 (II,19–21); pectoral-fin rays 13 (12–14); pelvic-fin elements I,3; segmented caudal-fin rays 13, upper procurrent rays 4 (4–5) and lower 4 (3–4).

Body slim and elongate, body depth 19 (19–22)% SL, body width 68 (62–72)% of body depth; predorsal length very short, 19 (18–21)% SL; prepelvic length 21 (22–25)% SL; preanal length 44 (45–48)% SL; caudal-peduncle length very short 29 (20–30)% HL, caudal-peduncle depth 38 (31–36)% HL. Head very short, length 23 (23–27)% SL; snout very short, pointed then becoming blunter with maturity, snout span 13 (14–23)% HL; orbit diameter 23 (19–27)% HL; single, unbranched, short orbital cirrus, less than pupil width; interorbital narrow, concave, minimum width 13 (10–13)% HL; anterior naris a low tube with a single finger-like cirrus, short becoming longer, up to about pupil width, posterior naris a flat elliptical opening adjacent to upper orbital rim; head pores usually full complement of genus; mouth large, upper jaw extending past eye and up to level of dorsal-fin origin in larger fish, oblique length 60 (52–62)% HL; upper and lower jaws with recurved caniniform teeth, in a wide band of tiny teeth at front, becoming a single row posteriorly, largest at start of single row; crescent of palatine teeth, up to 10 per side, two largest well-recurved and larger than jaw teeth; opercle, preopercle, interopercle, and subopercle margins smooth. Gill rakers 2+5, short, about one third length of longest gill filament.

Spinous and soft dorsal fins continuous, dorsal-fin base long, 78 (75–79)% SL; variable membranous flap in front of first spine, absent (Fig. 10) to distinct (Fig. 11), first dorsal-fin spine in TP relatively short, 52 (44–55)% HL, 12 (12–14)% SL, reaching 5–6th spine base when adpressed, in IP long, 62–73% HL, reaching 6–8th spine base when adpressed; second spine 54 (42–57)% HL in TP, 60–65% HL in IP; third spine 52 (28–52)% HL in

Figure 14. *Emblemariopsis lancea*, preserved paratypes, TP males: (upper) ANSP 113982, 20.0 mm SL; (lower) ANSP 113999, 20.3 mm SL, both St. Vincent (courtesy Kyle Luckenbill, ANSP).

Figure 15. *Emblemariopsis lancea*, pale TP males, both with lateral midline spots and X-shape cranial pattern: (upper) , developing opercular white lines, St. Vincent (Keri Wilk); (lower) trace of white lines © Stephen Frink/stephenfrink.com); both with lateral midline spots and X-shape cranial pattern.

TP, 29–41% HL in IP; fourth spine 50 (27–53)% HL in TP, 20–23% HL in IP; last spine shortest, 29 (17–29)% HL; IP with distinctly notched mid-dorsal-fin profile, i.e. first dorsal-fin soft ray much longer than last spine (more variable in TP), first dorsal-fin soft ray, 42 (28–46)% HL, longest dorsal-fin soft ray (about 4th) 54 (47–68)% HL; anal-fin base long, 49 (48–50)% SL, first anal-fin spine 23 (18–22)% HL; second anal-fin spine 29 (27–40)% HL, longest anal-fin soft ray (about antepenultimate) 48 (28–54)% HL; pelvic-fin spine not externally visible, first pelvic-fin ray medium length, 60 (42–57)% HL, middle longest 67 (55–72)% HL (intervening membrane incised about one-third length), third spindly and shortest and attached to middle for entire length, 42 (30–38)% HL; pectoral fin long, longest about middle ray, 92 (69–103)% HL; caudal fin rounded, length 16 (15–19)% SL.

Urogenital papilla of males a small short cone; urogenital opening of females inconspicuous beside fimbriated opening of anus.

Color in life. (Figs. 10, 11, 13, 15–20) Territorial TP all black anteriorly, including iris, except red band on distal portion of spinous dorsal fin extending posteriorly to about 5–7th membrane, overlying a narrow white band and with a narrower white rim, as well as reddish tips to pelvic-fin membranes. Dark-shaded and pale TP with same dorsal-fin color bands, but head with variably reddish iris and white-speckled upper half of head and lips, also prominent thin white lines (and often intervening darker bands) crossing lower operculum and extending onto branchiostegal membranes and sometimes underside of lower jaw; orbital cirrus black; mid and posterior spinous-dorsal fin with two or three irregular rows of dark spots; remaining fins mostly unmarked; body mostly translucent with a variable-length row of widely spaced, small, black spots along anterior lateral midline and patches of small melanophores spaced out along upper body just below dorsal fin; internal markings include alternating long red and short white bands along vertebral column, reddish to dusky streaks along dorsal and ventral bony processes, and an opaque peritoneal lining with an irregular, central, dark, V-shaped saddle. Transitional males (Figs. 17 & 18) similarly marked, but first three dorsal-fin spines variably elongated with distal red band and lower membranes

Figure 16. *Emblemariopsis lancea*, IP cranial pattern, early with ends of wide-V in band 3 (left) and later filling in to form an X-shape (right), bands 1, 2, and 4 undeveloped, St. Vincent (Ray Haberman).

Figure 17. *Emblemariopsis lancea*, transitional TP, elongated and reticulated anterior dorsal fin, incipient white lines on operculum, Dominica (Alan Whitworth/ Seahorse Productions).

Figure 18. *Emblemariopsis lancea*, transitional TP, shortening and reticulated anterior dorsal fin, Dominica (Jason Phillip).

Figure 19. *Emblemariopsis lancea*, IP, orange-tipped first dorsal-fin membrane, Dominica (Keri Wilk).

with thick red or brown reticulated bands, as well as residual white patches on proximal pectoral-fin rays and pelvic-fin rays, and a long, dark, usually thin, nearly vertical bar near pectoral-fin base.

IP fish with full complement of head spots on lower head, often forming up into opercular lines, reddish to pink upper iris with dark spokes, orbital cirrus dark or pale with speckles; elongated first three dorsal-fin membranes whitish to dark with 4 or 5 dark bands along leading edge of first spine, orangish tip, and thin white rim, fourth membrane with dark distal band and a dark patch at base, remaining fin with dark-lined spines and rays and well-spaced, small patches of fine white spots; other fins mostly unmarked except white patches near base of caudal-fin, pectoral-fin, and pelvic-fin rays; body mostly translucent with a prominent vertical to slightly oblique, long, typically narrow bar of melanophores near pectoral-fin base (sometimes breaking into two long spots), and some dark speckling mostly along upper body; internal markings include alternating long red and short white bands along vertebral column, reddish or dusky streaks along dorsal and ventral bony processes, and an opaque peritoneal lining with an irregular, central, dark, V-shaped saddle.

Early IP cranial pattern composed of an unpatterned area in bands 1 and 2; band 3 made up of only red ends of a wide-U; a red midline spot between bands 3 and 4; an undeveloped band 4 with red segments proximally; and a short red segment of band 5. As red bands develop and connect, band 3 becomes a sharp V and then fuses with the red midline spot connecting bands 3 and 4, the proximal red ends of band 4, and residual band 5 to form a broad red X.

Color in preservative. (Figs. 12 & 14) TP holotype in ethanol overall yellowish with some persistent pale-red markings, melanophore pattern preserved with wide dark bands across operculum; preserved IP uniform yellowish with prominent head and pectoral-fin-base markings. Formalin-preserved paratypes (all TP) yellowish with fine shading melanophores and a prominent dark anterior proximal dorsal fin, irregular rows of black spots along mid- and posterior spinous dorsal fin, and a mid-lateral line of small dark spots; fins otherwise mostly translucent. Two TP from Martinique are missing mid-lateral spots (perhaps a preservation artifact).

Figure 20. *Emblemariopsis lancea*, IP, St. Vincent (top, Keri Wilk; middle, Les Wilk), Dominica (bottom, Jason Phillip).

Etymology. The species epithet *lancea* is a Latin noun for lance or spear and treated as a noun in apposition. The name refers to the similarity of the red-over-white bands on the dorsal fin to the red-over-white spear banner carried by Lancer light-cavalry regiments in European (and Ottoman) armies over the centuries, and up to the present in the British and Indian Army (Fig. 21). The banner originated in the Lithuanian army in the 14th century from local Mongol (later Turkic) Tatar horsemen pressed into service. Lancer regiments fought in many notable historic battles, including at Waterloo (on both sides), the Charge of the Light Brigade in the Crimean War, Ulundi in the Anglo-Zulu war, and at Omdurman (Sudan) in 1898, probably the last major mounted-cavalry charge in history, with a young Winston Churchill at the fore.

It may not be coincidental that red and white contrasting bands are visible in low light conditions both on the battlefield and in sometimes murky reef waters in the southern Caribbean Sea, especially a region under the influence of the Orinoco outflow plume (see Johns et al. [2014]).

Figure 21. The 61st Lancer Cavalry of the Indian Army, one of the last mounted cavalry units in a modern army (J. Richards)

Distribution. (see Fig. 157) The new species is limited to the Windward chain of the Lesser Antilles, from Dominica south to Grenada and Tobago. Photographs and specimens have been taken from Dominica (photographs by Ned DeLoach, Les, Keri, and Kris Wilk, Jason Philip, and Alan Whitworth and collections), Martinique (Carole Assier de Pompignan and collections), St. Lucia (David Grenda and Jade Hoksbergen), St. Vincent (Ray Haberman and Keri Wilk), Little St. Vincent and Bequia in the Grenadines (Sue Manning and collections), and Grenada (Ethan Gordon, Douglas Harder, and Amy Lee). There are no records of the species from adjacent Guadeloupe to the north or Barbados in the east, although neither location has been very well documented. The new species is replaced by *E. tayrona* in Trinidad and Tobago and along continental shores.

Habitat. The reported depth range is from 1–15 m. Photographs show dark males in holes in both live and dead corals, of many species and of different morphologies, including holes embedded among encrusting sponges. IP fish perch on all substrates, living and dead, and are often found on sponges.

Remarks. The geographic range and range of appearances are well-established by a large volume of underwater photographs: over 200 were reviewed. The photographs included about half IP and half TP with only a handful clearly showing transitional-phase individuals (including the single *E. lancea* photograph in the most recent fish guidebook: Humann & DeLoach [2014: 342]). *Emblemariopsis lancea* is the only red-bannered species photographed or collected on the islands between Dominica and Grenada, other than *E. carib* in Barbados and a single TP *E. carib* photographed in St. Vincent by Keri Wilk (years of surveys and photographing of small reef fishes in St. Vincent by Ray Haberman, including the same site, has yielded no additional evidence of *E. carib*).

Stephens (1970) had only small collections to examine and worked only with preserved specimens, often unmarked, and thus erred in uniting different-appearing fish from opposite ends of the Caribbean Sea into the same species, including *E. lancea* with *Emblemariopsis occidentalis* Stephens, 1970 from Bahamas. The *E. lancea* TP of the SE Caribbean differs in many ways from true *E. occidentalis* TP from Bahamas, but Stephens had only a single male specimen of *E. occidentalis* for comparison and was conservative in not splitting the two populations into different species. Without additional specimens, especially fresh TP males showing their colors, as well as genetics, it would have been difficult to justify the split.

Stephens (1970) recognized that females "may differ considerably" from males and only tentatively associated IP fish with the TP males he described. He correctly suggested that the single IP fish collected at the same site as

the *E. occidentalis* TP was likely the same species. However, because that IP specimen was completely unmarked after long periods in preservative (an artifact), he decided to assign unmarked IP from anywhere to *E. occidentalis* and, concomitantly, any spotted-head IP to *E. carib* (as "*E. signifera*"). This false dichotomy has resulted in the gross inflation of the ranges of the two species in the literature. That dichotomy led Stephens (1970) to assign unspotted IP glass blennies from Antigua and Grand Cayman to *E. occidentalis* and to assign spotted IP fish from literally the same location and collections at Grand Cayman, plus those from Little St. Vincent and Bequia, to "*E. signifera*". The latter assignment must have concerned him, since he was assigning female fish to a different species from the males they were collected with, precisely at the same time and place. In retrospect, all of those IP individuals, regardless of the degree of spotting remaining in preservative, apparently belong to the local species (with orbital cirri) found at each location. That would be *E. leptocirris* from Cayman Islands (where there is no red-bannered species), *E. carib* or *E. leptocirris* from Antigua, and *E. lancea* from Little St. Vincent and Bequia (part of the non-type material above).

In the more recent past, *E. lancea* populations have been called *Emblemariopsis ramirezi* Cervigón, 1999 by divers in surveys and guidebooks, due to the general similarity of the red-banded pattern to Venezuelan populations originally described as *E. ramirezi*. However, *E. tayrona* (presently the senior synonym of *E. ramirezi*) is endemic to Colombia, Venezuela, and Trinidad and Tobago.

Comparisons. The only glass blenny sympatric with *E. lancea* is *E. bottomei*, which has no orbital cirri, no red banner on the TP, and no bar at the pectoral-fin base in the IP.

The black TP of *E. lancea* most closely resembles *E. falcon*, from western Venezuela: both have red-bannered TP males with relatively short first few dorsal-fin spines that are about equal in length and about the same length as the middle-fin spines. Black TPs of the two species look about the same if only the blackened head is visible and the distinctive row of spots on the lateral midline of *E. lancea* is not visible. The black TP of *Emblemariopsis randalli* Cervigón, 1965 (from Venezuela) looks quite similar, but has no orbital cirri (and 14 pectoral-fin rays). The TP of *E. dianae* (from Belize and Honduras) has a similar look and profile to the anterior dorsal fin (although often more notched anteriorly), but is missing the white band underlying the red band. The other red-bannered species have relatively longer first dorsal-fin spines: longer than the middle-fin spines in *E. tayrona*, spike-like in *E. carib* and *E. signifer*, and a moderately longer first spine in *E. occidentalis*. The remaining species have no red banner: two with cirri and 4 without.

Dark-shaded, pale, and transitional TP of the three banded-operculum species, *E. lancea*, *E. falcon*, and *E. tayrona* share the banded operculum, sometimes as only thin white lines on operculum; the flap along the first dorsal-fin spine; the long, almost vertical bar near the pectoral-fin base; and reticulated brown to orange bands on the anterior dorsal fin when transitional. In this stage, *E. lancea* is mainly distinguished by having a mid-lateral row of dark spots on the anterior body, shorter first several dorsal-fin spines than *E. tayrona*, and typically dark opercular bands vs. *E. falcon* with often bright rust-red bands. The TP of the other red-banded species do not have the banded operculum (*E. randalli* have unique markings, no cirri, and 14 pectoral-fin rays) or the vertical bar at pectoral-fin base; other species do not have a red-banded dorsal fin, and the 4 smoothhead species also have no cirri and shorter first dorsal-fin spines.

The IP of *E. lancea* and the other two banded-operculum species share the distinctive dark bar near the pectoral-fin base: long, thin (unless all melanophores are unusually well expanded), and slightly oblique. Other species have IP with spots, fully oblique bands (about 45°), or no dark marks near the pectoral-fin base. All three banded-operculum species also have IP with orange-tipped first dorsal-fin membranes, a phenomenon shared only with some IP *E. occidentalis* and *E. signifer*, and all can develop scattered small dark spots on the anterior upper body. It is likely that the IP of the banded-operculum group broadly overlap in appearance and are best distinguished by location. The IP of other species with orbital cirri are best separated by the lack of the pectoral-fin-base bars (and most without orange-tipped dorsal-fin membranes), and *E. ruetzleri* by greenish blue and gold colors and cranial pattern. Other species have no orbital cirri and two have very short first dorsal-fin spines; IP *E. randalli* have unique markings and 14 pectoral-fin rays.

The cranial pattern of *E. lancea* is also shared to some degree with the two other banded-operculum species, although it is not well-documented for those species. The undeveloped band 4, sharp-V band 3, and overall red X-shape are distinctive. The earlier pattern of red ends of a wide-U appears similar to several other species.

Emblemariopsis falcon, n. sp. Victor & Rodríguez

Falcon Red Banner Blenny
Tubícola Falcon

urn:lsid:zoobank.org:act:1616E130-9A00-46D4-8A46-8A3BCA5CE2FB

mtDNA COI sequence BIN https://doi.org/10.5883/BOLD:ABA4170 (in part)

Figures 22–32; Tables 1 & 2

Emblemariopsis ramirezi [*non* Cervigón] Rodríguez 2008: 249–250, fig. 1A (Morrocoy, Venezuela); Rodríguez 2010a: 313 (Los Roques, Venezuela); Rodríguez 2012: 94 (San Esteban, Venezuela); Robertson & Van Tassell 2015, 2019: online guide (central and western Venezuela listings only).

Holotype. AMNH 249359, 20.0 mm SL, TP male, Venezuela, Monje del Norte, 12.4836°, -70.9161°, D.R. Robertson, O. Lucanus & J. Posada, 9 September 2008.

Paratypes. AMNH 242844, 21.0 mm SL, TP, Venezuela, Aragua, La Ciénaga de Ocumare, 10.4847°, -67.8372°, J. Van Tassell, D.R. Robertson & J. Posada, 23 June 2007; AMNH 249368, 19.1 mm SL, transitional TP

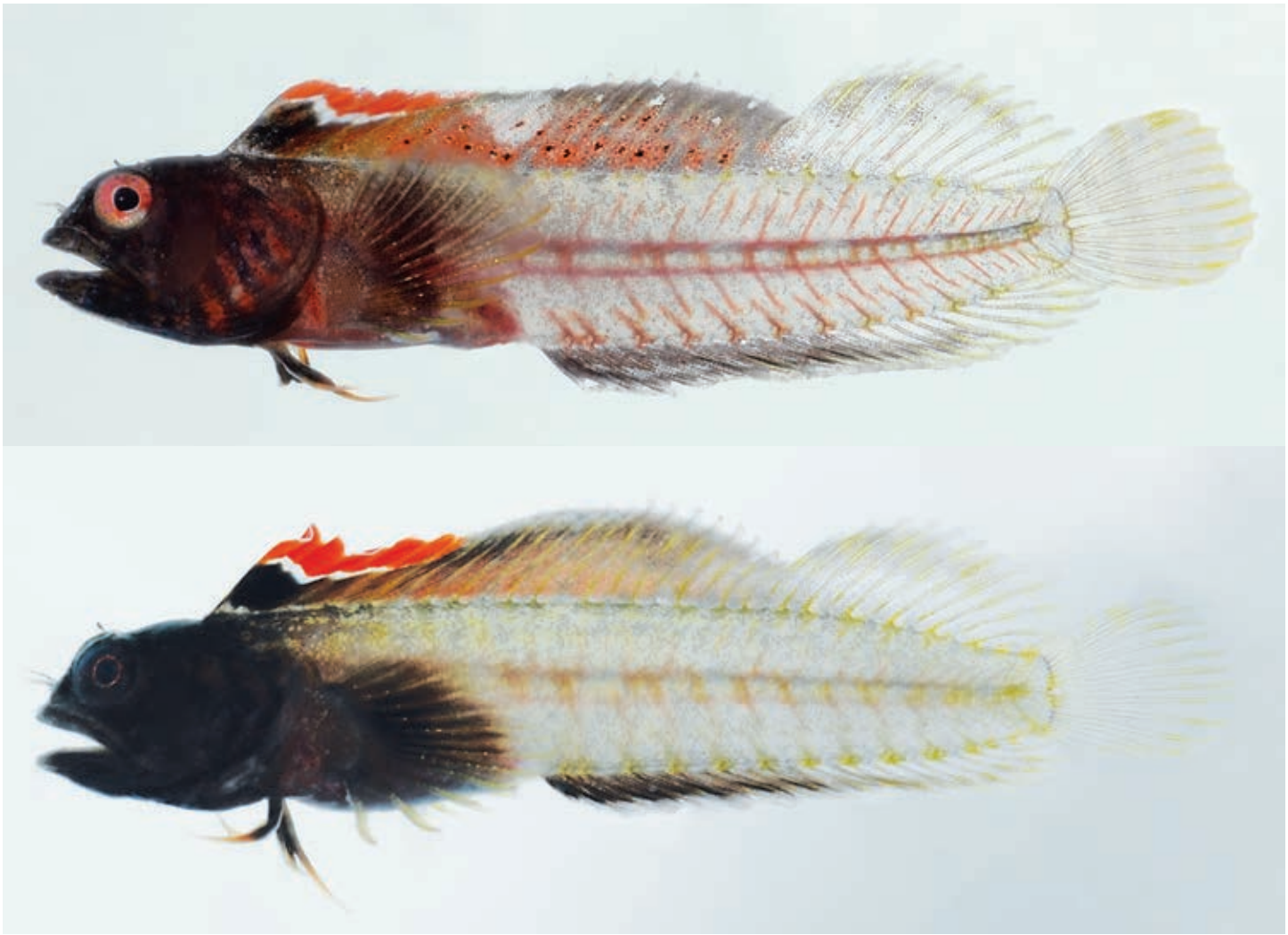

Figure 22. *Emblemariopsis falcon*, upper: holotype, AMNH 249359, 20.0 mm SL TP male, Los Monjes, NW Venezuela; lower: paratype, AMNH 249390, 19.5 mm SL, TP male, Los Monjes, NW Venezuela (James Van Tassell & D. Ross Robertson).

& 19.9 mm SL, IP, Venezuela, Monje del Norte, 12.4836°, -70.9161°, D.R. Robertson, O. Lucanus & J. Posada, 9 September 2008; AMNH 249390, 19.5 mm SL, TP, Venezuela, Monje del Sur, 12.3597°, -70.9042°, D.R. Robertson, O. Lucanus & J. Posada, 10 September 2008; UF 177147, 17.0 mm SL, transitional TP, Venezuela, Los Roques Islands, Los Canquises, 11.9217°, -66.8283°, 1 m, D. deSylva, L. Salas, J.M. Green & F. Weibezahn, 10 August 1963.

Diagnosis. A species of *Emblemariopsis* with an orbital cirrus and a red banner (a set of 7 spp.); TP territorial males in holes with a black head and blackened anterior dorsal fin with a distal red band over a narrow white band and a thin white margin, red band extending posteriorly to 5–7th spinous membrane, curved down at front when erected in displaying TP, a narrow anterior flap variably present along first spine; first 10 dorsal-fin spines relatively short and about equal length, first spine reaching to 5–6th spine base when adpressed, about half of HL, 11–12% SL. Profile of anterior dorsal fin usually a straight line or slight concavity.

Dark-shaded and pale TP with a red-banded dorsal fin with irregular rows of larger dark spots along membranes of mid and posterior spinous-dorsal fin, lower operculum and branchiostegal membranes with prominent narrow white lines alternating with wider rust-red or dark bands (=banded-operculum group of 3 spp.), no row of discrete small dark spots along anterior lateral midline, uncommonly a row of dark spots along anterior upper body; transitional males with variably elongated anterior dorsal-fin spines with a distal red band over reticulated brown to orange bands on first three membranes.

IP with elongated first two dorsal-fin spines, usually orange-tipped membranes, first spine reaching to base of 6–9th spine base when adpressed, second slightly shorter, third about 1/2 of first (earlier IP and juvenile with less elongate spines); live colors include red, orange, and pink; cranial pattern not documented; IP head spots usually full complement; melanophores near pectoral-fin base typically form a long, thin, slightly oblique bar, often followed by one or more spots.

Figure 23. *Emblemariopsis falcon*, dark-shaded TP, aquarium photograph, specimen collected from San Esteban, Carabobo, NW Venezuela (Lisette Molins & Jose Gregorio Rodríguez).

Figure 24. *Emblemariopsis falcon*, pale TP, AMNH 242844, 21.0 mm SL TP male, Ocumare de al Costa, Aragua, NW Venezuela (James Van Tassell & D. Ross Robertson).

Dorsal-fin elements XX–XXI,11–12 (total 32–33); anal-fin elements II,20–21; pectoral-fin rays usually 13; caudal-fin procurrent rays usually 3–4/3–4; LIO pores 3; largest specimen 25.2 mm SL.

Description. (morphometrics from 5 TP types) Dorsal-fin elements XXI,11 (XX–XXI,11–12), total 32 (32–33); anal-fin elements II,21 (II,20–21); pectoral-fin rays 13 (12–14); pelvic-fin elements I,3; segmented caudal-fin rays 13, upper procurrent rays 3 (3–5) and lower 4 (2–4).

Body slim and elongate, body depth 19 (19–21)% SL, body width 64 (52–67)% of body depth; predorsal length very short, 20 (20–24)% SL; prepelvic length 24 (23–25)% SL; preanal length 48 (48–50)% SL; caudal-peduncle length very short 21 (19–29)% HL, caudal-peduncle depth 31 (30–33)% HL. Head very short, length 29 (27–28)% SL; snout very short, pointed then becoming blunter with maturity, snout span 16 (12–17)% HL; orbit diameter 22 (24–28)% HL; single, unbranched, very short orbital cirrus, much less than pupil width; interorbital narrow, concave, minimum width 11 (10–12)% HL; anterior naris a low tube with a single finger-like cirrus, from rudimentary to about pupil width, posterior naris a flat elliptical opening adjacent to upper orbital rim; head pores usually full complement of genus; mouth large, upper jaw extending past eye and up to level of dorsal-fin origin in larger fish, oblique length 53 (45–48)% HL; upper and lower jaws with recurved caniniform teeth, in a wide band of tiny teeth at front, becoming a single row posteriorly, largest at start of single row; crescent of palatine

Figure 25. *Emblemariopsis falcon*, dark-shaded TP, Chichiviriche de la Costa, Vargas, NW Venezuela (Jose A. Paez).

Figure 26. *Emblemariopsis falcon*, anterior dorsal fin with a relatively wide membranous flap in front of the first dorsal-fin spine, red band is white here in ethanol-preserved paratype, AMNH 249390, 19.5 mm SL, TP male, Los Monjes, NW Venezuela (Benjamin Victor).

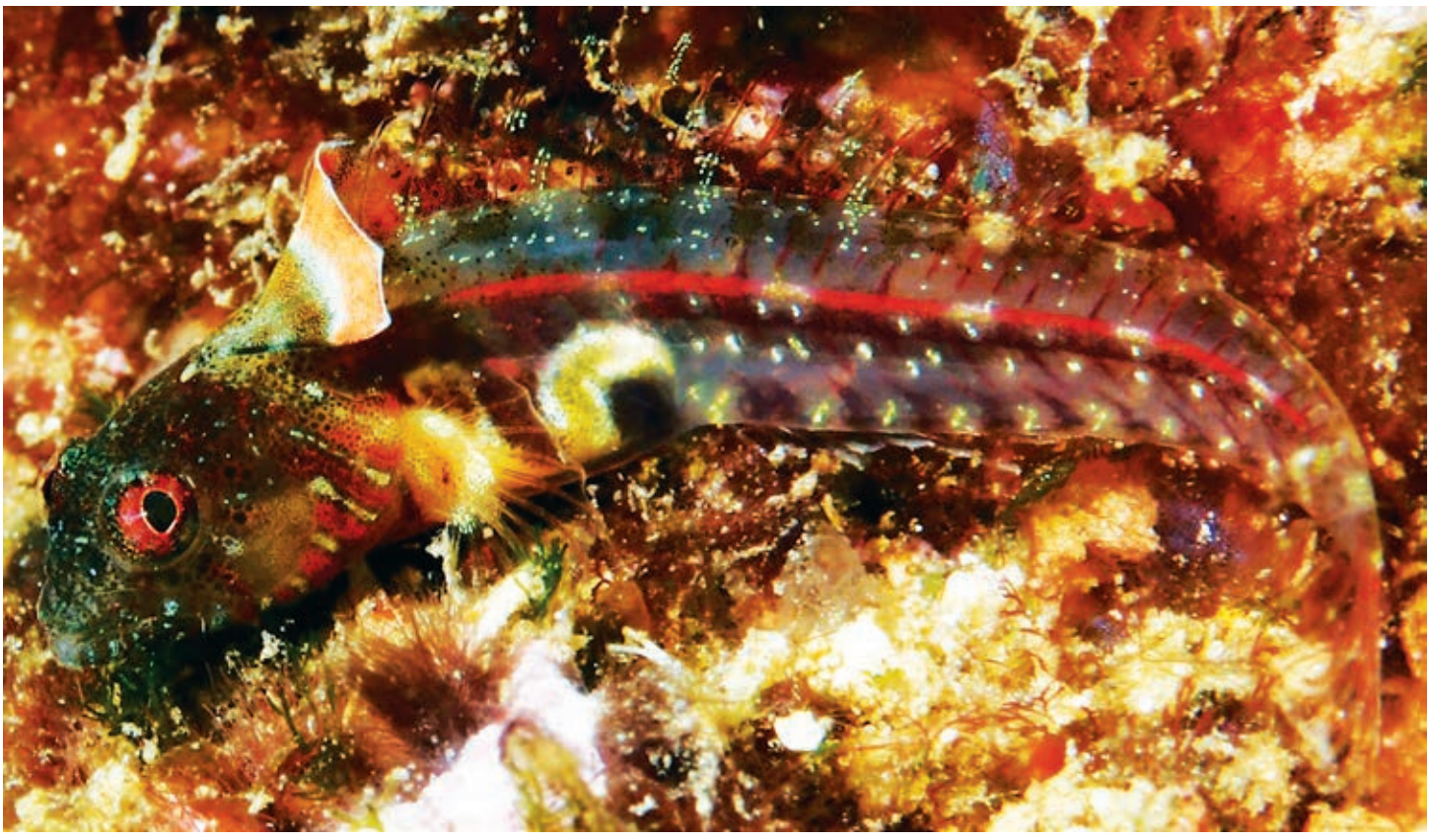

Figure 27. *Emblemariopsis falcon*, dark TP, Chichiviriche de la Costa, Vargas, NW Venezuela (Gabriela Carias).

teeth, up to 10 per side, two largest well-recurved and larger than jaw teeth; opercle, preopercle, interopercle, and subopercle margins smooth. Gill rakers 2+5, short, about one third length of longest gill filament.

Spinous and soft dorsal fins continuous, dorsal-fin base long, 75 (69–76)% SL; variable membranous flap anterior of first spine, from absent up to half width of first interspinous membrane (Fig. 26), first dorsal-fin spine in TP relatively short, 47 (41–43)% HL, 13 (12)% SL, reaching 5–6th spine base when adpressed, in IP long, reaching 6–9th spine base when adpressed; second spine 47 (41–43)% HL in TP; third spine 47 (30–42)% HL in TP; fourth spine 38 (26–42)% HL in TP; last spine shortest, 24 (12–25)% HL; IP with distinctly notched mid-dorsal-fin profile, i.e. first dorsal-fin soft ray much longer than last spine (more variable in TP), first dorsal-fin soft ray, 48 (30–42)% HL, longest dorsal-fin soft ray (about 4th) 62 (41–52)% HL; anal-fin base long, 48 (46–48)% SL, first anal-fin spine 22 (10–18)% HL; second anal-fin spine 41 (25–31)% HL, longest anal-fin soft ray (about antepenultimate) 50 (31–43)% HL; pelvic-fin spine not externally visible, first pelvic-fin ray medium length, 55 (48–58)% HL, middle longest 43 (50–68)% HL (intervening membrane incised about one-third length), third spindly and shortest and attached to middle for entire length (sometimes indistinct), 33 (36–40)% HL; pectoral fin long, longest about middle ray, 71 (72–80)% HL; caudal fin rounded, length 21 (17–20)% SL.

Urogenital papilla of males a small short cone; urogenital opening of females inconspicuous beside fimbriated opening of anus.

Color in life. (Figs. 22–25, 27–32) Territorial TP all black anteriorly, including iris, except red band on distal portion of spinous dorsal fin extending posteriorly to about 5–7th membrane, overlying a narrow white band and

Figure 28. *Emblemariopsis falcon*, pale TP, Chichiviriche de la Costa, Vargas, NW Venezuela (Gabriela Carias).

Figure 29. *Emblemariopsis falcon*, transitional TP, aquarium photograph, specimen collected from San Esteban, Carabobo, NW Venezuela (Lisette Molins & Jose Gregorio Rodríguez).

with a narrower white rim, as well as reddish tips to pelvic-fin membranes. Dark-shaded and pale TP with same dorsal-fin color bands, but head with variably reddish iris and white-speckled upper half of head and lips, also prominent thin white lines and intervening rust-red or darker bands, crossing lower operculum and extending onto branchiostegal membranes and sometimes underside of lower jaw; orbital cirrus black; mid and posterior spinous-dorsal fin with two or three irregular rows of dark spots; remaining fins mostly unmarked; body mostly translucent with no discrete spots, except sometimes a short row of spots along anterior upper body (well above lateral midline)and patches of small melanophores spaced out along upper body just below dorsal fin; internal markings include alternating long red and short white bands along vertebral column, reddish to dusky streaks along dorsal and ventral bony processes, and an opaque peritoneal lining with an irregular, central, dark, V-shaped saddle. Transitional males (Figs. 29 & 30) similarly marked, but first three dorsal-fin spines variably elongated

Figure 30. *Emblemariopsis falcon*, paratype, AMNH 249368, 19.1 mm SL transitional TP, Los Monjes, NW Venezuela (James Van Tassell & D. Ross Robertson).

Figure 31. *Emblemariopsis falcon*, paratype, AMNH 249368, 19.9 mm SL IP female, Los Monjes, NW Venezuela (James Van Tassell & D. Ross Robertson).

with distal red band and lower membranes with thick red or brown reticulated bands, and a long, dark, usually thin, nearly vertical bar near pectoral-fin base.

IP fish with full complement of head spots on lower head, often forming up into opercular lines, reddish to pink upper iris with dark spokes, orbital cirrus dark or pale with speckles; elongated first three dorsal-fin membranes whitish to dark with three to 5 dark bands along leading edge of first spine, orangish tip, and thin white rim, fourth membrane with dark distal band and a dark patch at base, remaining fin with dark-lined spines and rays and well-spaced, small patches of fine white spots; other fins mostly unmarked except white patches near base of caudal-fin, pectoral-fin, and pelvic-fin rays; body mostly translucent with a prominent vertical to slightly oblique, long, typically narrow bar of melanophores near pectoral-fin base (sometimes breaking into two long spots), and some dark speckling mostly along upper body; internal markings include alternating long red and short white bands along vertebral column, reddish or dusky streaks along dorsal and ventral bony processes, and an opaque peritoneal lining with an irregular, central, dark, V-shaped saddle.

Cranial pattern of markings not well documented.

Color in preservative. (Fig. 26) TP types overall yellowish with dark markings preserved, anterior dorsal fin with black proximal membranes and white in place of red band, usually also showing wide dark bands across operculum and dark spots on spinous dorsal fin and dark bands along distal spinous dorsal and anal-fin membranes, especially anteriorly; pectoral-fin membranes often also darkened; soft dorsal fin and caudal fin unmarked. Preserved IP uniform yellowish with dark head and pectoral-fin-base spots and markings.

Figure 32. *Emblemariopsis falcon*, small IP, orange-tipped first dorsal-fin membrane, aquarium photograph, specimen collected from San Esteban, Carabobo, NW Venezuela (Lisette Molins & Jose Gregorio Rodríguez).

Etymology. The species epithet is a noun in apposition, referring to the Venezuelan state of Falcon in western Venezuela, the location at which the species was first recognized by Jose Gregorio Rodríguez in 2008.

Distribution. (see Fig. 157) The new species is endemic to NW coastal Venezuela and the offshore archipelagos, surveyed thoroughly by Jose Gregorio Rodríguez. The range includes offshore islands of Los Monjes (collections by D. Ross Robertson and James Van Tassell at AMNH) and the Los Roques archipelago at Los Canquises and Herradura/Dos Mosquisos Sur (Rodríguez 2010a). It is also found along the coastline, at Morrocoy National Park in Falcon (Rodríguez 2008), the nearby San Esteban National Park in Carabobo (Rodríguez 2012), and collections from Ocumare de la Costa de Oro in Aragua (AMNH) and numerous photographs from Chichiviriche de la Costa in Vargas. Two surveys of the east-central coastline, at the Piritu Islets, off Anzoátegui (Rodríguez 2010b), and Mochima in Sucre (Molins & Rodríguez-Quintal 2014), did not record either *E. falcon* or *E. tayrona* (thus far, the only red-bannered species photographed underwater at the frequently dived Mochima Park has been *E. randalli*).

Habitat. The depth range is reported to be 10–12 m at Morrocoy National Park (Rodríguez 2008), in habitat with dead colonies of *Colpophyllia* brain corals, and less than one meter deep at Los Roques. They are noted not to be found in groups, a characteristic of the co-occurring *E. randalli*.

Remarks. The new species was only recently recognized as different from adjacent populations of red-bannered *Emblemariopsis*. All red-bannered glass blennies with orbital cirri (vs. *E. randalli*) from Venezuela and the Windward Lesser Antilles have been referred to as "*E. ramirezi*" after the description of that species in 1999 and similar-appearing Colombian populations had been described earlier as *E. tayrona* in Acero (1987). However, "*E. ramirezi*" from NE Venezuela and *E. tayrona* have distinctly longer first dorsal-fin spines than *E. falcon* (and the two former species are synonymized here). *Emblemariopsis falcon* occurs in the intervening region between those two populations, an area less influenced by cold-water upwelling (see discussion for *E. tayrona*).

Comparisons. The two glass blennies sympatric with *E. falcon* are *E. randalli*, with no orbital cirri, a very different -looking IP but a very similar-looking black TP; and *E. bottomei*, with no orbital cirri, no red banner and a well shorter first dorsal -fin spine on the TP, and no bar at the pectoral-fin base in the IP.

Emblemariopsis falcon most closely resembles *E. lancea*, from the southern Lesser Antilles chain: both have red-bannered TP males with relatively short first few dorsal-fin spines that are about equal in length and about the same length or even less than the middle-fin spines. Black TPs of the two species look about the same if only the blackened head is visible and spots on the lateral midline are not visible. The black TP of the sympatric *E. randalli* looks quite similar, but has no orbital cirri (and 14 pectoral-fin rays). The TP of *E. dianae* (from Belize and Honduras) has a similar profile to the anterior dorsal fin (although often more notched), but is missing the white band underlying the red band. The other red-bannered species have relatively longer first dorsal-fin spines: much longer than the middle-fin spines in *E. tayrona*, spike-like in *E. signifer* and *E. carib* and moderately longer in *E. occidentalis*. The species without red banners or orbital cirri, especially sympatric *E. bottomei*, also have a much shorter first dorsal-fin spine, about 1/4 to 1/3 HL.

Dark-shaded, pale, and transitional TP of *E. falcon* share the banded operculum and bar near the pectoral-fin base only with *E. lancea* and *E. tayrona*. The bands are often bright rust-red in *E. falcon* (vs. typically dark bands, sometimes reddish in pale TP, in the other species). In this stage, *E. lancea* are separated by having a mid-lateral row of discrete dark spots on the anterior body (vs. none or rarely spots on the anterior body well above the lateral midline) and *E. tayrona* have a longer first dorsal-fin spine. Transitional TP males of *E. tayrona* and *E. falcon* can look quite similar (with their elongated first dorsal-fin spines), although the first dorsal-fin spine of *E. tayrona* is still relatively longer.

The IP of *E. falcon* is not well documented, especially underwater. Nevertheless, they appear very similar to the two other banded-operculum species that share the distinctive thin, somewhat oblique bar near the pectoral-fin base as well as orange-tipped first dorsal-fin spines (also can be on some IP *E. occidentalis* and *E. signifer*). Other congeners have IP with spots, fully oblique bars, or no dark marks on the pectoral-fin base. The IP of several other species are distinguished by the absence of orbital cirri, especially the two overlapping glass blenny species within the range: *E. bottomei* and *E. randalli* (the latter with very different IP markings and 14 pectoral-fin rays). The two remaining smoothhead species can be distinguished by having very short first dorsal-fin spines in the IP (and they do not overlap the range).

Emblemariopsis tayrona (Acero, 1987)

Highfin Red Banner Blenny
Tubícola Aleta Alta

Figures 33–45; Tables 1 & 2

Emblemariopsis signifera [*sic*] [*non* Ginsburg] Palacio 1974: 70 (UF 29972: Tierra Bomba, Colombia).
Coralliozetus tayrona Acero, 1987: 14–18, fig. 1 (Cartagena, Colombia).
Coralliozetus ramirezi Cervigón, 1999: 1–4, 2 figs. (Los Frailes, NE Venezuela).
Emblemariopsis ramirezi Williams 2003: 1767; Lasso-Alcalá et al. 2005: 191 (Venezuela); Patzner et al. 2009: 470.
Emblemariopsis ramirezi (in part) Humann & DeLoach 2014: 342–343, 2 figs. (Venezuela listings only); Robertson & Van Tassell 2015, 2019: online guide (NE Venezuela listings only).

Holotype. ANSP 150876, 22.4 mm SL, TP male, Colombia, Santa Marta, Punta de Betin, 11.25°, -74.22°, 0–1 m, A. Acero, 2 July 1980.

Diagnosis. A species of *Emblemariopsis* with an orbital cirrus and a red banner (a set of 7 spp.); TP territorial males in holes with a black head and blackened anterior dorsal fin with a distal red band over a narrow white band and a thin white margin, red band extending posteriorly to 5–7th spinous membrane, typically forming a straight line when fully erected in displaying TP (or a high crescent when not erected), a narrow anterior flap variably present along first spine; first three dorsal-fin spines elongated, first spine reaching to 7–10th spine base when adpressed, more than 3/4 HL, 21–23% SL, second spine 80–90% of first, third spine 65–80% of first, fourth to tenth spine about 1/2 to 2/3 of first; profile of anterior dorsal fin usually a broad down-sloping concavity due to shorter middle-fin spines (unless fully erected).

Figure 33. *Emblemariopsis tayrona*, black TP with fully extended dorsal-fin display, Isla Margarita, Venezuela (Paul Humann).

Figure 34. *Emblemariopsis tayrona*, preserved holotype, TP male, ANSP 150876, 22.4 mm SL, Punta de Betin, Santa Marta, Colombia (courtesy Kyle Luckenbill, ANSP).

Dark-shaded and pale TP with a red-banded dorsal fin with irregular rows of larger dark spots along membranes of mid and posterior spinous-dorsal fin, lower operculum and branchiostegal membranes with prominent wider dark bands alternating with pale bands and/or white lines (=banded-operculum group), no row of discrete small dark spots along anterior lateral midline, sometimes a row of dark spots along anterior upper body; transitional males with elongated anterior two dorsal-fin spines with a distal red band over reticulated brown to orange bands on first few membranes.

IP with elongated first two dorsal-fin spines, usually orange-tipped membranes, first spine reaching to base of 6–8th spine base when adpressed, second slightly shorter, third about 1/2 of first (earlier IP and juvenile with less elongate spines); live colors include red, orange, and pink; cranial pattern not well documented; IP head spots usually full complement; frequently speckled anterior upper body; melanophores near pectoral-fin base typically form a long, thin, slightly oblique bar, often followed by one or more spots.

Dorsal-fin elements IXX–XXI,11–13 (total 31–33); anal-fin elements II,18–22, usually 20 or 21; pectoral-fin rays almost always 13; caudal-fin procurrent rays usually 4/3; LIO pores 3; largest specimen 31.0 mm SL (MMM).

Habitat. Acero (1987) reported a wide depth range in Colombia, from 0–20 m, and from coral and rocky-coral reefs and even on pilings in the Santa Marta harbor, but not in high-energy zones. Males occupied barnacle shells and worm holes, especially on dead *Millepora* corals, whereas females were on the hard surface, in crevices and on corals, especially *Montastrea annularis*. Cervigón (1999) reported the depth range for the Venezuelan population (as "*E. ramirezi*") to be 9 to 15 m, noting they occur deep to avoid rougher shallow water. The holes occupied by males were typically empty cirripede shells placed among *Millepora* corals. A specimen from Los Testigos (SIO 01-176) was reportedly collected at 10 m depth. In all locations, this species apparently avoids high-energy areas, going deep when necessary.

Distribution. (see Fig. 157) The species ranges from Colombia to Venezuela and Trinidad and Tobago, but split into two populations, one in Colombia and the other in NE Venezuela to Tobago. In Colombia, Acero (1987) reported *E. tayrona* from along the central coast, from Isla de Tierra Bomba (Cartagena) to Bahia de Cinto (Santa Marta). The Colombian range extends eastward to Bahia Portete on the Guajira Peninsula (based on MHNMC PEC 1505, collected by Jaime Garzon Ferreira; presently in the El Museo de Historia Natural Marina de Colombia, photograph on internet). The Venezuelan range is limited to the northeast region, including the Cariaco Basin, Araya and Paria Peninsulas, and the offshore islands of Margarita, Cubagua, Coche, Los Frailes, and Los Testigos archipelago (collections by D. Ross Robertson and James Van Tassell, AMNH; photographs by Luiz Rocha, Humberto Ramirez, Gabriela Carias, and Paul Humann). At the eastern limit of the range, the species extends to the Chaguaramas Peninsula of Trinidad, near the tip of the Paria Peninsula (Ken Deaver and D. Ross Robertson) and to Tobago (collections by Jeff Williams, underwater photograph by Paul Humann).

The northeast of Venezuela is a focus of endemism for a number of marine organisms, most likely due to an intense zone of upwelling, with concomitant cold waters and different oceanographic conditions, including a major deep anoxic zone (Rueda-Roa et al. 2018). The disjunct distribution of *E. tayrona*, in eastern Colombia

Figure 35. *Emblemariopsis tayrona*, TP males with row of spots along upper anterior body: (upper) preserved holotype, ANSP 150876, 22.4 mm SL, Punta de Betin, Santa Marta, Colombia (courtesy Kyle Luckenbill, ANSP); (lower) fresh specimen, AMNH 237354, Los Frailes, Venezuela, 05-536 (James Van Tassell & D. Ross Robertson).

Figure 36. *Emblemariopsis tayrona*, black TPs (top and upper middle), AMNH 247600, Los Testigos archipelago, Venezuela 06-656; dark-shaded TP (lower middle), no collection, Isla de Patos, Paria Peninsula, Venezuela 08-807; late transitional TP (bottom), AMNH 247600, Los Testigos archipelago, Venezuela (James Van Tassell & D. Ross Robertson).

Figure 37. *Emblemariopsis tayrona*, dark-shaded TP, USNM 317601, Tobago (Jeffrey T. Williams, USNM).

and, after a gap (occupied by *E. falcon*), along the coast of northeastern Venezuela to the tip of the Paria Peninsula closely matches locations of peak upwelling (Fig. 38). The collections in Tobago are from an area with a colder and very turbid surface layer and well within Orinoco-outflow effects (J.Williams, pers. comm.).

Remarks. At present there are no DNA sequences available for this species, making it the only *Emblemariopsis* without a sequence.

Until now, *E. tayrona* has been considered endemic to Colombia and *E. ramirezi* endemic to Venezuela. The distinction between the two nominal species has persisted due to limited information and few available specimens and photographs. Cervigón described *E. ramirezi* in 1999 without any mention of *E. tayrona*. Upon further examination, both nominal species have TPs with the distinctive long first few anterior dorsal-fin spines (not a spike for the first spine) and have the same fin-ray counts. Because there are no discernable features presently found separating them, *E. tayrona* should be considered the senior synomym of *E. ramirezi*.

The name "*E. ramirezi*" has been liberally applied to red-bannered glass blennies throughout the SE Caribbean, including *E. lancea* and *E. falcon*. However, TP males from the type location of *E. ramirezi* (Los Frailes, NE Venezuela) and the adjacent islands and coastline have notably longer first few dorsal-fin spines (Fig. 36) than other red-bannered species in NW Venezuela and the Windward Lesser Antilles. Measurements show that the first dorsal-fin spine for 6 TP males (UF 160234) from near the type location are 21–23% SL, more than 3/4 HL, and about twice as long as the middle-fin spines. The second and third spines are also long, leading to the appearance in underwater photographs where the anterior dorsal fin can cover the anterior body somewhat like a sheet (Fig.

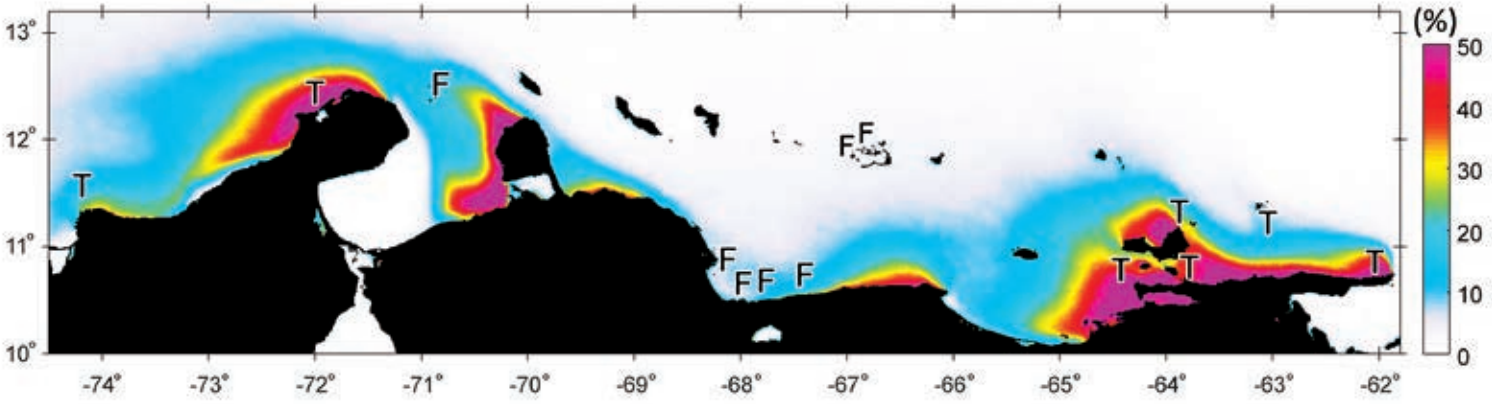

Figure 38. Disjunct distribution of *Emblemariopsis tayrona* (T) and *E. falcon* (F) compared to the spatial distribution of the Southern Caribbean upwelling system along the Colombian and Venezuelan coastline: color indicates percentage of passes with Sea Surface Temperature (SST) lower than 24°C (produced by newly upwelled water) during the Southern Caribbean upwelling season (January–April, 1994–2016). Each color pixel represents the proportion of passes with SST below 24°C vs. total passes with data: 17,077 individual passes from the Advanced Very High-Resolution Radiometer (AVHRR) were used for the calculation (courtesy Digna T. Rueda-Roa & Frank Muller-Karger, Institute for Marine Remote Sensing -IMaRS, College of Marine Science, University of South Florida, http://imars.usf.edu/).

Figure 39. *Emblemariopsis tayrona*, transitional TP, (upper) with barred operculum and spoked iris, AMNH 249169, Isla de Patos, Paria Peninsula,Venezuela 08-802; (lower) early transitional TP (barred operculum), AMNH 247598, Los Testigos, Venezuela, 06-662 (James Van Tassell & D. Ross Robertson).

40), and extending to or beyond the snout when the fin is fully erected in displaying males, with the red band projecting as a straight line (Fig. 33).

The original photograph of the preserved holotype of *E. ramirezi* in Cervigón (1999: 2) shows a long curled end of the first spine(s), white in the photograph (red in life), making it longer than later spines and clearly twice the length of the middle-fin spines. The drawing on the next page (p. 3) is stylized and shows the first dorsal-fin spine slightly shorter than the second and third, although still about twice the length of the middle-fin spines, and

Figure 40. *Emblemariopsis tayrona*, pale TP, long anterior dorsal-fin spines, Isla Margarita, Venezuela (Paul Humann).

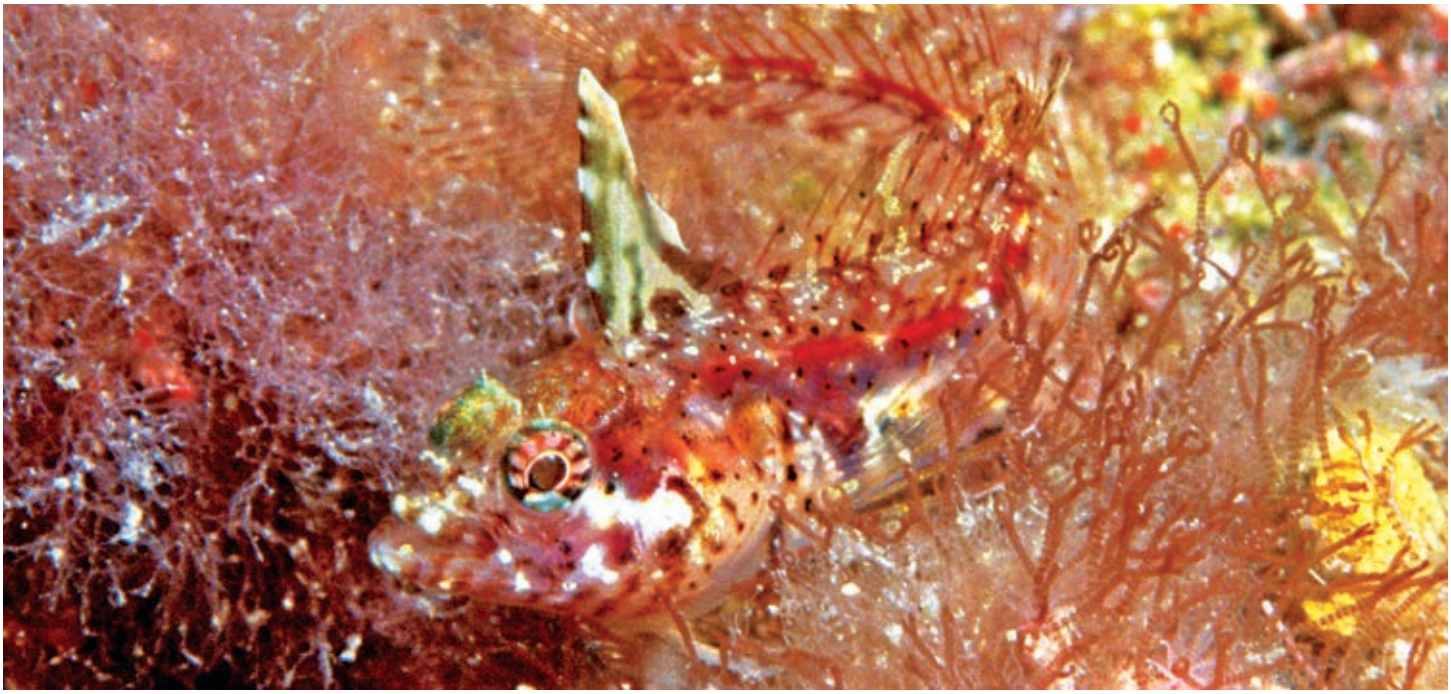

Figure 41. *Emblemariopsis tayrona*, early transitional, Isla Margarita, Venezuela (Paul Humann).

more than 3/4 of the HL (the drawing also shows the eye about half the true size from the holotype photograph and measurements presented in the paper).

The morphometric description of *E. tayrona* (in his Table 4, p. 16) lists the first dorsal-fin spine as much shorter than it is on the actual specimen (ANSP 150876): for the TP holotype it is listed as 2.2 mm with a SL of 22.4 mm (about 10% SL) and a HL of 4.7 mm (i.e. less than half of HL). However, on the holotype specimen it is double that, 20% SL and 3/4 of HL (Figs. 34 & 35). A photograph on the internet of a Colombian TP specimen (MHNMC PEC 1505) also shows the distinctively long first 4 dorsal-fin spines. The photograph of a paratype in the description (Fig. 1, INVEMAR-P 0760: p. 21) shows an apparently transitional TP with a relatively long first dorsal-fin spine and shorter subsequent spines, but the angle of the photograph makes the profile of the dorsal fin unclear (probably transitional based on the iris with a spoke pattern and an apparently pale snout and cheek). That photograph shows the long bar at the pectoral-fin base that is obscure on the preserved holotype (and characteristic of all three banded-operculum species).

Figure 42. *Emblemariopsis tayrona*, transitional TP, barred operculum, spoked iris, Isla Margarita, Venezuela (Paul Humann).

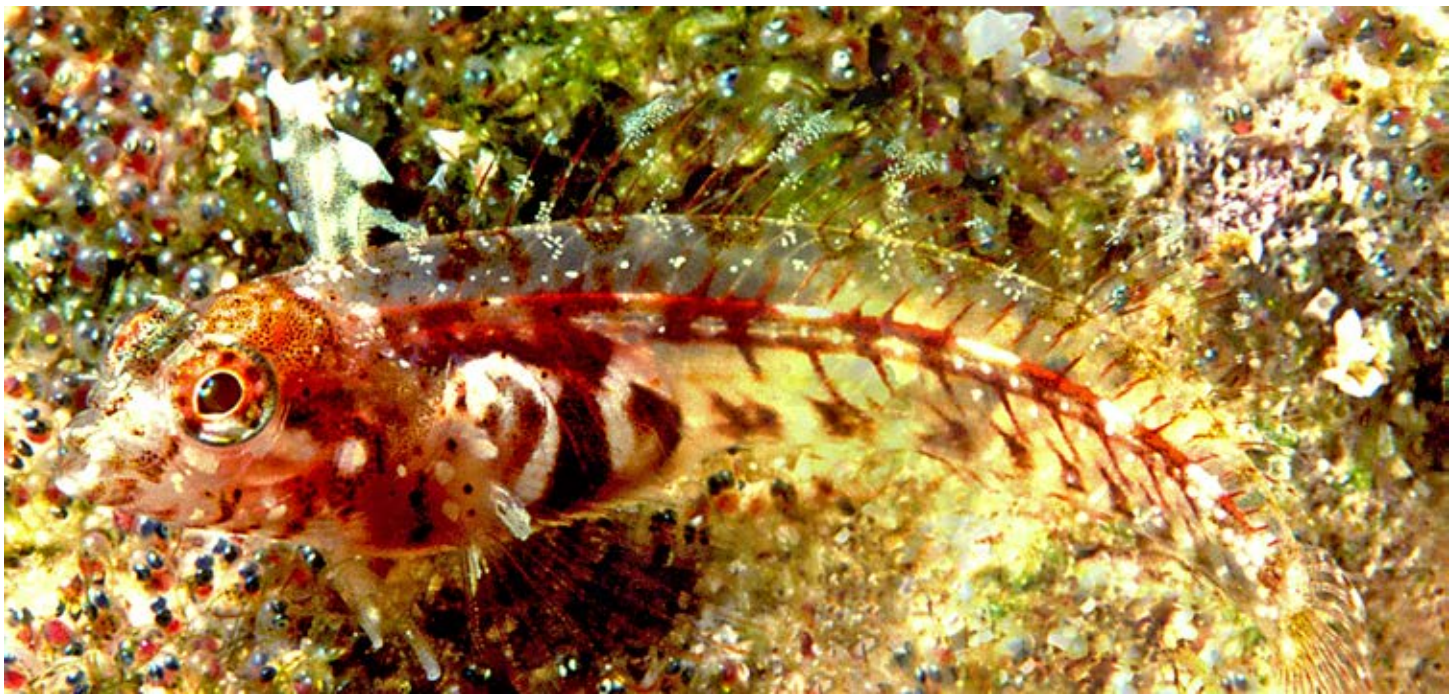

Figure 43. *Emblemariopsis tayrona*, IP, Isla Margarita, Venezuela; damselfish eggs in background (Paul Humann).

One unusual feature of the *E. tayrona* holotype is the row of dark spots along the upper anterior body below the dorsal-fin, however, the same row of spots is present on some Venezuelan specimens, e.g. a TP specimen in Fig. 35 (from Los Frailes, the type location for *E. ramirezi*), a transitional TP from the NE Venezuelan coastline (Fig. 39 upper) and on some Tobago specimens (Fig. 37): note that these are not the midlateral row of spots that distinguish *E. lancea*.

Comparisons. Two other *Emblemariopsis* species, *E. bottomei* and *E. randalli*, occur within the range of *E. tayrona*, and both are distinguished by the absence of orbital cirri and neither have the bar on the pectoral-fin base (*E. randalli* also has very distinct IP markings and color patterns and 14 pectoral-fin rays). The red-banded TP of *E. randalli* looks very similar to *E. tayrona* and can be mistaken if the presence of the cirri and the length of the first dorsal-fin spines are not clearly apparent.

The black TP of *E. tayrona* can be distinguished from several other red-banded TP by a relatively long first dorsal-fin spine (up to twice middle-fin spines, > 3/4 of HL, 20–23% SL), vs. shorter in *E. dianae* (8–15%), *E. falcon* (12–13%), *E. lancea* (12–14%), *E. occidentalis* (15–17%), and *E. randalli*. The long first spine is only slightly longer than the second spine, whereas *E. carib* and *E. signifer* have a much longer, spike-like first spine. Both adjacent species, *E. falcon* and *E. lancea*, have the first dorsal-fin spine about the same length as the midfin spines, as does the sympatric *E. randalli* (but the latter without orbital cirri and 14 pectoral-fin rays). In

Figure 44. *Emblemariopsis tayrona*, IP, AMNH 237355, Los Frailes, Venezuela (James Van Tassell & D. Ross Robertson).

Figure 45. *Emblemariopsis tayrona*, IP with orange-tipped first dorsal-fin spines, Isla Margarita, Venezuela (Paul Humann).

underwater photographs, only *E. tayrona* (and sometimes *E. randalli*, but without cirri) shows the red band on the anterior dorsal fin forming a straight line when fully erected in the male display.

Dark-shaded and pale TP of *E. tayrona* have the distinctive red-banded and long anterior dorsal fin; they also show the banded operculum shared only with *E. falcon* and *E. lancea*. In this stage, and in transitional males, *E. lancea* can be distinguished by having a mid-lateral row of dark spots on the anterior body. Transitional males of *E. falcon* look quite similar to those of *E. tayrona*, but would still have relatively shorter first dorsal-fin spines.

The IP of *E. tayrona* and the other banded-operculum species share the distinctive long and slightly oblique dark bar on the pectoral-fin base (note infrequent variation where bar is broken into two spots in Fig. 45). The remaining congeners have IPs with spots, fully oblique bands, or no dark marks on the pectoral-fin base. The IP *E. tayrona* also often have a prominent scattering of small spots on the anterior upper body, sometimes persisting on transitional males (Figs. 41 & 42), not shared to the same degree by *E. falcon* or *E. lancea* and not seen at all on other species. The IP of *E. tayrona* also have orange-tipped first dorsal-fin membranes (Fig. 44), a feature characteristic of the other three banded-operculum species, as well as sometimes in *E. occidentalis* and *E. signifer* in Brazil. The IP of the two sympatric *Emblemariopsis* species, *E. bottomei* and *E. randalli*, are distinguished by the absence of orbital cirri (the latter also with very different IP markings and 14 pectoral-fin rays). Two smoothhead species (from the opposite corner of the Caribbean) can be further distinguished by not having elongated first dorsal-fin spines in the IP.

The cranial pattern for *E. tayrona* has not been well documented due to the paucity of live photographs of IP fish, especially from overhead where the cranial pattern is most clearly demonstrated. From the available photographs, it appears that bands 1 & 2 are pale and reticulated, band 3 is red distally, with a break to a pale spot centrally, forming a pair with the other side, and then a prominent pale band 4 and inconspicuous band 5. Whether this pattern develops into an X-shape as in closely related *E. lancea* is uncertain.

Other material cited. Holotype of *Coralliozetus ramirezi*: MMM (Museo Marina de Margarita) 350, 29.6 mm SL, TP male, Venezuela, Nueva Esparta, Los Frailes archipelago, Puerto Real, Punta Payape, 11.187°, -63.729°, 15 m, H. Ramirez, 21 February 1999. Paratypes of *C. ramirezi*: MMM 351, (3) 24.0–31.0 mm SL, TP males, same data as holotype.

Material examined. *Emblemariopsis tayrona*: UF 160234, (9) 17.8–27.8 mm SL, Venezuela, Nueva Esparta, Isla Cubagua, ferry wreck, 10.8167°, -64.1833°, L. Rocha, 19 April 2005.

Emblemariopsis dianae Tyler & Hastings, 2004

Shortspine Red Banner Blenny
Tubícola Aleta Corta

mtDNA COI sequence BIN https://doi.org/10.5883/BOLD:AAF0072 & BOLD:ABA4171

Figures 46–48; Tables 1 & 2.

Emblemariopsis sp. nov. Smith et al. 2003: 54 (midshelf Pelican Cays, Belize).
Emblemariopsis occidentalis (*non* Stephens) Smith et al. 2003: 55 (USNM 345355, midshelf sand bores south of Carrie Bow Cay, Belize)

Holotype. USNM 365355, 16.7 mm SL, TP male, Belize, Peripheral Rhomboidal Cays, NE side of North Elbow Cay, 16.7056°, -88.1812°, 3 m, field number JCT-2001-4, J.C. Tyler & W.C. Davis, 28 January 2001.

Diagnosis. A species of *Emblemariopsis* with an orbital cirrus and a red banner (a set of 7 spp.); TP territorial males in holes with a mostly black head, dark-shaded body, and blackened fins, dorsal fin with a distal red band, reportedly without a narrow white band below or a thin white margin; first dorsal-fin spine short, reaching to about 5th spine base when adpressed, about 1/3 to 1/2 of HL, 8–15% SL, second spine slightly shorter than first, third spine about equal or slightly shorter than first, fourth spine about equal to first, tenth spine longer than first, profile of anterior dorsal fin with a shallow concavity.

Dark-shaded TP also with relatively short first dorsal-fin spines and a red band, no opercular bands or lines, no discrete rows of dark spots on dorsal-fin membranes; and no dark spots along lateral midline or above midline.

IP with short first two dorsal-fin spines, first spine reaching to base of 5–6th spine base when adpressed, second slightly shorter, third 3/4 of first, middle-fin spines longer than anterior spines; live colors and cranial

Figure 46. *Emblemariopsis dianae*, black TP holotype, fresh (upper), preserved (lower), USNM 365355, 16.7 mm SL, Belize (upper courtesy Philip Hastings, SIO; lower courtesy Sandra Raredon, USNM).

Figure 47. *Emblemariopsis dianae*, dark-shaded TP, USNM 415847, 16.5 mm SL, DNA-confirmed, midshelf sand bores, Belize (Carole C. Baldwin et al., Smithsonian Institution, Laboratories of Analytical Biology).

pattern undocumented; IP head spots reduced, only a band forward of eye and a patch under eye and over lower opercle; melanophores near pectoral-fin base a sparse oval collection of melanophores.

Dorsal-fin elements XVIII–XX,10–12 (total 30–32); anal-fin elements II,19–21; pectoral-fin rays 13; caudal-fin procurrent rays usually 3/3; LIO pores 0, occasionally 1; 3 mandibular pores (vs. 4); largest specimen 21.1 mm SL.

Distribution. (see Fig. 157) This species has the smallest known range within the genus, originally known only from the mid-shelf lagoonal reefs of Belize, primarily the Pelican Cays (Smith et al. 2003, Tyler & Hastings 2004). An IP specimen matching near the mtDNA lineage of a Belizean specimen was collected in Utila, Honduras.

Habitat. Tyler & Hastings (2004) documented the preference for the low-energy habitats of the protected mid-shelf reefs in Belize. They noted that TP *E. dianae* preferred holes in dead coral substrates, most often the coiled shells of dead vermetid gastropods. All of their specimens were collected in less than 5 m depth. The single IP Honduran specimen was collected on the lee side of Utila in a relatively protected area, in less than 5 m depth.

Remarks. Although the color of the band on the dorsal fin of the TP male was noted in the description to be notably orange, it is apparently no different from the orange or reddish bands found on the other red-bannered glass blenny species (the band color is generally referred to in this review as red for simplicity, since the range of colors from orange to reddish would also vary depending on lighting conditions). The common name suggested at that time, orangeflag blenny, was based on that misconception and is uninformative. The distinctive character for this species is the unusually short first dorsal-fin spines in the TP male, especially apparent relative to the midfin spines (8–15% SL from Tyler & Hastings (2004); other red-bannered species range from 12–27% SL.

Tyler & Hastings (2004) collected dozens of TP male *E. dianae* over an extended period, but found no females. However, they noted that the "ubiquitous *E. signifera*" were out on the surface of corals and algal mats, and present both on the mid-shelf reefs and on the barrier reef. Although difficult to reconcile, Smith et al. (2003) working on the same broad project and in the same area, only reported their "*E. signifera*" from the barrier and outer islands. Tyler & Hastings (2004) suggested "*E. signifera*" did not have a hole-dwelling dark male (but all *Emblemariopsis* have one). Subsequent DNA surveys and collections indicate that there are no "*E. signifera*" (= *E. carib*) in the region, and no photograph of a red-bannered spikefin male has ever been taken there, despite intensive recent underwater photography (with literally a thousand photographs of western Caribbean glass blennies). Only 4 species have been photographed, collected, and/or sequenced in Belize and Honduras: three with orbital cirri (common *E. leptocirris*, plus infrequent *E. ruetzleri* and *E. dianae*) and one without (*Emblemariopsis pricei* Greenfield, 1975). The oft-cited "*E. signifera*" must be the overlooked IP of one or more of the three species with cirri. Indeed, the only other species recorded on the mid-shelf reefs by Smith et al. (2003) was *E. leptocirris* (TP): the IP of that species and/or *E. dianae* must be the putative "*E. signifera*". Greenfield & Johnson (1981, 1990) surveyed the blennioids of Belize and Honduras and collected a few "*E. signifera*". However, they recognized *E. leptocirris* as only TP males with dark dorsal fins and low dorsal-fin spines, so *E. leptocirris* IP in the area must have been automatically assigned to "*E. signifera*". They do note, furthermore, that their "*E. signifera*" were collected "with *E. leptocirris*".

Comparisons. Black TP of *E. dianae* can be distinguished from most other red-bannered TP by a relatively short first dorsal-fin spine, shorter than the third, about the same as the fourth, well shorter than the middle-fin spines, and less than half the HL (i.e. a shallow concave anterior profile rising toward the midfin). The TP of

Figure 48. *Emblemariopsis dianae*, ethanol-preserved IP, UF 246132, 12.3 mm SL, DNA-confirmed, Utila, Honduras (Benjamin Victor).

other red-bannered species have relatively longer first dorsal-fin spines: well longer than the middle-fin spines in *E. tayrona*, spike-like in *E. signifer* and *E. carib*, and moderately longer in *E. occidentalis*; *E. lancea* and *E. falcon*, from the opposite side of the Caribbean, share the relatively short first dorsal-fin spines to a lesser degree, but can be distinguished by also having rows of spots along the spinous-dorsal-fin membranes and, in *E. lancea*, a mid-lateral row of spots on the anterior body. Also from the other side of the Caribbean, *E. randalli* differs in having a longer red band (to beyond the 7th spine), no orbital cirri, and 14 pectoral-fin rays. Two other distinctive features may separate black TP *E. dianae* from other species: no underlying white band or white rim to the red band (but no live photographs) and mostly black median fins (vs. only the anterior portion of the dorsal and anal fins blackened).

The black TP of sympatric species all have no red banner and, at most, a thin white rim on the black anterior dorsal-fin membranes: *E. leptocirris* has a prominent coarse speckling over the body and dorsal and pectoral fins and more typically has a straight dorsal-fin profile vs. shallow concave; *E. ruetzleri* has scalloped first dorsal-fin membranes and the fourth dorsal-fin spine shortest, and 14 pectoral-fin rays; and *E. pricei* has no orbital cirri, a linear rising dorsal-fin profile and 14 pectoral-fin rays.

A dark-shaded TP (DNA-confirmed) collected in Belize (Fig. 47), shows the same relatively short first dorsal-fin spines with a red band. It can be separated from other red-bannered species by the short first dorsal-fin spine, well shorter than the middle-fin spines, and by the absence of the opercular banding and narrow bar near the pectoral-fin base of *E. falcon*, *E. lancea*, and *E. tayrona*. It further differs from most other red-bannered species by not having rows of dark spots on the dorsal-fin membranes, or along the lateral midline (vs. *E. lancea*).

Transitional *E. leptocirris* (sympatric with *E. dianae*) developing shorter first dorsal-fin spines can sometimes also have the first spine shorter than the middle-fin spines, in that phase they can look very similar to *E. dianae*, differing mainly in the absence of the red dorsal-fin band and the pattern of melanophores. However, in preservative the red is lost and the two species would require a close look because *E. leptocirris* TP can have a thin white rim along the first spines, but clearly thinner than the red band on *E. dianae*. In that phase, *E. leptocirris* males have discrete head spots and often a short row of spots along the lateral midline not seen on *E. dianae*. The other species with an orbital cirrus in the area, *E. ruetzleri*, can transition to a TP with a short first dorsal-fin spine with the concave anterior profile as well, but, they have no red bands, distinctive colors, and 14 pectoral-fin rays.

The single DNA-confirmed IP specimen from Utila has a short first dorsal-fin spine, similar to small juveniles of other species, shorter than the middle-fin spines. Its fresh appearance is not documented. The ethanol-preserved specimen shows few dark markings: the cranial pattern, a dark band forward of the eye, a small collection of melanophores under the eye, and a dispersed patch over the lower operculum (Fig. 48). There is a loose, vertically oval patch of melanophores forward of the base of the pectoral fin. The first dorsal-fin membrane is black, with a short white tip (in ethanol; it may be colored in life).

Additional material (both with mtDNA COI sequences). *Emblemariopsis dianae: Belize*: USNM 415847, 16.5 mm SL, TP male, Belize, midshelf, sand bores SW of Carrie Bow Cay, 16.773°, -88.1163°, 0–8 m, field number CB08-35, C.C. Baldwin, Z.R. Foltz, D.G. Smith & L.A. Weigt, 26 May 2008 [tissue sample BZLW8380, GenBank number JQ841544]. *Honduras*: UF 246132, 12.3 mm SL, IP, Honduras, Bay Islands, Utila, South side, 16.076°, -86.939°, B.C. Victor, 30 June 2008 [tissue sample u8630e123, GenBank number MT467488].

Emblemariopsis occidentalis Stephens, 1970

Bahamas Red Banner Blenny
Tubícola Bandera Roja Bahamas

mtDNA COI sequence BIN https://doi.org/10.5883/BOLD:ADZ0488

Figures 49–59; Tables 1 & 2

Emblemaria signifer [*non* Ginsburg] ("or sp.?") Böhlke 1957: 46–49, plate 2 (ANSP 74472, Sandy Cay, Bahamas).
Pseudemblemaria signifer [*non* Ginsburg] (in part) Stephens 1963: 68, 2 plates (all Bahamas: ANSP 94995, holotype of *E. occidentalis* listed as "ST-367" [B-367 in ANSP records], plate 15, fig. 1; ANSP 74472, plate 15, fig. 2; ANSP 110478 (4), listed in Stephens as 2 specimens from station "ST-496" [B-496 in ANSP records]).
Pseudemblemaria signifera [*sic*] [*non* Ginsburg] (in part) Böhlke & Chaplin 1968, 1993: 548, 2 illustrations (Bahamas only).
Emblemariopsis signifera [*sic*] [*non* Ginsburg] (in part) Stephens 1970: 286 (IP fish from Bahamas, "TS-2"=ANSP 113989); Palacio 1974: 70 (Bahamas listing only); Smith-Vaniz & Böhlke 1991: 199 (New Providence, Bahamas listing only: based on Stephens' [1970] IP Bahamas fish and erroneously from his TP mislabeled as from Bahamas [really St. John, US Virgin Islands, UF 212234]); Böhlke & Smith-Vaniz 1991 in Böhlke & Chaplin 1993: xx (New Providence, Bahamas listing only, also based on Stephens [1970]); Smith 1997: 596–597 (Bahamas listing only).
Emblemariopsis leptocirris [*non* Stephens] Stephens 1970: 291 (Great Inagua, Bahamas: paratype of *E. leptocirris* "TS-32"=ANSP 114014).

Holotype. ANSP 94995, 15.4 mm SL, TP male, Bahamas, Great Bahama Bank, 0.5 km north of Green Cay (north of Rose Island), 25.109°, -77.188°, 16 m, field number B-367, J.E. Böhlke et al., 12 May 1957.

Figure 49. *Emblemariopsis occidentalis*, black TP male, Exumas, Bahamas (Frank Krasovec).

Diagnosis. A species of *Emblemariopsis* with an orbital cirrus and a red banner (a set of 7 spp.); TP territorial males in holes with a black head and blackened anterior dorsal fin with a distal red band (up to at least 5th membrane) over a narrow white band and a thin white margin; first dorsal-fin spine moderately elongated, reaching to 6–7th spine base when adpressed, about 2/3 of HL, 15–17% SL, second spine about 3/4 of first, third spine about 1/2 to 2/3 of first, tenth spine about 2/3 to 3/4 of first; profile of anterior dorsal fin with a shallow concavity.

Dark-shaded, pale, and transitional TP with elongated first two dorsal-fin spines and red-banded dorsal fin, red on first two membranes when transitional, no opercular bands or lines, no discrete rows of dark spots on dorsal-fin membranes; and no dark spots along lateral midline or above midline.

IP with well elongated first two dorsal-fin spines, first spine reaching to base of 6–8th spine base when adpressed, second slightly shorter, third about 1/2 of first (juvenile with less elongate spines); live colors include

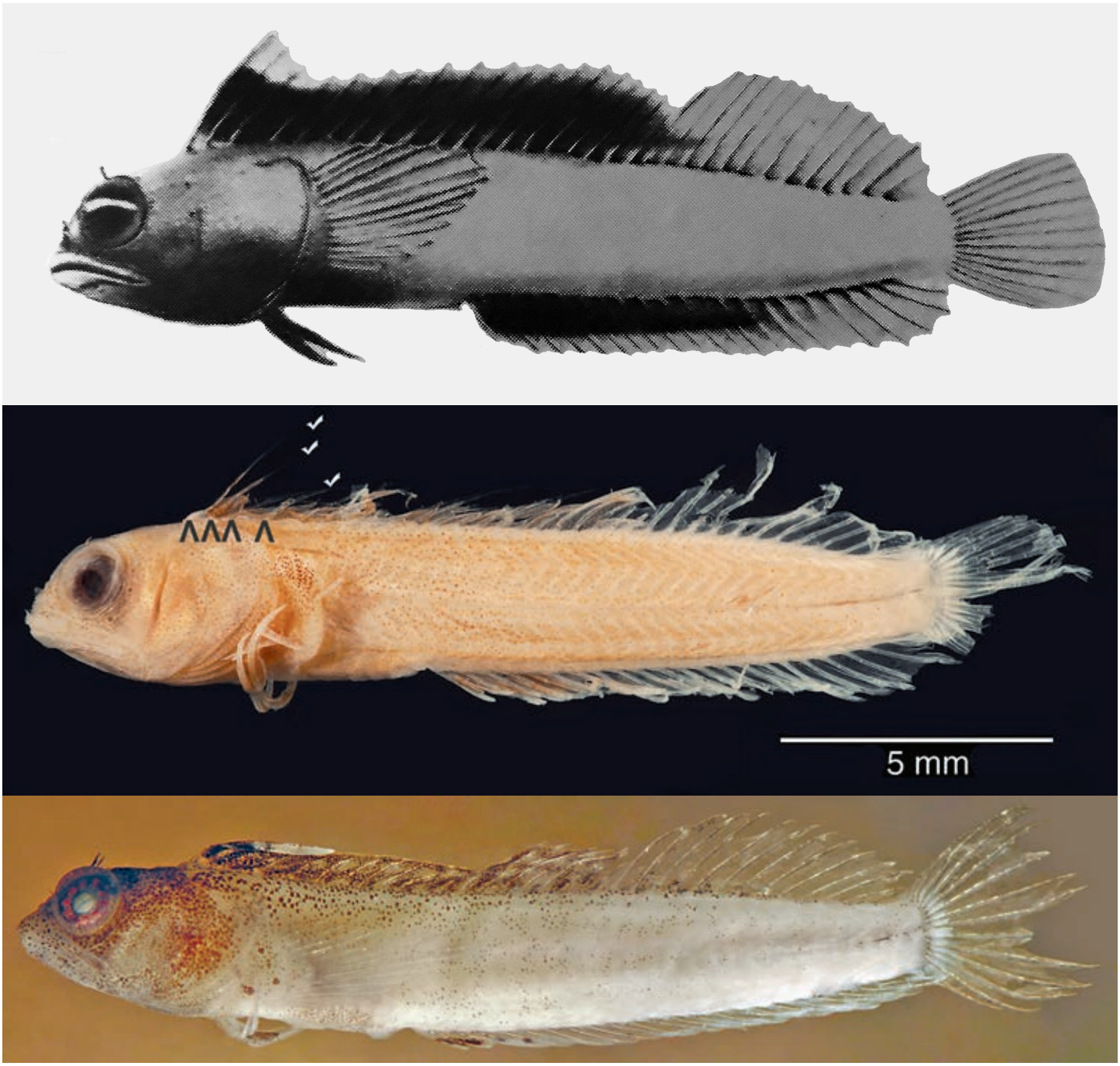

Figure 50. *Emblemariopsis occidentalis*, (top) drawing of holotype, 15.4 mm SL, TP male, ANSP 94995; (by Böhlke; copy in Stephens [1963] as plate 15, fig. 1); (middle) preserved holotype, black Vs point to bases of the first 4 dorsal-fin spines and white checks point to the tips of the first three spines (courtesy Kyle Luckenbill, ANSP); (bottom) ethanol-preserved TP male, 18.0 mm SL, ANSP 192008 (Benjamin Victor); all type location of Green Cay, Bahamas.

Figure 51. *Emblemariopsis occidentalis*, transitional TP, Turks & Caicos, Bahamas (Rob Rogers).

red, orange, and pink; cranial pattern with all 5 bands well developed; band 1 is a red oval; band 2 is inconspicuous, pale, and broken, with only two short arms (clearly not a Y); band 3 is broad, red, and broken at the midline, the arms are divided into spots or branched towards or connecting to the reddish posterior of band 4; band 4 is long and usually pale, but red towards midline; band 5 is broad, red, and often divided; bands can break up and develop into a mosaic; IP head spots full complement but mainly reddish with a few central, if any, melanophores; pectoral-fin base with an oblique band and up to three spots.

Dorsal-fin elements XIX–XXI,12–13 (total 31–33); anal-fin elements II,20–21; pectoral-fin rays 13–14; caudal-fin procurrent rays usually 4/3; LIO pores 2–3; largest specimen 18.6 mm SL (UF).

Description of TP. [data from 5 TP specimens as holotype (paratypes)] Dorsal-fin elements XIX,13 (XIX–XXI,12), total 32 (31–33); anal-fin elements II,21 (II,20–21); pectoral-fin rays 13 (13–14); pelvic-fin elements I,3; segmented caudal-fin rays 13, upper procurrent rays 4 (3–5) and lower 4 (3–4).

Body slim and elongate, body depth 16–19% SL, body width 54–78% of body depth; predorsal length very short, 20–21% SL; prepelvic length 21–27% SL; preanal length 42–50% SL; caudal-peduncle length very short

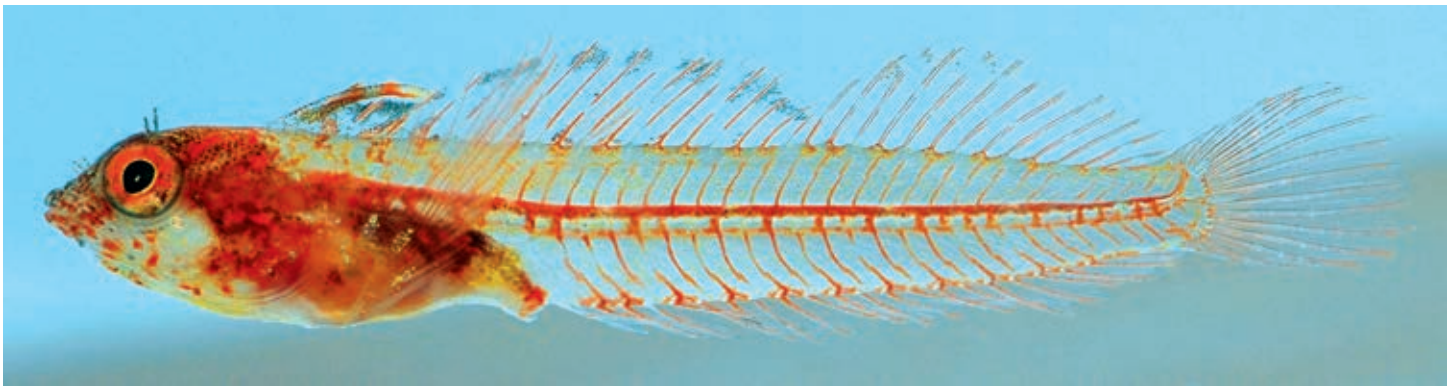

Figure 52. *Emblemariopsis occidentalis*, AMNH 249761, Exuma Sound, Bahamas (James Van Tassell & D. Ross Robertson). D-XX,13 A-II,21

19–22% HL, caudal-peduncle depth 25–33% HL. Head very short, length 25–28% SL; snout very short, pointed then becoming blunter with maturity, snout span 12–17% HL; orbit diameter 22–32% HL; single, unbranched, very short orbital cirrus, well less than pupil width; interorbital narrow, concave, minimum width 10–11% HL; anterior naris a low tube with none or a short finger-like cirrus, posterior naris a flat elliptical opening adjacent to upper orbital rim; head pores up to full complement of genus in largest fish; mouth large, upper jaw extending past eye in larger fish, oblique length 45–53% HL.

Spinous and soft dorsal fins continuous, dorsal-fin base long, 69–74% SL; first dorsal-fin spine (4 fully TP) 56–67% HL, 15–17% SL, reaching 6–7th spine base when adpressed; second spine 44–56% HL; third spine 34–40% HL; fourth spine 28–31% HL; last spine shortest, 17–20% HL; first dorsal-fin soft ray, 31–54% HL, longest dorsal-fin soft ray (mid-fin) 42–58% HL; anal-fin base long, 47–54% SL, first anal-fin spine 24–27% HL; second anal-fin spine 36–48% HL, longest anal-fin soft ray (about antepenultimate) 36–59% HL; pelvic-fin spine not externally visible, first pelvic-fin ray medium length, 36–49% HL, middle longest 49–69% HL (intervening membrane incised about one-third length),

Figure 53. Comparison of length of first dorsal-fin spines in preserved TP *E. occidentalis*, ANSP 192008 (upper) and *E. carib*, holotype, UF 179454 (lower) (Benjamin Victor).

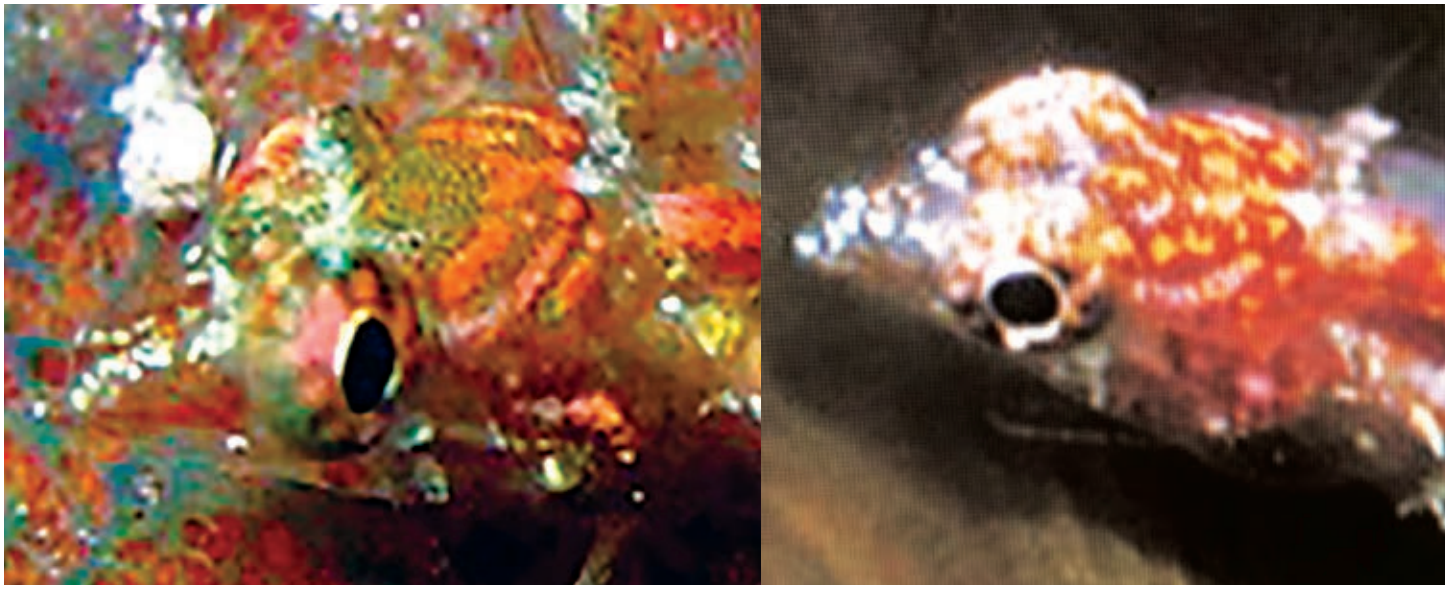

Figure 54. *Emblemariopsis occidentalis*, IP, cranial pattern developing additional red spots, Turks & Caicos, Bahamas (left) (Jim Catlin); IP cranial pattern developing mosaic of spots, Turks & Caicos, Bahamas (right) (Keri Wilk).

Figure 55. *Emblemariopsis occidentalis*, IP, cranial pattern breaking up into many red spots, Exuma Sound, Bahamas (Frank Krasovec).

third spindly and shortest and attached to middle for entire length, 25–33% HL; pectoral fin long, longest about middle ray, 83–102% HL; caudal fin rounded, length 17–20% SL.

Distribution. (see Fig. 157) *Emblemariopsis occidentalis* appears to be endemic to the Bahama Islands, collected or photographed at New Providence (Jan Philip Morton), Exuma Sound (Frank Krasovec), Great Inagua, and Turks and Caicos (Jim Catlin, Rand McMeins, Shirley Westcott, and Keri Wilk). It has yet to be documented on the Little Bahama Bank in the north.

Habitat. The depth range reported from specimen collection data is from 1–41 m; preferred substrates unknown, but photographed on live and dead coral substrate.

Remarks. Stephens (1970) described *E. occidentalis* from a single TP male holotype from the Bahamas and 8 TP paratypes from the distant Windward Lesser Antilles (Dominica south to Tobago). The paratypes are

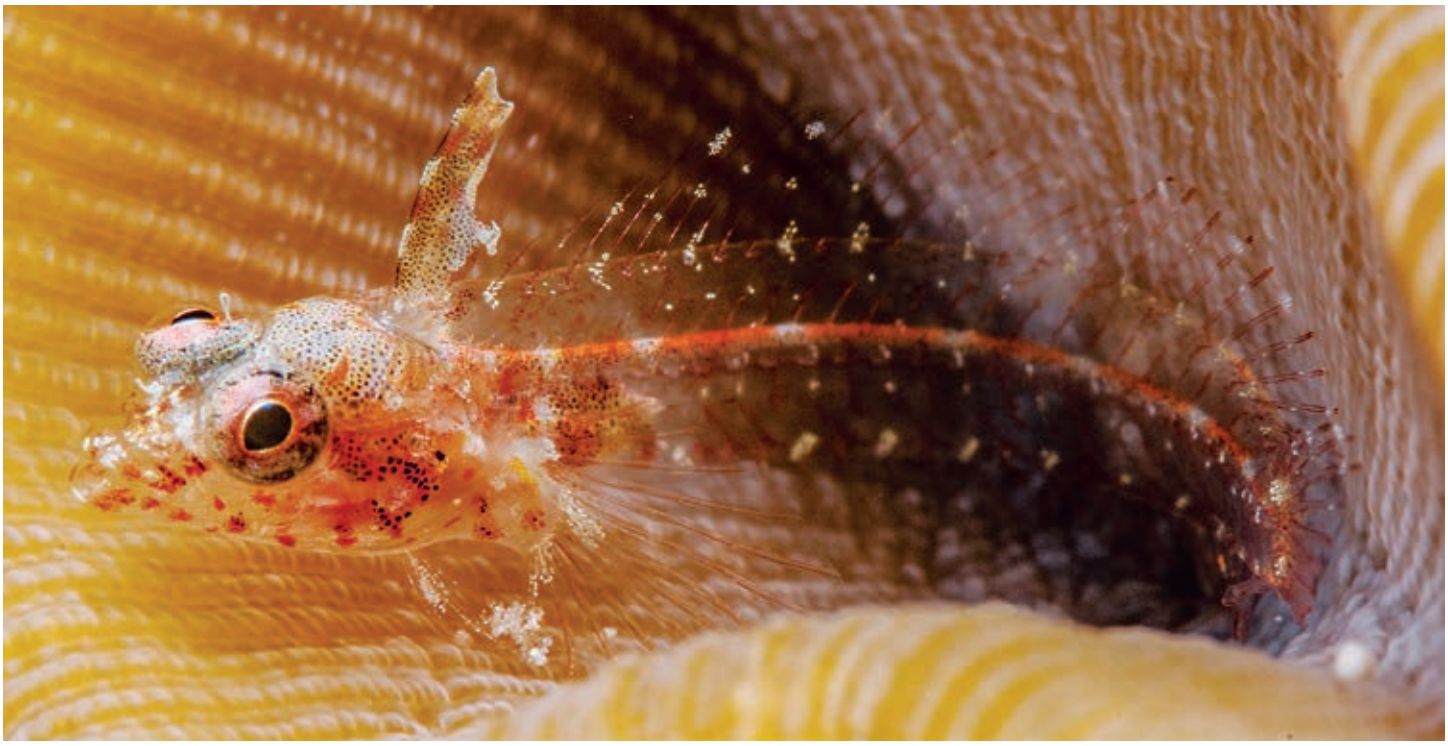

Figure 56. *Emblemariopsis occidentalis*, IP, Exuma Sound, Bahamas (Frank Krasovec).

Figure 57. *Emblemariopsis occidentalis*, IP, Nassau, Bahamas (left) (Jan Philip Morton); IP, Turks & Caicos, Bahamas (right) (Shirley Westcott).

now described here as the new species *E. lancea*, with many differences from *E. occidentalis* in both IP and TP, as well as deeply divergent mtDNA sequence lineages (>10%) for the barcode-marker COI. Stephens (1970) was wisely cautious about IP identifications and did not make the IP specimen he examined from near the type location (ANSP 74772) a type specimen. Without explanation, he also did not mention several additional ANSP collections of IP specimens from the area by the same collectors over the same period (ANSP 110475–110479). After long preservation, IP specimens cannot be identified to species, so it is presently impossible to resolve the status of those specimens, especially since similar species are found nearby in the Antilles.

A brief redescription of TP *E. occidentalis* is included here since the original description by Stephens (1970) was based on a single TP specimen and contaminated by inclusion of 8 paratypes from distant locations that are a different species. Measurements here are limited to 5 intact TP specimens.

The red-bannered glass blenny species found in the Bahamas was confused for a long time, since the drawing of a male with a long spike-like first dorsal-fin spine (clearly a TP *E. carib*) in Stephens (1970: fig. 3, UF 212234), was mislabeled as from Bahamas. It is actually from St. John, US Virgin Islands (Rob Robins, UF, pers. comm.). This error led to later reports of "*E. signifera*" in the Bahamas, (e.g. Böhlke & Smith-Vaniz 1991). In addition, *E. leptocirris* is reported from Bahamas based on the paratype listed in Stephens (1970) from Great Inagua (ANSP 114014). However, that specimen proves on examination to be a black TP *E. occidentalis*, based on the first two spines being elongated, clearly longer than the third, while the first few spines are about the same length on black TP *E. leptocirris*, but the difference is subtle. The distal membranes are abraded from the spines in the preserved specimen.

Thus far, the only TP males with orbital cirri collected or photographed in the Bahamas have the moderately elongated first dorsal-fin spine of *E. occidentalis*, compared to the spike-like fin of *E. carib* and Brazilian *E. signifer*, the long first spines of *E. tayrona*, and the non-elongated first spine of *E. lancea* and *E. falcon*, as well as *E. leptocirris* and *E. ruetzleri* (those two also without a red band). Live colors were only recently documented, when the black TP male was photographed by Frank Krasovec in Exuma Sound (Fig. 49) and Rob Rogers photographed a transitional TP male at Turks and Caicos (Fig 51). There also appears to be only a single form of IP with cirri present in the Bahamas. Bahamian TP and IP specimens in general are smaller, thinner, and more delicate than most congeners, except *E. carib*.

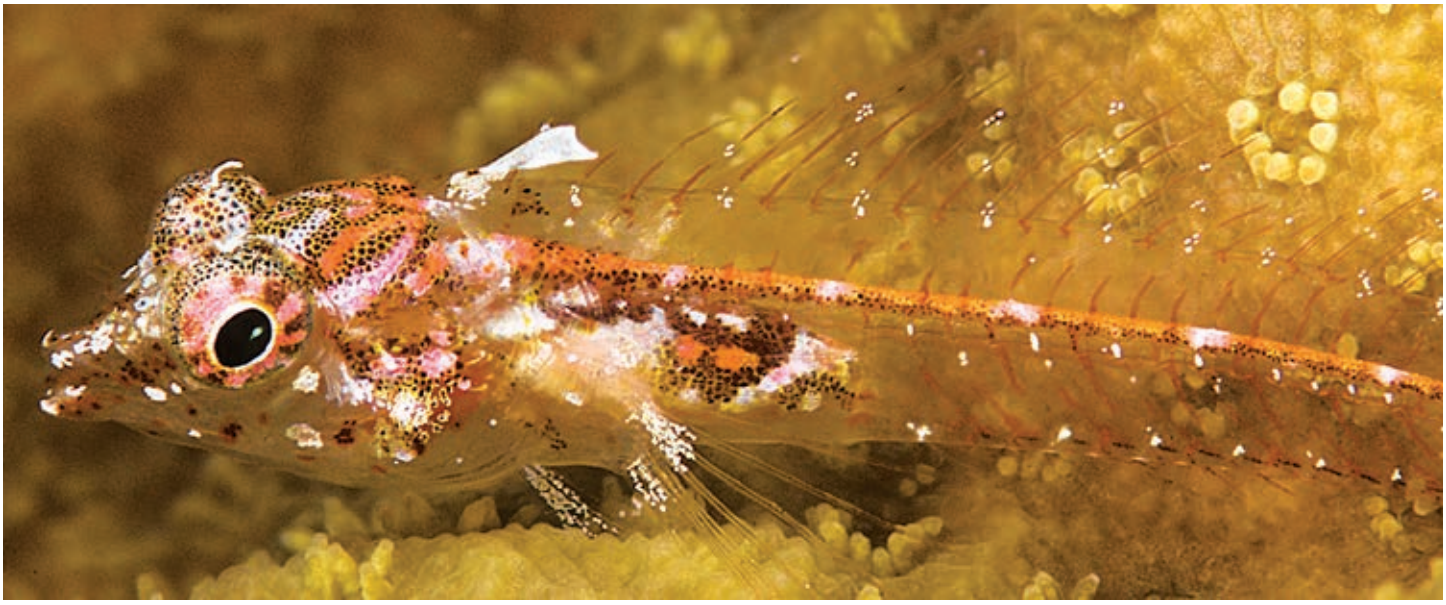

Figure 58. *Emblemariopsis occidentalis*, juvenile (with short first dorsal-fin spines, a transparent body, and a row of melanophores along anal-fin base), Turks & Caicos, Bahamas (Rand McMeins).

Comparisons. The only glass blenny sympatric with *E. occidentalis* is *E. bahamensis*, which has no orbital cirri, no red banner on the TP, and the first dorsal-fin spine shorter than subsequent spines in the IP and TP.

The black TP of *E. occidentalis* can be distinguished from other red-bannered TP by having the first dorsal-fin spine longer than the next few spines and middle-fin spines, but only moderately longer, extending posteriorly to about the 7th spine base when adpressed (Fig. 53) (vs. much longer in *E. carib* and *E. signifer*). The closest relative, *E. dianae* from Belize and Honduras, also has a relatively short first dorsal-fin spine that is longer than the second, but it is about equal or shorter than the third, fourth, and middle-fin spines; *E. falcon* and *E. lancea* have about-equal first ten spines. Black TP males of *E. tayrona* have the first dorsal-fin spine well elevated, i.e. their first dorsal-fin spine is longer, more than 3/4 HL and usually twice the length of the middle-fin spines; black TP of *E. randalli* have no orbital cirri and the first dorsal-fin spine is slightly shorter than the subsequent spines. The species without a red band have black almost up to the rim of the anterior dorsal fin and do not have elongated first dorsal-fin spines in the black TP; in addition, *E. ruetzleri* has scalloped tips to the first spines. The black TP of the 4 smoothhead species have no red band or orbital cirri and the first dorsal-fin spine is not longer than the subsequent spines, and often shorter than middle-fin spines.

Dark-shaded, pale, and transitional TP share the red on the anterior dorsal fin with the other red-bannered species, but can be distinguished from the three banded-operculum subset by not having the distinctive opercular white lines (vs. *E. falcon*, *E. lancea*, and *E. tayrona*) and from *E. carib* and *E. signifer* by their much longer first dorsal-fin spine and from *E. dianae* by its relatively shorter first dorsal-fin spine. The Venezuelan *E. randalli* has a red-banded anterior dorsal fin, but no orbital cirrus and very different markings. Early transitional *E. leptocirris* may have longer first dorsal-fin spines as they transition from IP with long spines, but they have no red band.

The IP of *E. occidentalis* can be distinguished from the three banded-operculum species which have a thinner, near-vertical bar near the pectoral-fin base vs. a broad oblique band of melanophores or spots. IP *E. ruetzleri* differ by having bright greenish blue and gold colors in life, a distinctive cranial pattern, and 14 pectoral-fin rays (vs. 13). The IP fish photographed in Bahamas have the first two dorsal-fin spines well elongated (less in juveniles) and look similar to IP *E. carib* and *E. leptocirris* at the same size. The Bahamas IP fish do appear to differ in live colors, in that their head spots are mainly reddish; when there are melanophores within the markings, they are few and in the center of a reddish area (one juvenile appears to be an exception, in Fig. 58). In addition, their cranial pattern appears somewhat different, in larger IP breaking up into spots to form a mosaic pattern to some degree, a pattern shared only with *E. carib* among species with orbital cirri. The IP of the smoothhead species differ mainly by an absent cirrus and a different cranial pattern; the one sympatric smoothhead species, *E. bahamensis*, has few head spots and very short first dorsal-fin spines.

The cranial pattern of *E. occidentalis* is somewhat variable and the progression is not clearly documented, since IP fish can have the early pattern of only the red arms of a wide-U, but one juvenile has a full complement of bands (Fig. 58). Furthermore, some IPs have a developing mosaic pattern, but a transitional TP has not developed the mosaic pattern (Fig. 51). The full cranial pattern includes all 5 bands prominent: band 1 is a red oval; band 2 is least conspicuous and limited to the short pale arms of an incomplete Y; band 3 is a prominent thick red band, broken midway becoming large red round spots, with a spot developing between band 3 and 4 or a direct connection to band 4; band 4 is a long, prominent, pale band, reddish toward the midline or sometimes reddish overall, broken around the midline into three red spots; band 5 is a shorter, thick, red band, sometimes divided into segments. As the bands continue to break into spots, the pattern can become a mosaic, however the transitional TP in Fig. 51 has mostly complete bands that have not broken up (but does show a red branch from band 3 towards the red proximal band 4).

Material examined. *Emblemariopsis occidentalis*: all *Bahamas*: ANSP 74772, 15.1 mm SL, female, Bahamas, Great Bahama Bank, Sandy Cay (north of Rose Island), 25.1133°, -77.2200°, 3–7 m, station 303, C.C.G. Chaplin, J.E. Böhlke & C. & N. Limbaugh, 16 May 1956; ANSP 113989, 16.9 mm SL, female, Bahamas, New Providence, off Clifton Point, 25.011°, -77.560°, field number TS-2, J.C. Tyler & C.L. Smith, 9 January 1968 ("*E. signifera*" of Stephens [1970]: 286); ANSP 114014, 16.5 mm SL, male, Bahamas, Great Inagua, Man of War Bay, 21.090°, -73.657°, 41 m, field number TS-32, J.C. Tyler & C.L. Smith, 19 January 1968 (paratype of *E. leptocirris* of Stephens [1970]: 290); UF 212841, 14.6 & 15.0 mm SL, immature males, Bahamas, Exuma Cays, Pipe Cay, 24.2360°, -76.5277°, H. Feddern, J. Staiger, T. Devaney & P. Pierce, 24 August 1963; UF 230374, 18.6 mm SL, male, Bahamas, south of Bimini, Turtle Rocks, 25.6627°, -79.3080°, 0–1 m, P. Colin & A. Teytaud, 17 June 1970.

Material examined with mtDNA COI sequences. *Emblemariopsis occidentalis*: ANSP 191865, 17.0 mm SL, male, Bahamas, Great Bahama Bank, New Providence Island, Green Cay, 25.1049°, -77.1972°, 17 m, field number BA10-04-GC3, K.L. Ilves, M.W. Westneat, R.I. Eytan, G.W. Chaplin, R. Ilves & H. Hertler, 15 November 2010 [tissue sample B-554, GenBank number MN750695]; ANSP 192008, 18.0 mm SL, male, Bahamas, Great Bahama Bank, New Providence Island, Green Cay, 25.1049°, -77.1975°, 7 m, field number BA10-05-GC2, K.L. Ilves, M.W. Westneat, R.I. Eytan, G.W. Chaplin, R. Ilves & H. Hertler, 16 November 2010 [tissue sample B-1072, GenBank number MN750694].

Figure 59. *Emblemariopsis occidentalis*, juvenile, Exuma Sound, Bahamas (Frank Krasovec).

Emblemariopsis carib Victor, 2010

Spikefin Glass Blenny
Tubícola Alta Espiga

mtDNA COI sequence BIN https://doi.org/10.5883/BOLD:AAB5630

Figures 60–65; Tables 1 & 2

Emblemariopsis signifera [*sic*] [*non* Ginsburg] (in part) Stephens 1970: 285–286 (St. John, US Virgin Islands [UF 212234], ?Anguilla [ANSP 113987], and ?St. Barthelemy [ANSP 114010] only); Palacio 1974: 70 (Virgin Islands & British and French West Indies listings only); Smith & Tyler 1975: 9 (St. John, US Virgin Islands); Smith-Vaniz & Böhlke 1991: 199 (West Indies, Leeward Islands listings only); Böhlke & Smith-Vaniz 1991 in Böhlke & Chaplin 1993: xx (West Indies, Leeward Islands listings only); Smith 1997: 596–597 (Lesser Antilles listing only); Dennis 2000: 171 (St. John, US Virgin Islands and La Parguera, Puerto Rico); Patzner et al. 2009: 470.

Pseudemblemaria signifera [*sic*] [*non* Ginsburg] Smith & Tyler 1972: XXX (St. John, US Virgin Islands).

Emblemariopsis signifer [*non* Ginsburg] (in part) Williams 2003: 1767 (Caribbean, listing as "undescribed species).

Emblemariopsis occidentalis [*non* Stephens] (in part) Williams 2003: 1767 (Lesser Antilles listing only); Dennis et al. 2004: 79–80 (La Parguera, Puerto Rico [ANSP 176583] juvenile likely *E. carib*, because of 11 dorsal-fin rays); Davies & Piontek 2016: 75 fig. 4 & 79 (St. Eustatius).

Emblemariopsis cf. *carib* Victor 2010a: 6–15 (St. Croix, US Virgin Islands, and Barbados).

Emblemariopsis cf. *signifer* Williams et al. 2010: 25, fig. 158 (Saba).

Figure 60. *Emblemariopsis carib*, black TP male, St. Eustacius (Mike Harterink).

Holotype. UF 179454, 14.8 mm SL, TP male, United States Virgin Islands, St. Thomas, Outer Brass Island, 18.396°, -64.976°, B.C. Victor & T. Smith, 2 May 2009.

Diagnosis. A species of *Emblemariopsis* with an orbital cirrus and a red banner (a set of 7 spp.); TP territorial males in holes with a black head and blackened anterior dorsal fin with a distal red band over a narrow white band and a thin white margin; first dorsal-fin spine very long, reaching to 8–15th spine base when adpressed, equal or well more than HL, up to 27% SL, second spine usually about 1/2 to 2/3 of first, third spine about 1/3 to 1/2 of first, tenth spine at most 1/2 of first, profile of anterior dorsal fin with a deep concavity since third and fourth spines are well shorter than subsequent spines.

Dark-shaded and pale TP with a similarly long first dorsal-fin spine and red band, sometimes several single scattered dark spots on anterior spinous-dorsal-fin membranes, but not in a row; no opercular bands or lines, and no dark spots along lateral midline or above lateral midline.

IP with elongated first two dorsal-fin spines, first spine reaching to base of 6–8th spine base when adpressed, second slightly shorter, third half of first (earlier IP and juvenile with less elongate spines); live colors include red, orange, and pink; cranial pattern with bands progressively breaking up and additional spots filling in: band 1 often two red spots; band 2 indistinct, a few red spots and not a Y-shape; band 3 most prominent, thick red arms of a U breaking up into spots; band 4 thin and pale, pushed aside by red spots; band 5 thick red segments; later pattern with red spots expanded to form a mosaic; IP head spots dark and usually full complement; melanophores near pectoral-fin base usually one to three spots, anterior spot often elongated obliquely.

Dorsal-fin elements XIX–XXI,10–12 (total 30–32); anal-fin elements II,19–21; pectoral-fin rays almost always 13; caudal-fin procurrent rays usually 3–4/3–4; LIO pores 2; largest specimen 17.5 mm SL.

Distribution. (see Fig. 157) The range of *E. carib* is expanded from that reported by Victor (2010a) by additional underwater photographs and now is mainly Hispaniola and the northern Lesser Antilles: i.e. Haiti (Nick Hobgood), the Dominican Republic (Jose Alejandro Alvarez and Juan Carlos Navarro), Mona Island (Keri Wilk), the Puerto Rican Plateau, including PR and St. Thomas and St. Croix, US Virgin Islands (type collections and DNA), Saba (Jeff Williams), St. Eustacius (Mike Harterink and Allison Estapé), Nevis (Jonathan Lavan), Isla Aves (Jose Gregorio Rodríguez), and then a jump down to Barbados (DNA via Henri Valles) and St. Vincent (one TP photographed by Les and Keri Wilk, but none others subsequently). It seems to be replaced by *E. lancea* in the remaining Windward Lesser Antilles, including Dominica, Martinique, St. Lucia, St. Vincent, the Grenadines, Grenada, and Tobago.

Figure 61. *Emblemariopsis carib*, dark-shaded TP male, Dominican Republic (Jose Alejandro Alvarez).

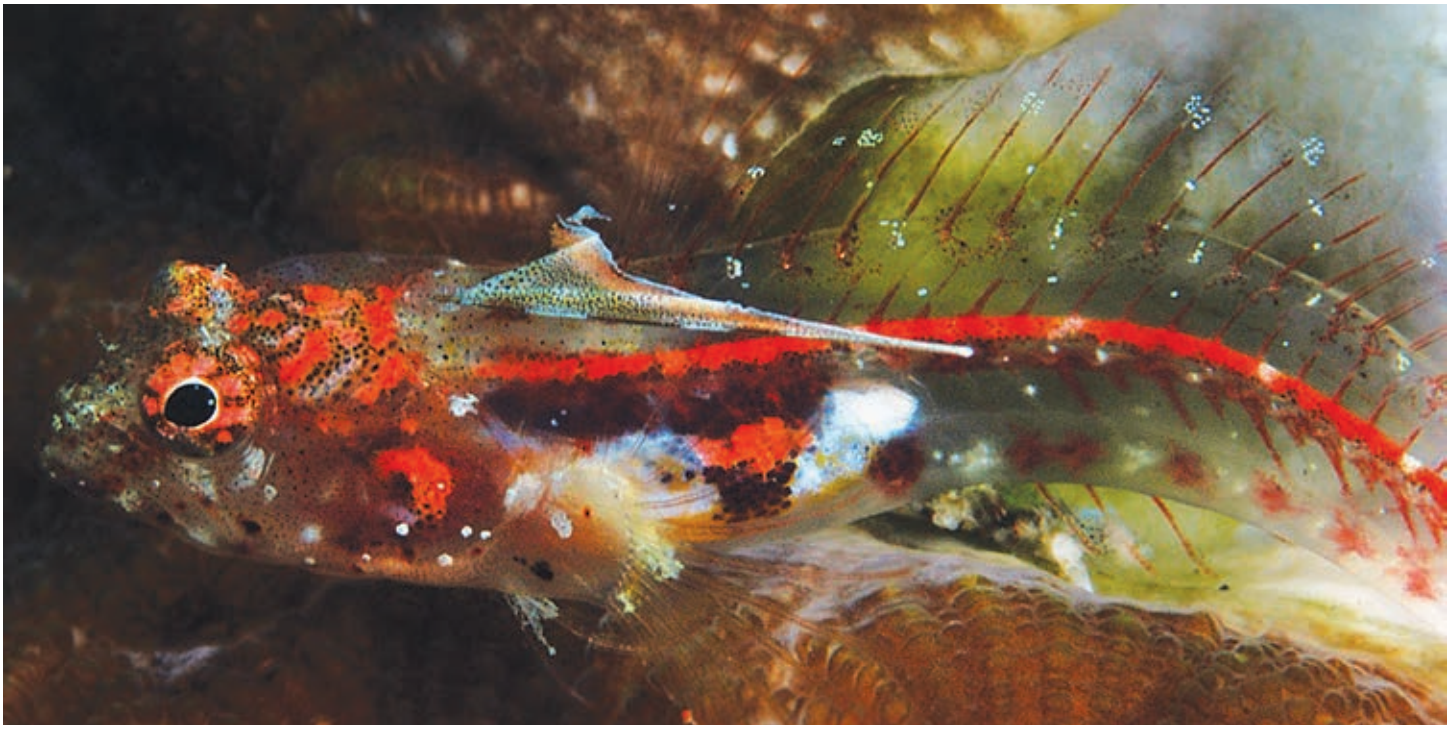

Figure 62. *Emblemariopsis carib*, pale TP, mosaic cephalic pattern, St. Vincent (Keri Wilk).

Habitat. Photographs show dark males in holes in both live and dead corals, of several species and of different morphologies, including holes embedded among encrusting sponges. IP fish are mostly photographed on live coral substrate. The depth range is not documented.

Remarks. For a long period in the past, all glass blennies, both IP and TP, with elongated first dorsal-fin spines were labeled "*E. signifera*". After Stephens (1970), it was recognized to varying degrees that IP fish of several species could also have elongated spines. Caribbean TP males with a greatly elongated first dorsal-fin spine were considered to be the same species as the Brazilian *E. signifer*, described by Ginsburg (1942). Despite the widespread reporting of "*E. signifera*", very few specimens and photographs of TP fish with the long first spines ("spikefin") were actually known, and those were always from the Lesser Antilles. Victor (2010a) documented the

Figure 63. *Emblemariopsis carib*, dark-shaded TP male, Isla Aves, Venezuelan Lesser Antilles (Jose Gregorio Rodríguez).

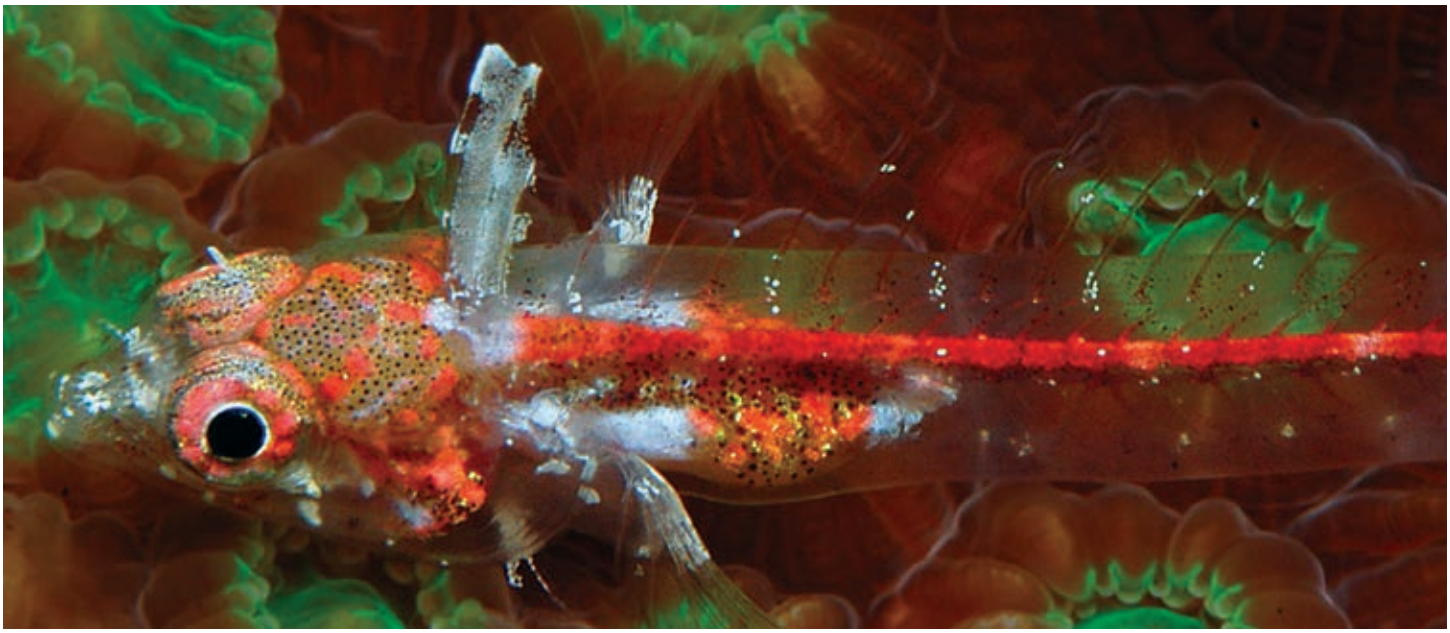

Figure 64. *Emblemariopsis carib*, IP, many red spots of all sizes in cephalic pattern, Mona Island (Keri Wilk).

occurrence of those fish and used mtDNA sequencing to unite the juvenile, female, immature male, and TP male and confirm the geographic range limited to the Antilles. The Caribbean population was found to be genetically very distinct from the Brazilian species, diverging more than 10% in the sequence of the mtDNA COI marker. There were some differences in color and markings and a significant shift in dorsal-fin and anal-fin ray counts, and thus the fish in the Caribbean Sea were split off and described as the new species *E. carib*. The mtDNA sequences of populations in St. Croix and Barbados were slightly different from those in the type location of the Puerto Rican Plateau, and Victor (2010a), in an overabundance of caution, labeled them as *E.* cf. *carib*. Subsequently, additional sequences have bridged the differences and presently the Caribbean populations all comprise a single mtDNA lineage and should be considered one species.

Victor (2010a) referred to IP fish with elongated dorsal-fin spines when he claimed that "similar" fishes have been photographed in Bahamas and the western Caribbean in his discussion on distribution; in fact, when it comes to TP males, no spikefin individuals have been observed, photographed, or collected in Bahamas or anywhere in the Caribbean west of Hispaniola. Furthermore, no DNA sequences matching the lineage of *E. carib* have been obtained in extensive surveys in the western or southern Caribbean, including Cayman Islands, Yucatan, Belize, Utila, Panama, Curaçao, and Tobago (BOLD data; and there are no unassigned lineages).

As in the remarks on *E. occidentalis*, Stephens (1970) also, without explanation, did not mention additional ANSP collections of IP specimens within the range of *E. carib* by the same collectors over the same period (between ANSP 113991 and 114008, 168605). After long preservation, IP specimens cannot be identified to species, so it is presently impossible to confirm the status of those specimens.

Comparisons. Within the range of *E. carib*, it is the only red-bannered species (except in St. Vincent). Throughout its range, it can be found with *E. bahamensis*, *E. leptocirris*, and *E. ruetzleri*. The first is are easily distinguished by no orbital cirrus and short first dorsal-fin spine, *E. ruetzleri* by its greenish blue and gold color in the IP and no red band or much elongated dorsal-fin spines in the TP. The TP of *E. leptocirris* is very different from *E. carib*, also with no red band or elevated dorsal-fin spines, but the IP is very similar to that of *E. carib* (and compared below).

The black TP of *E. carib* can be easily distinguished from all other species in the Greater Caribbean by having a greatly elongated spike-like first dorsal-fin spine. Only *E. signifer* from Brazil has a similarly long first spine and sharply concave anterior dorsal-fin profile: those black males differ subtly in typically having white spots over the cranium (and are larger than TP *E. carib*). Black TP males of *E. tayrona* also have a relatively long first dorsal-fin spine but it is not twice or more the length of the third spine and the third and fourth spines are not particularly short, therefore their anterior dorsal-fin profile is at most shallowly concave. Black TP males of all other species have much shorter first dorsal-fin spines.

Figure 65. *Emblemariopsis carib*, juvenile, St. Eustatius (Allison Estapé).

Dark-shaded, pale, and transitional TP can be distinguished from all other regional species by the greatly elongated first dorsal-fin spine, and additionally from three other red-bannered species (*E. falcon*, *E. lancea*, and *E. tayrona*) by having neither a banded operculum or a thin dark bar near the pectoral-fin base. When the cranial pattern is visible, *E. carib* show a mosaic cranial pattern, forming as bands break up and additional spots fill in (Fig. 62).

The IP of *E. carib* usually have spots (or, at most, a short band of melanophores) near the pectoral-fin base vs. the three banded-operculum species who have a distinctive thin dark bar near the pectoral-fin base. The IP of most other species with an orbital cirrus share a generally similar appearance (except *E. ruetzleri* which are greenish blue and gold and have 14 pectoral-fin rays). The cranial pattern may distinguish IP *E. carib* as they develop: some photographs do show additional isolated small red spots than in other species (Fig. 64), but whether that is a rule is not established. Late IP *E. carib* develop a mosaic cranial pattern, apparently shared only with *E. occidentalis* (IP of *E. diaphana* develop mosaic patterns, but a different form). It is unclear how to reliably distinguish IP *E. leptocirris* and *E. occidentalis* from *E. carib* by appearance: IP *E. leptocirris* do often have a broad oblique band of melanophores across the pectoral-fin base, but the consistency of this character is not certain, and in the zone of overlap the dorsal-fin and anal-fin ray counts are modally one different. Unfortunately, the two similar-appearing IP are frequently collected together, as in Victor (2010a), where mtDNA sequences first revealed two sets of juvenile specimens.

Similarly, the IP of *E. occidentalis* in adjacent Bahamas looks very similar: photographs appear to show them having mostly reddish head spots with at most a few central melanophores within the spots, vs. clearly dark spots in IP *E. carib*. However, the consistency of that difference is uncertain, given a photograph of an apparent juvenile in Bahamas with dark head spots. Additional sampling of glass blennies in the Bahamas is needed to clearly delineate the differences. The IP of species without an orbital cirrus are best distinguished by that feature, but also have different cranial patterns. Fortunately the one smoothhead species overlapping the range of *E. carib*, *E. bahamensis*, is easily recognized by short first dorsal-fin spines, few head spots, and the Y-shaped cranial pattern.

Material examined. *Emblemariopsis carib*: ANSP 176583, 11.5 mm SL, Puerto Rico, La Parguera, shelf edge, 17.893°, -67.023°, J.J. Kimmel, 16 March 1982.

Material examined with mtDNA COI sequences, from Victor (2010a). *Emblemariopsis carib*: UF 179454 (holotype), 14.8 mm SL, United States Virgin Islands, St. Thomas, Outer Brass Island, 18.396°, -64.976°, B.C. Victor & T. Smith, 2 May 2009; UF 179455, (4) 9.7–10.2 mm SL, United States Virgin Islands, St. Thomas, Outer Brass Island, 18.396°, -64.976°, B.C. Victor & T. Smith, 2 May 2009; UF 179456, (2) 10.8–13.8 mm SL, Puerto Rico, La Parguera, Medialuna Reef, 17.935°, -67.049°, B. Victor & C. Caldow, 4 August 2007; UF 179457, 13.3 mm SL, Puerto Rico, La Parguera, wall buoy, 17.893°, -67.023°, B.C. Victor & C. Caldow, 4 August 2007.

Emblemariopsis signifer (Ginsburg, 1942)

Brazilian Glass Blenny
Tubícola Brasileno

mtDNA COI sequence BIN https://doi.org/10.5883/BOLD:AAB5632 & ACJ1687 & ACJ1248

Figures 66–71; Tables 1 & 2

Emblemaria atlantica [*non* Jordan & Evermann] Fowler 1940: 796 (Rio de Janeiro, Brazil).
Emblemaria signifer Ginsburg, 1942: 367–368 (type location: Rio de Janeiro, Brazil).
Pseudemblemaria signifer (in part) Stephens 1961: 3 (Brazil only); Stephens 1963: 67–68 (Brazil only).
Pseudemblemaria signifera [*sic*] (in part) Böhlke & Chaplin 1968: 548 (Brazil listing only).
Emblemariopsis signifera [*sic*] (in part) Stephens 1970: 284–287 (Brazil only); Greenfield & Johnson 1981: 65 (Brazil listing only); Smith-Vaniz & Böhlke 1991: 199 (Brazil listing only); Böhlke & Smith-Vaniz 1991 in Böhlke & Chaplin 1993: xx (Brazil listing only); Smith 1997: 596–597 (Brazil listing only); Carvalho-Filho 1999: 201–202 (Brazil only); Patzner et al. 2009: 470.
Coralliozetus signifer Acero 1987: 8 (Brazil).
Emblemariopsis occidentalis [*non* Stephens] Carvalho-Filho 1999: fig. 206 (Parcel Manoel Luis, Brazil).

Holotype. USNM 119877, 27.8 mm SL, TP male, Brazil, Rio de Janeiro, Wilkes Expedition, 1838.

Diagnosis. A species of *Emblemariopsis* with an orbital cirrus and a red banner (a set of 7 spp.); TP territorial males in holes with a black head with a dorsal overlay of small white spots; anterior dorsal fin blackened with a distal red band over a narrow white band and a thin white margin; first dorsal-fin spine very long, reaching to 7–11th spine base when adpressed, about equal or well more than HL, second spine usually about 1/2 to 2/3 of

Figure 66. *Emblemariopsis signifer*, black TP, Sao Paulo, Brazil (Ary Amarante, fig. 13 from Victor [2010a]).

Figure 67. *Emblemariopsis signifer*, pale TP, Sao Paulo, Brazil (Mauricio Andrade, fig. 11 from Victor [2010a]).

first, third spine about 1/3 to 1/2 of first, tenth spine up to 1/2 of first, profile of anterior dorsal fin with a deep concavity.

Dark-shaded and pale TP with a similarly long first dorsal-fin spine and red band, dark spots usually present along proximal spinous-dorsal-fin membranes forming a single row, no opercular bands or lines, and no row of dark spots along lateral midline or above lateral midline.

IP with elongated first two dorsal-fin spines, first spine reaching to base of 5–7th spine base when adpressed, second slightly shorter, third 1/2 of first (earlier IP and juvenile with less elongate spines); live colors red, orange, and pink, but often brown and green (on darker backgrounds); cranial pattern with all bands prominent, pale bluish white or red, then breaking up, especially bands 2 and 3, to form a reticulated mosaic; IP head spots usually full complement; melanophores near pectoral-fin base one to three spots.

Dorsal-fin elements XX–XXI,11–13 (total 31–34); anal-fin elements II,20–22; pectoral-fin rays almost always 13; caudal-fin procurrent rays usually 4–5/3–4; LIO pores 3; largest specimen 27.8 mm SL.

Distribution. Endemic to the Brazilian coast and offshore islands.

Habitat. Photographs show dark males in holes in both live and dead corals, usually *Mussismilia* (Fig. 66), as well as among encrusting zoanthids of *Palythoa*. IP fish are photographed often on live coral substrate, but also on dead coral surfaces and sponges. The depth range is not documented.

Remarks. Interestingly, the holotype was collected on the first large-scale, US-government sponsored marine expedition, the Wilkes Expedition in 1838, and was one of the largest collections of fishes at the time. The collections were made during a circumnavigation of the world and included about 588 species of fishes, forming the nucleus of the nascent Smithsonian Insititution collection.

There are several populations of *E. signifer* on the offshore island groups off Brazil that may or may not be separate genetic lineages (genovariants), subspecies, or species (Carvalho-Filho 1999). At present, the taxonomic status of those populations remains to be explored by Brazilian taxonomists.

A curious finding in this species is that most underwater photographs of IP fish have reddish orange bands on the dorsal fin (Fig. 69). Orange-tipped first dorsal-fin membranes are found on *E. falcon* and *E. tayrona*, and *E. occidentalis* to some degree. It is not clear what produces this phenomenon in *E. signifer*, whether both genders

Figure 68. *Emblemariopsis signifer*, pale TP, Rio de Janeiro, Brazil (Joao Paulo Cauduro Filho, fig. 15 from Victor [2010a]).

develop red-banded dorsal fins or if it has a different life-history pattern from other congeners.

Some photographs of IP *E. signifer* show a dark variant form, with an absence of red and yellow, and the cranial bands pale bluish against a dark to greenish background (Fig. 70). That variant color pattern has been photographed on some *E. diaphana* in Florida and rare individuals of *E. bottomei* in Bonaire, but are common in *E. signifer*. Along with the different head colors on dark variant *E. signifer*, the pigment along the spine and along internal bony processes are more black (vs. typically reddish on Caribbean congeners). The latter feature can also be prominent on *E. diaphana* in Florida. It is perhaps not a coincidence that *E. diaphana* is the other subtropical species in the genus: red color may be less useful to match background patterning in more turbid temperate waters (larger particles scatter long wavelengths more readily).

Comparisons. The black TP of *E. signifer* can be easily differentiated from all but one congener by having a greatly elongated first dorsal-fin spine (Fig. 66). Only *E. carib* from the Lesser Antilles has a similarly long first

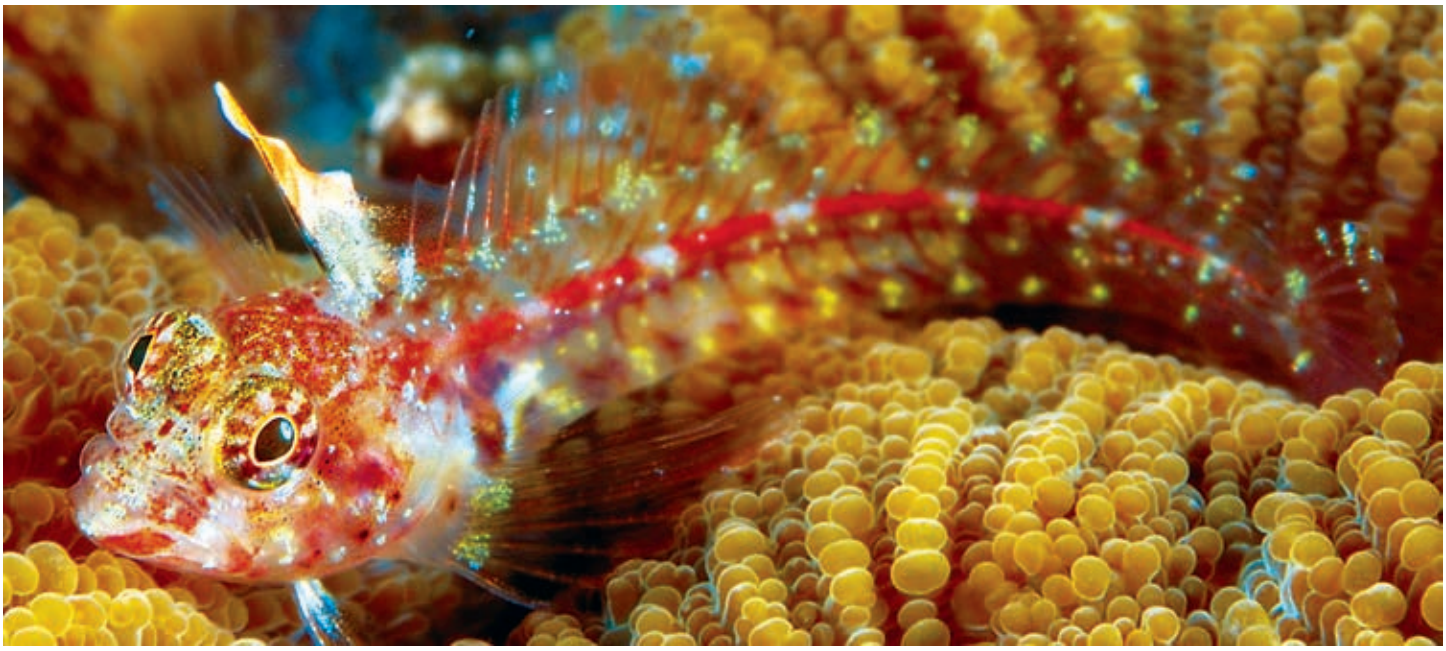

Figure 69. *Emblemariopsis signifer*, transtional male, Sao Paulo, Brazil (Mauricio Andrade, fig. 10 from Victor [2010a]).

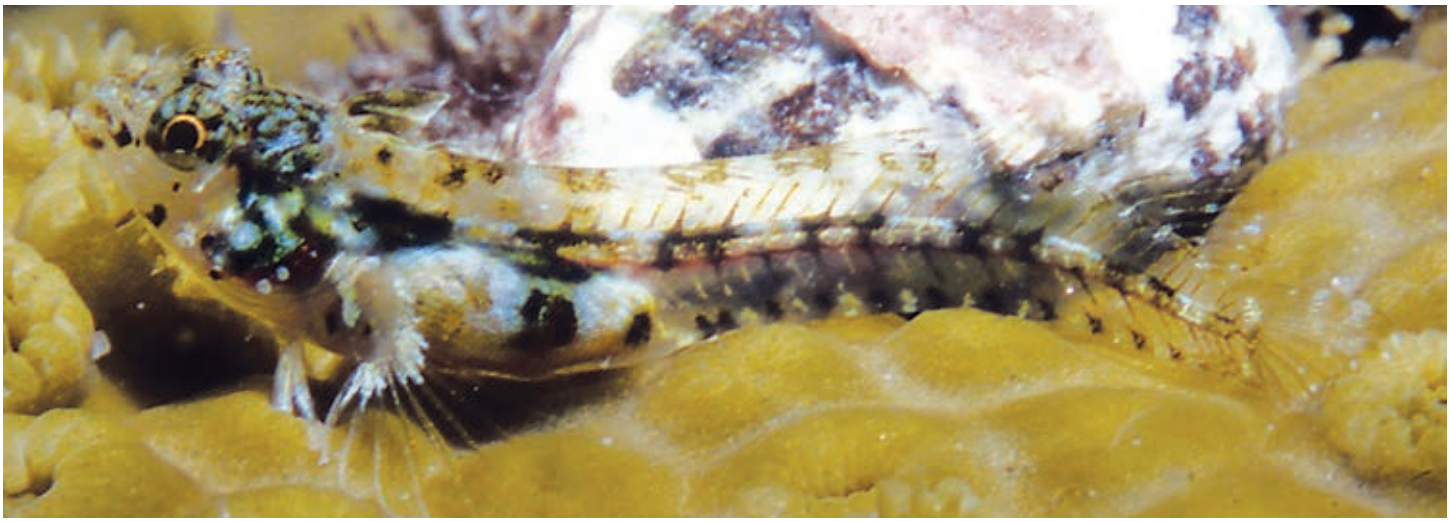

Figure 70. *Emblemariopsis signifer*, IP, dark variant form with pale-blue cephalic pattern, Rio de Janeiro, Brazil.

spine and sharply concave anterior dorsal-fin profile: those black males differ in not having a speckling of white spots over the top of the head and being much smaller. Victor (2010a) noted that there was no overlap in the size of TP fish between Caribbean *E. carib* and *E. signifer* from the Brazilian mainland.

Dark-shaded, pale, and transitional TP from Brazil can be distinguished from all other species except *E. carib* by the greatly elongated first dorsal-fin spine; the differences from *E. carib* are mostly in degree, with *E. signifer* developing white spots over the dorsal head (Figs. 66 & 67) and often having a single row of prominent spots near the base of the spinous-dorsal-fin membranes (Fig. 68). They further differ from the three other Caribbean red-bannered species (*E. falcon*, *E. lancea*, and *E. tayrona*) by not having the banded operculum and having spots instead of the long thin bar near the pectoral-fin base. They are also missing the characteristic dark spots along the lateral midline on some other species.

The cranial pattern of both pale TP and IP *E. signifer* is distinctive, forming a mosaic pattern. Only *E. carib* and *E. occidentalis* have a similar mosaic pattern, nevertheless the mosaic appears somewhat different in *E. signifer*, with a broken band 3 with the central portion forming two opposing Vs pointing inward (e.g. Fig. 71). The consistency of this marking is not documented. In addition, some *E. signifer* show the loss of red color and have dark and pale-blue cranial markings to some degree (e.g. Fig. 70).

Material examined. *Emblemariopsis signifer*: CIUFES-210, 211, 212, 213 (2), 463, 531, 726 (2), 763, 1273, 1441 (2) from Guarapari, Espirito Santo, Brazil; UF 47329, 172341 (15), 172342 (2), 172343, 172344 (13) from Ubatuba, Brazil; São Paulo, Brazil; BV-BR07 (4) from Arraial do Cabo, Rio de Janeiro, Brazil.

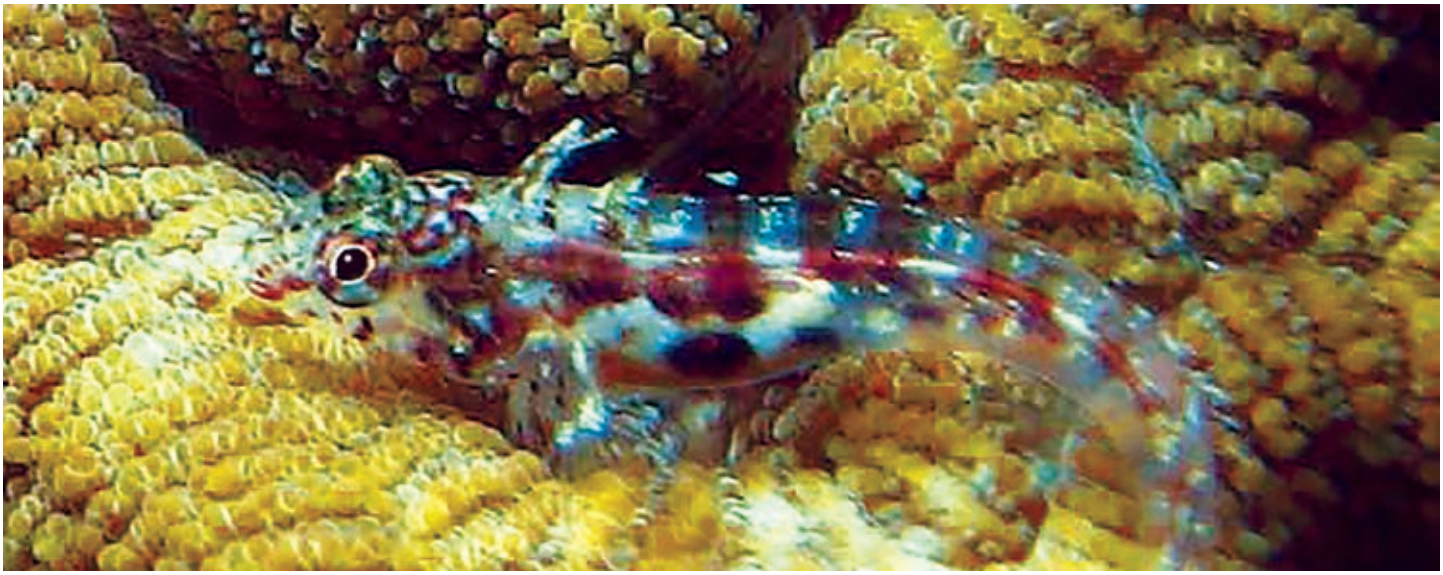

Figure 71. *Emblemariopsis signifer*, IP female (relatively swollen abdomen), Rio de Janeiro, Brazil (Laís Chaves).

Emblemariopsis randalli Cervigón, 1965

Hornless Red Banner Blenny
Tubícola Sin Cuernos

mtDNA COI sequence BIN https://doi.org/10.5883/BOLD:ABA4170 (in part)

Figures 72–81; Tables 1 & 2

Coralliozetus randalli Acero 1987: 8; Cervigón 1994: 105–106, fig. 63 (Cubagua, Venezuela).

Holotype. MOBR-EDIMAR (MHNLS) P-880, 28.2 mm SL, Venezuela, Nueva Esparta, Isla Cubagua, Bahia de Charagato, 10.825°, -64.165°, 5 m, J.E. Randall, 24 January 1965.

Diagnosis. A species of *Emblemariopsis* without an orbital cirrus and with a red banner (one species); TP territorial males in holes with a black head and blackened anterior dorsal fin with a distal red band over a narrow white band and a thin white or blue margin, red band extending posteriorly to 7th to 10th spinous membrane, forming a straight line or curved down when fully erected in displaying TP, first dorsal-fin spine relatively short, reaching to 5–6th spine base when adpressed, about half HL, subsequent spines progressively slightly longer.

Dark-shaded and pale TP with a similar red-banded dorsal fin, but a wider white band, and dark membrane only on first one or two membranes; a row of large dark spots along body just below base of spinous dorsal fin, no rows of dark spots along spinous-dorsal-fin membranes or along lateral midline or mid-way between lateral midline and base of dorsal fin; a large black patch around anus; head mostly unmarked except for a pale or bluish reticulated pattern under lower jaw; a dark or reddish oblique band across iris; no opercular bands or lines.

Figure 72. *Emblemariopsis randalli*, black TP, Mochima, Sucre, Venezuela (Gabriela Carias).

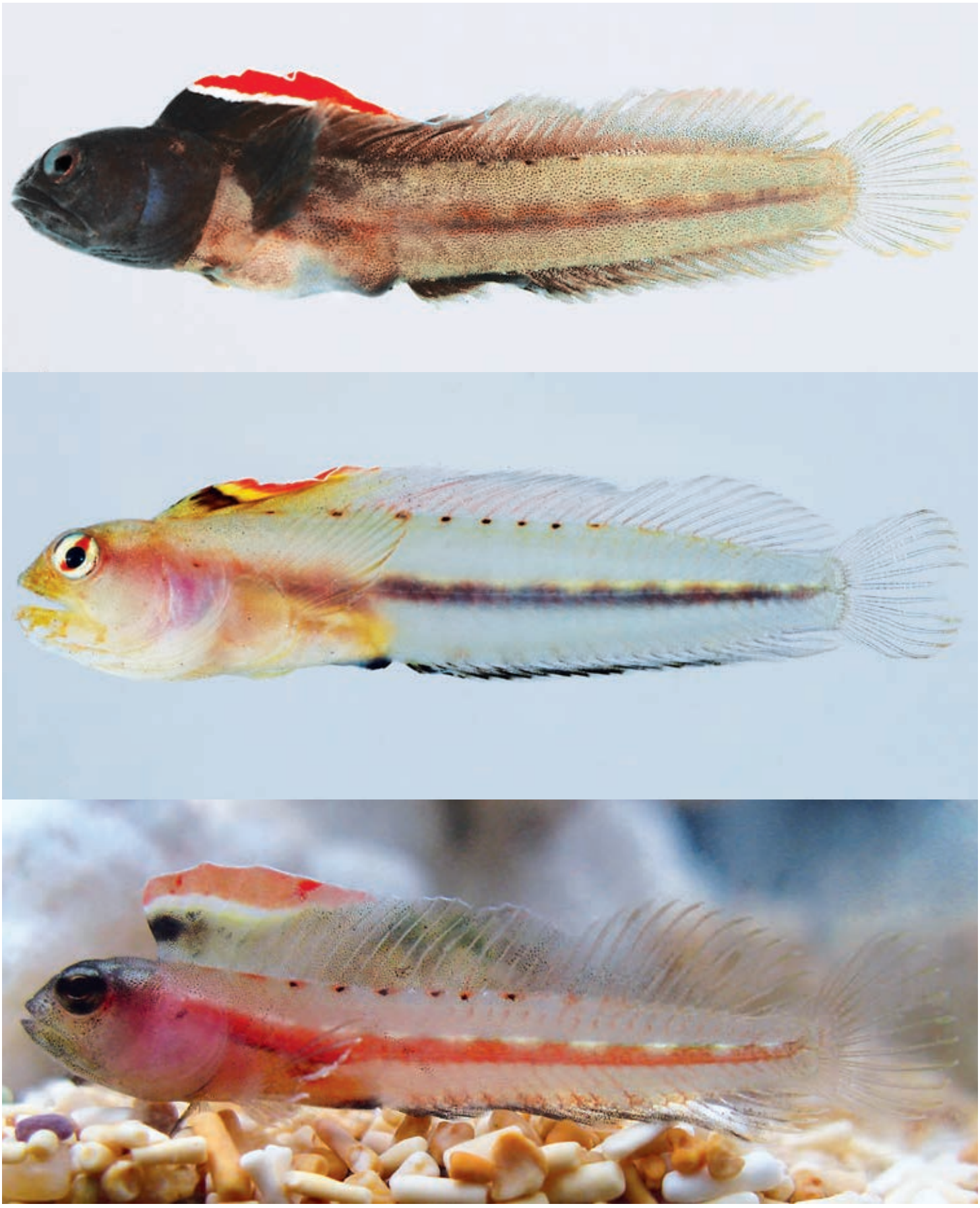

Figure 73. *Emblemariopsis randalli*, black TP (top), pale TP (middle), both AMNH 247601, Araya Peninsula, Sucre, Venezuela (James Van Tassell & D. Ross Robertson); dark-shaded TP (bottom), aquarium photograph, from San Esteban, Carabobo, NW Venezuela (Lisette Molins & Jose Gregorio Rodríguez).

Figure 74. *Emblemariopsis randalli*, pale TP, Isla Margarita, Nueva Esparta, Venezuela (Paul Humann).

IP with short first several dorsal-fin spines, first spine reaching to base of 4–5th spine base when adpressed, fourth spine shortest and midfin spines longest, forming a slightly notched dorsal-fin profile, first few membranes with dark reticulated bands or lines and a reddish edge (even in juveniles); head and body mostly unmarked except for dark or reddish oblique band across iris, a row of reddish or dark spots along body just below base of spinous dorsal fin, a large black patch around anus, a wide internal reddish or dark band along sides of vertebral column, and a dark distal band along anterior anal fin; live colors include orange, pink and yellow; cranial pattern

Figure 75. *Emblemariopsis randalli*, pale TP, Mochima, Sucre, Venezuela (Gabriela Carias).

Figure 76. *Emblemariopsis randalli*, group of pale TP, Mochima, Sucre, Venezuela (Gabriela Carias).

a simple pale band 2 and 4; no IP head spots or markings near the pectoral-fin base; IP fish and pale TP individuals live in groups on reef (vs. no apparent grouping behavior in any congeners).

Dorsal-fin elements XX–XXI,10–13 (total 31–34); anal-fin elements II,22–24; pectoral-fin rays 14; LIO pores 3; largest specimen 32.4 mm SL (Cervigón 1994) (illustration in Cervigón [1965] labeled 45 mm TL in error).

Distribution. (see Fig. 159) Endemic to Venezuela and present along much of the Venezuelan coastline: from the islands of the northeast (Margarita Island and described from Isla Cubagua), the Paria and Araya Peninsulas and Gulf of Cariaco (Lasso-Alcalá et al. 2005), and westward along the coastline: at Mochima in Sucre (Molins & Rodríguez-Quintal 2014); the Piritu Islets, off Anzoátegui (Rodríguez 2010b); San Esteban in Carabobo

Figure 77. *Emblemariopsis randalli*, group of IP fish, Mochima, Sucre, Venezuela (Gabriela Carias).

Figure 78. *Emblemariopsis randalli*, pale TP, note cranial pattern, Morrocoy, Falcon, Venezuela (Jose A. Paez).

(Rodríguez 2012); Ocumare in Aragua (AMNH specimens, photographs); Morrocoy National Park in Falcon (Rodríguez 2008) to Paraguaná, Falcon (Univ. de Carabobo CPC 480). They are not present on the offshore Los Roques archipelago (Rodríguez 2010a), nor on the nearby ABC Netherlands Antilles. The AMNH collections from Los Monjes, from far NW Venezuela, contain only *E. falcon* and *E. bottomei*.

Habitat. Reported from shallow sand and rocks about 5 m deep at the type location (Cervigón 1965), later as 6–8 m (Cervigón 1966). Recent collections by Lisette Molins & Jose Gregorio Rodríguez range from 3–9 m. The species is distinctive in behavior and population structure– they form relatively tight groups perched over coral heads, often as separate groupings of IP females and pale TP fish (Figs. 76 & 77). Territorial black males are found alone in burrows, often challenged by passing pale TP individuals. In contrast, other glass blennies do not form interacting groups, but have IP and TP fish moving independently, even in high densities.

Figure 79. *Emblemariopsis randalli*, IP female, AMNH 247601, Araya Peninsula, Sucre, Venezuela (James Van Tassell & D. Ross Robertson).

Remarks. There are inconsistencies in counts and measurements between Cervigón's 1965, 1966, and 1994 descriptions that need to be evaluated. There were 10 specimens reported in 1965, 7 in 1966, and 13 in 1994. The fin-ray counts reported for the 7 fish in 1966 are not compatible with the 10 in 1965; no subset of 7 of the 10 is consistent with the reported counts– and then in 1994 the counts go back to consistent with 1965. For example, 2 of the 7 are listed as having XX spines in 1966, but all 10 have XXI in 1965 and all 13 have XXI in 1994. A date mismatch, with the collection date as 24 January in Cervigón (1965) and 23 January in Cervigón (1966) raises the question whether they were separate collections, as do the limits of the SL range in 1966 not exactly fitting any SL reported in 1965. However, that possibility is ruled out by the morphometric values, because the exact values reported as top and bottom of the range for the 7 in 1966 are all present in the table for 10 in 1965, so they have to be from the same dataset. As a result, I use only the 7 from 1966 as correct, because they have a more precise and a wider range of counts (e.g. pectoral-fin counts reported for both sides including a single 15 vs. 14 reported across the table in 1965; as well as two individuals with XX dorsal-fin spines vs. all XXI across the table in 1965). The 1994 range of counts repeats the 1965 range and the upper and lower limits of the morphometrics presented are mostly present in the table of 1965, but the range in 1994 is sometimes narrower than in the table, which is impossible. Thus, only the 7 from 1966 are internally consistent.

It should be noted that the photograph in the 1965 description was edited to remove the caudal-peduncle connecting membrane from the last dorsal-fin and anal-fin rays, followed to a degree in the adjacent drawing (p. 3 and also p. 685 of Cervigón [1966]); the drawing is corrected in Cervigón (1994) to show the membrane connected to the peduncle at the level of the procurrent caudal-fin rays (p. 105).

Comparisons. Three species co-occur with *E. randalli*: two with red-bannered TP, *E. falcon* and *E. tayrona*, both with orbital cirri; and *E. bottomei*, without a red banner. The IP of *E. randalli* is unmistakable.

This species differs in many aspects from other glass blennies and is easily distinguished. It is the only red-bannered species without an orbital cirrus and has 14 pectoral-fin rays vs. 13 in most congeners. The only stage where there is any question of the identification is the black TP male, which can look much like some other red-

Figure 80. *Emblemariopsis randalli*, IP, Isla Margarita, Nueva Esparta, Venezuela (Paul Humann).

Figure 81. *Emblemariopsis randalli*, juvenile, aquarium photograph, from San Esteban, Carabobo, NW Venezuela (Lisette Molins & Jose Gregorio Rodríguez).

bannered black males if the presence of the orbital cirrus is uncertain. The two other red-bannered species that share the range, *E. falcon* in NW Venezuela and *E. tayrona* in NE Venezuela, can be confused with *E. randalli* when fully blackened (which blots out their prominent banded operculum and pectoral-fin base markings). The black TP of *E. randalli* differs from those two species by having no orbital cirri; a longer red band, reaching back past the 7th and often to the 10th membrane (vs. ending by the 7th spinous membrane); and no rows of spots on any dorsal-fin membranes. The TP of *E. tayrona* further differs by having distinctly longer first dorsal-fin spines.

The pale TP of *E. randalli* is very different from other *Emblemariopsis*, with a set of diagnostic markings: reticulated pale-to-bluish bands under the lower jaw; a red or black oblique band across the golden iris; a pale pinkish cheek without spots; simple pale bands 2 and 4 on the cranium; the anterior dorsal fin with a longer red band, overlying a relatively wide white band, overlying a black patch limited to the first few membranes with a thin blue rim; no rows of spots along the dorsal-fin membranes; a prominent row of black spots along the upper body just below the spinous-dorsal-fin base; an unmarked pectoral-fin base; a black patch around the anus; and a wide dark or reddish internal band along the sides of the vertebral column.

The IP of *E. randalli* similarly has a distinctive set of features: a mostly unmarked pinkish head; a red or black oblique band across the iris; the anterior dorsal fin with a pattern of dark reticulated bands or lines against a pale background on the first three membranes, with a variably red band distally and a thin blue rim; a row of reddish to dusky spots along the body just below the spinous-dorsal-fin base; a black patch around the anus; a dark band distally on the anterior anal-fin membranes; and a wide dark or reddish internal band along the sides of the vertebral column. The cranial pattern is unlike other glass blennies, with a simple pattern of white bands against a brownish background: basically two wide central bands forming brackets, often joined to form an oval, and/or with a rear extension forming a large rounded Y-shape (occasionally with a central anterior spot), plus a broad, pale, outer band 4.

Juvenile *E. randalli* have overall reduced markings, but the very short first dorsal-fin membrane has an obvious proximal dark mark and a red outer membrane. The dark patch around the anus and the prominent bar through the iris are present from the earliest stages on the reef.

Other material. *Emblemariopsis randalli*: *Venezuela*: (paratypes) MOBR-EDIMAR (MHNLS) 881, (9) 25.5–28.7 mm SL, same data as holotype; CPC-007 up to CPC-480 (Universidad de Carabobo), (48) 17.1–25.6 mm SL, Venezuela, including Punta Escondido, Paraguaná (Falcon), Parque Nacional Morrocoy (Falcon), Parque Nacional San Esteban (Carabobo), Isletas de Piritu (Anzoátegui) and Parque Nacional Mochima (Sucre) by Jose Gregorio Rodríguez and Lisette Molins, July 2001–July 2013.

Emblemariopsis leptocirris Stephens, 1970

Blackfin Glass Blenny
Tubícola Aleta Negra

mtDNA COI sequence BIN https://doi.org/10.5883/BOLD:AAB5634 & AAB5635 & ACN1712 & AED1042

Figures 82–94; Tables 1 & 2

Emblemariopsis signifera [*sic*] [*non* Ginsburg] (in part) Stephens 1970: 286–287 (IP from Cayman Islands in UF 12459 and ?Anguilla and ?St. Barthelemy); Palacio 1974: 70 (Cayman Islands listing only); Greenfield & Johnson 1981: 65 (Belize & Honduras); Burgess et al. 1994: 219 (UF 12459, Grand Cayman); Smith 1997: 596–597 (Cayman, Belize & Honduras listing only); Ramos et al. 2003: 98 (UF 24007 ex-12459, Grand Cayman); Smith et al. 2003: 55 (barrier and offshore banks, Belize); Tyler & Hastings 2004: 59 (barrier and offshore banks, Belize).
Emblemariopsis sp. Greenfield 1975: 175 (Glover's Reef, Belize).
Emblemariopsis leptocirrus [*sic*] Greenfield & Johnson 1981: 65 (Belize & Honduras); Dennis 2000: 171 (Puerto Rico); Williams 2003: 1767 (Caribbean listing); Tyler & Hastings 2004: 59 (Belize); Victor 2010a: 22 (list).
Emblemariopsis occidentalis [*non* Stephens] Burgess et al. 1994: 219 (UF 12461, Grand Cayman).
Emblemariopsis arawak Victor, 2010a: 19–22, fig. 18 (type series from Puerto Rico).

Holotype. USNM 203819, 21.3 mm SL, TP male, USA, Puerto Rico, Cabo Rojo, El Negro Reef, 18.153°, -67.244°, J.E. Randall, 14 November 1964.

Diagnosis. A species of *Emblemariopsis* with an orbital cirrus and no red banner (a set of 2 spp.); TP territorial males in holes with a black head; anterior dorsal fin black, with a short thin white margin reaching back to second to fifth membrane, first three membranes not incised or only slightly incised; first dorsal-fin spine relatively short, reaching to about 5–6th spine base when adpressed, about 1/3 to 1/2 HL, subsequent spines usually rising somewhat to midfin spines; prominent coarse dark speckling over dorsal and pectoral fins.

Dark-shaded TP with a relatively short first dorsal-fin spine, subsequent spines after 4th rising, a thin white margin on first dorsal-fin membranes; prominent head spots can underlie shading; coarse dark speckling over

Figure 82. *Emblemariopsis leptocirris*, black TP, UF 246137, 16.4 mmm SL, Panama, DNA-confirmed (Jordan Casey & Simon Brandl).

Figure 83. *Emblemariopsis leptocirris*, black TP male, holotype, USNM 203819, 21.3 mm SL, El Negro Reef, SW Puerto Rico (courtesy Sandra Raredon, USNM).

dorsal and pectoral fins; often a variable row of small dark spots along lateral midline, usually no rows of dark spots along proximal spinous-dorsal-fin membranes, no opercular white bands or lines. Transitional males with first dorsal-fin spine shortening during transition from IP, but longer than 3rd and 4th, sometimes prominent head spots; no prominent isolated dark spot along mid-lower lip.

IP with elongated first two dorsal-fin spines, first spine reaching to base of 5–8th spine base when adpressed, first membrane with three or 4 dark bands, second spine slightly shorter, third 1/2 of first (earlier IP and juvenile with less elongate spines and first membrane white with a single dark band); live colors red, orange, and pink; early cranial pattern simple, with red at ends of band 3, later pattern a reddish round band 1, an inconspicuous V-shaped pale band 2, often broken at midline, band 3 a prominent red broken-U with midline side-by-side spots or a short curved band, a round red midline spot linking band 3 and band 4, a broad pale band 4 becoming reddish near midline or bulging and pinching off proximal red spots, followed by a midline large pale spot, and a short red band 5; IP head spots usually full complement; melanophores near pectoral-fin base usually a broad oblique band, and/or one to three spots.

Figure 84. *Emblemariopsis leptocirris*, black TP: Cayman Islands (left) (Everett Turner) and Roatan, Honduras (right) (Mickey Charteris).

Figure 85 *Emblemariopsis leptocirris*, dark-shaded TP, UF 246134, 18.8 mm SL, Belize 16-617, DNA-confirmed (Jordan Casey & Simon Brandl).

Dorsal-fin elements IXX–XXI,10–14 (total 30–33); anal-fin elements II,21–24; pectoral-fin rays almost always 13; caudal-fin procurrent rays usually 3–4/3; LIO pores 3; largest specimen, 21.3 mm SL holotype.

Distribution. (see Fig. 159) The species occupies a wide area of the central Caribbean: along the Central American coast from Cozumel (Yucatan, Mexico; Jeff Haines) south to Belize (collections by Smithsonian and Jordan Casey and Simon Brandl), Utila (collections and Brad Ryon), and Roatan (Mickey Charteris, Carlos and Allison Estapé, and Jamie Holdorf) to Panama (collections), on the islands of the western Caribbean, Corn Islands of Nicaragua (Ellie Place) and Cayman Islands (Everett Turner, Cindy Abgarian, and Frank Krasovec), and across to the northern Antilles, i.e. Dominican Republic (Juan Carlos Navarro), Puerto Rico and Virgin Islands (collections) and Nevis and St. Kitts (Jason Phillip, James Garin, and Mark Lessard), but stopping before Dominica. It is apparently absent from the southern Caribbean east of Panama, i.e. Colombia, Aruba, Bonaire, Curaçao, Venezuela, Trinidad, and the Windward (southern) Lesser Antilles (Dominica, Martinique, St. Lucia, Barbados, St. Vincent and Grenadines, Grenada, and Tobago). To the north, it is absent from the Gulf of Mexico, Florida, and the Bahamas.

Habitat. Photographs show IP fish mainly perched on live coral surfaces and TP males in holes, also typically within live coral heads. Everett Turner reports this species widely distributed down to 20 m in Cayman Islands.

Remarks. Based on the frequency of underwater photographs of this species, it appears that it is the most common glass blenny within its range (after review of about 500 underwater photographs of *E. leptocirris*).

Figure 86. *Emblemariopsis leptocirris*, late transitional black TP, Roatan, Honduras (Mickey Charteris).

Figure 87. *Emblemariopsis leptocirris*, dark-shaded TP, Roatan, Honduras (Mickey Charteris).

Identification of all phases and determining the variation in appearance is assisted by the fact that it is the only common glass blenny with a cirrus in the western portion of its range (Belize, Honduras, Yucatan, Panama, and Cayman Islands). The other species there with a cirrus is the uncommon (and obvious underwater) greenish blue and gold *E. ruetzleri*, and the rare *E. dianae*, found only on the midshelf of Belize and Bay Islands of Honduras. The numerous photographs show the variation in the height of the first dorsal-fin spine in the IP, usually with size, as well as in the pectoral-fin base markings and the cranial pattern, which varies in the intensities and shades of the various bands. It is likely that a similar degree of variation occurs in other species if sufficient individuals are documented.

In the eastern portion of the range, in the northern Antilles, *E. leptocirris* overlaps with *E. carib* and the IPs of the two can look quite similar. Victor (2010a) collected the IPs of the two species together, in Puerto Rico,

Figure 88. *Emblemariopsis leptocirris*, transitional TP, claiming a new hole, Cayman Islands (Everett Turner).

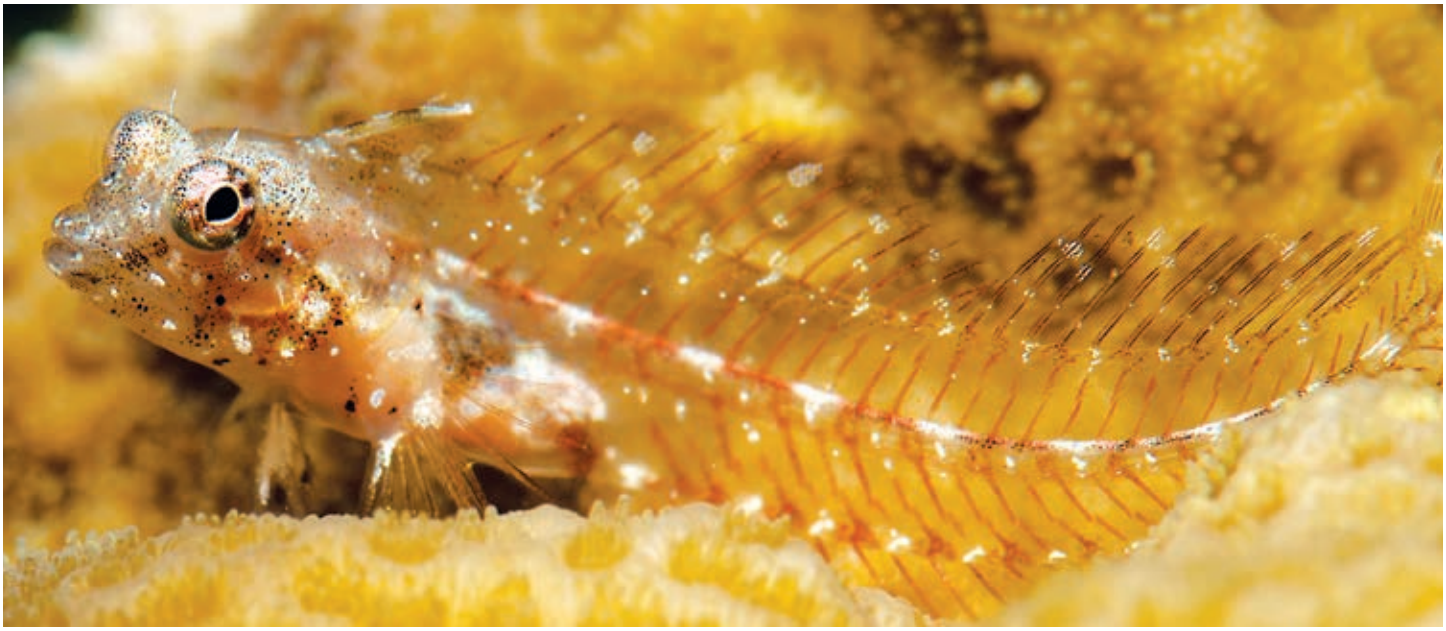

Figure 89. *Emblemariopsis leptocirris*, early transitional TP, Roatan, Honduras (Jamie Holdorf).

only distinguishing them when DNA results showed two unrelated lineages. I had collected only small IP of *E. leptocirris*, and, without a mature specimen or DNA sequence to match to, made the unwise decision to describe the new species *Emblemariopsis arawak* without clearly excluding all possible congeners within the same range. Unfortunately, Stephens' (1970) description of *E. leptocirris* promoted this error when he concluded that both male and female individuals do not have elongated first dorsal-fin spines: he was mistaken and assigned IP individuals with the elongated first dorsal-fin spines to "*E. signifera*". The two phases of *E. leptocirris* were finally united when they were found to share mtDNA sequences based on additional sets of specimens from Cayman Islands and Utila. The mtDNA matches show that *E. arawak* is the same as IP *E. leptocirris* and thus *E. arawak* is a junior synonym (type location of both is Puerto Rico).

The presumption that *E. leptocirris* does not have elongated first dorsal-fin spines led subsequent researchers to assign the long-spined IP *E. leptocirris* in Belize, Honduras, and Cayman Islands to "*E. signifera*". However, all DNA surveys and collections thus far in the western Caribbean region find no "*E. signifera*" (= *E. carib*), and no photograph of a red-bannered spikefin male has ever been taken in the region, despite intensive recent underwater

Figure 90. *Emblemariopsis leptocirris*, early transitional TP, fine anterior speckling, St. Kitts, Lesser Antilles (Jason Phillip).

Figure 91. *Emblemariopsis leptocirris*, IP female with eggs in abdomen, Cayman Islands (Everett Turner).

photography (almost a thousand photographs of western Caribbean glass blennies). Only 4 species have been photographed, collected, and/or sequenced in Belize and Honduras: three with orbital cirri (*E. leptocirris*, *E. ruetzleri*, and *E. dianae*) and one without (*E. pricei*). The oft-cited "*E. signifera*" must be the overlooked IP of one or more of the three species with cirri, and most likely the common *E. leptocirris*. Only *E. leptocirris* and *E. dianae* occur on the mid-shelf reefs of Belize (Smith et al. 2003) and only *E. leptocirris* and *E. ruetzleri* occur on the barrier and offshore reefs (Smith et al. 2003, Tyler & Hastings 2004). Greenfield & Johnson (1981, 1990) surveyed the blennioids of Belize and Honduras and, since they also presumed *E. leptocirris* do not have elongated dorsal-fin spines, the "*E. signifera*" they collected "with *E. leptocirris*" are doubtless the IP of *E. leptocirris* (and would include any IP *E. ruetzleri* or *E. dianae* they encountered). In the Cayman Islands as well, the records of "*E. signifera*" are presumably also IP *E. leptocirris*.

The drawing of the TP holotype of *E. leptocirris* in Stephens (1970: 289–290, fig. 6 & Table 5, labeled as male in the caption, female in the text, and "male?" in the table) is inaccurate and differs in important diagnostic characters from the holotype specimen. Among the many inconsistencies is the shortening of the dorsal-fin spines: the first is drawn as about the same as the eye diameter and 25% HL, but it is longer, 1.5 times the eye and about 40% HL. In addition, the cirrus is exaggerated, greater than pupil diameter vs. much less, and the dorsal-fin and anal-fin membranes are joined to the caudal fin almost half way out along the outer caudal-fin segmented ray vs. joined to the base of the caudal fin in recently preserved and undamaged TP. In addition, the one paratype of *E. leptocirris* from Bahamas (Great Inagua, ANSP 114014) proves on examination to be TP *E. occidentalis*, based on the first two spines being elongated in a black TP, much longer than the third and fourth, extending posteriorly to spine base 7 when adpressed (the membranes are torn from the spines).

Various populations of *E. leptocirris* have different ranges and modes of soft fin-ray counts, and not in the expected clinal pattern of fewer rays in lower latitudes. As in some other Caribbean blennies and gobies, these correspond to genetically different populations, and, in the absence of other morphological or marking differences, these populations are considered genovariant populations of the same species (*sensu* Victor 2015). In this case, the type population from the Antilles as well as the Belize/Honduras population have one higher dorsal-fin and anal-fin rays, compared to populations from the Cayman Islands and Panama.

Comparisons. Several glass blenny species are sympatric with *E. leptocirris*: red-bannered *E. carib* in the Antilles and *E. dianae* in Belize and Honduras; the greenish blue and gold *E. ruetzleri* at all locations; and then, without cirri, *E. pricei* in Belize and Honduras and *E. bahamensis* elsewhere.

The black TP of *E. leptocirris* has, at most, a thin white rim on the first few anterior dorsal-fin membranes and thus is easily differentiated from the 8 red-bannered congeners. Of the 8, only *E. dianae*, *E. falcon*, *E. lancea*, and *E. randalli* have relatively short first dorsal-fin spines (*E. randalli* without an orbital cirrus); the latter three

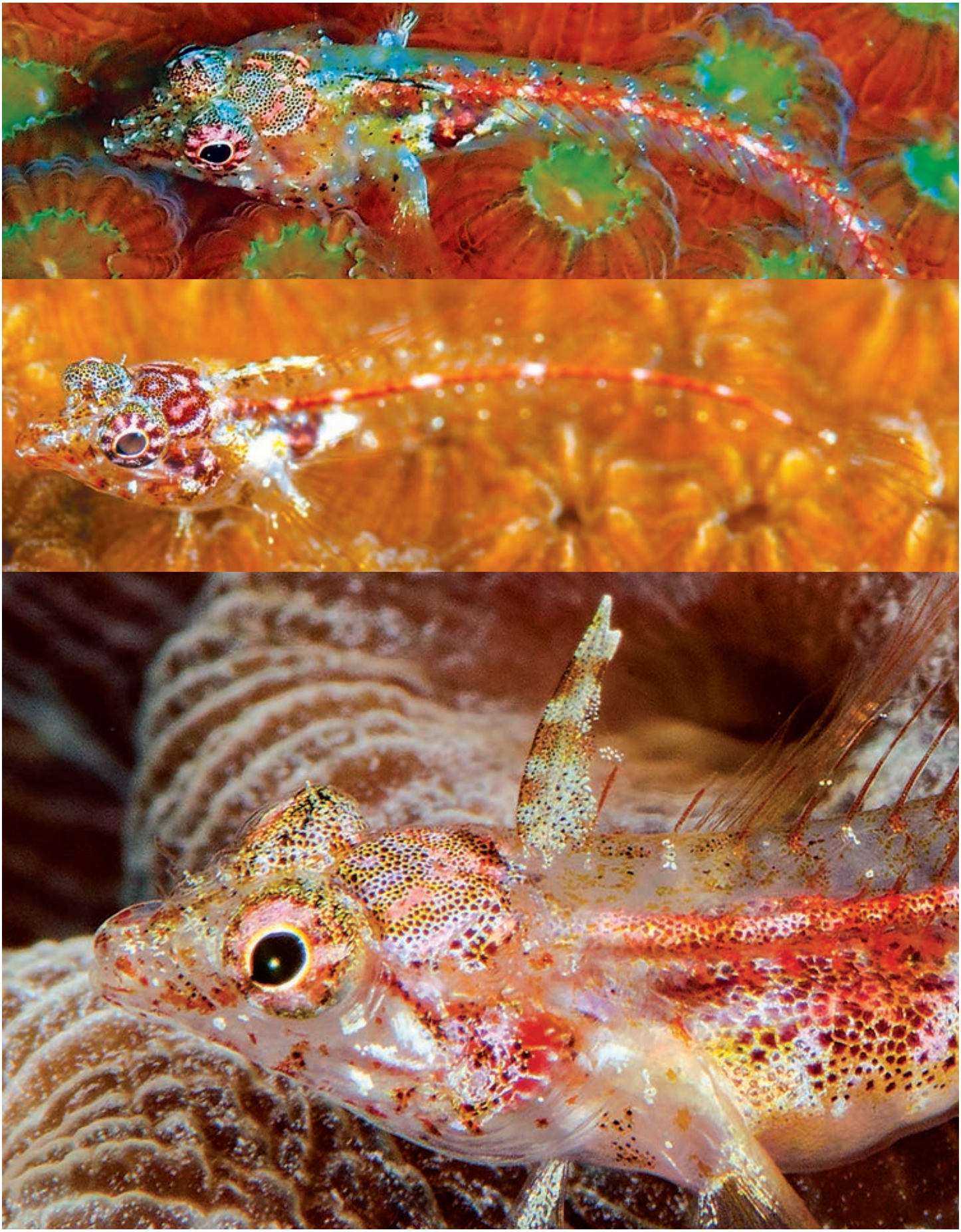

Figure 92. *Emblemariopsis leptocirris*, IP; variations in cranial pattern, Corn Island, Nicaragua (upper) (Ellie Place); Cayman Islands (middle) (Frank Krasovec); female with eggs, Cozumel, Mexico (lower) (Jeffrey Haines)

Figure 93. *Emblemariopsis leptocirris*, juveniles; first dorsal-fin spine relatively short, white, and with a single dark band, Nevis, Lesser Antilles (upper) (Mark Lessard) and Cayman Islands (lower) (Everett Turner).

are also from well outside the range. The several smoothhead species may look similar to *E. leptocirris* when blackened, but the absence of an orbital cirrus quickly separates them. That leaves the one remaining species that also has a black TP with a cirrus and no red band, i.e. *E. ruetzleri*, which is broadly sympatric with *E. leptocirris*, It can be difficult to separate when fully blackened, with the main difference being the deeply incised first two dorsal-fin membranes and the white rim concentrated on the rounded tips of the spines in *E. ruetzleri* vs. barely or not incised and a continuous thin white rim in black *E. leptocirris*. Also, *E. ruetzleri* has 14 pectoral-fin rays (vs. 13). One feature that may be specific to TP *E. leptocirris* is a coarse, grainy, dark speckling over the body and dorsal and pectoral fins, still quite evident on the holotype (USNM 203819; Fig. 83).

Dark-shaded and transitional TP *E. leptocirris* can show discrete large head spots underlying the shading. All but one of the congeners in transitional phase are easily separated by having a red banner, a banded operculum, well-elongated first dorsal-fin spines, and/or no orbital cirri. As in the black TP, *E. ruetzleri* is quite similar in this stage, and best distinguished by the prominent black spot one-third of the way along the lower lip, a more concave anterior dorsal-fin profile with a shorter fourth dorsal-fin spine, rounded white tips on the first two dorsal-fin spines, and often some blue and gold color remnants (and 14 pectoral-fin rays).

The IP of *E. leptocirris* can be distinguished from the set of 4 smoothhead species (plus *E. randalli*) by the presence of a cirrus and a different cranial pattern, and from the two sympatric smoothhead species, *E. bahamensis* and *E. pricei*, by their reduced arrays of head spots and very short first dorsal-fin spines. The three banded-operculum species differ by having a thinner, slighly oblique bar near the pectoral-fin base (vs. a broad fully oblique band of melanophores and/or spots). The IP of *E. ruetzleri* have their bright greenish blue and gold colors in life, a distinctive cranial pattern, and 14 pectoral-fin rays vs. 13 (note that fading at death and preservation can make it difficult to visually distinguish preserved IP *E. ruetzleri* without a close look at the cranial markings). The remaining Caribbean species, *E. occidentalis* and the partly sympatric *E. carib*, can appear quite similar to IP E. *leptocirris*, although their cranial patterns develop more mosaic patterns. In the overlapping range, in the northern Antilles, IP *E. carib* and *E. leptocirris* are collected together, and the primary difference in preserved fish is that *E. leptocirris* has one more dorsal-fin and anal-fin rays (Victor 2010a).

Figure 94. *Emblemariopsis leptocirris*, IP, Little Corn Island, Nicaragua (Ellie Place).

The cranial pattern of IP *E. leptocirris* is well-documented by the large number of underwater photographs available, especially from locations without any similar species. The pattern begins on juveniles as the red ends of a wide-U band 3, a pattern shared with similar species. With growth, IP *E. carib* and *E. occidentalis* diverge and develop additional red spots on their way to a mosaic pattern. The typical pattern on *E. leptocirris* is band 1 a reddish round spot; band 2 a relatively inconspicuous pale V-shape, broken at midline; band 3 a prominent red broken-U with midline side-by-side spots or a short curved band; a round red midline spot linking band 3 and 4; band 4 a broad pale band becoming reddish near midline and budding off a red spot each side, followed by a midline large pale spot; and band 5 a short, red, sometimes segmented band.

Material examined. *Emblemariopsis leptocirris*: *Puerto Rico*: (type specimens of *E. arawak*) UF 179673, 11.0 mm SL male holotype, Puerto Rico, La Parguera, Medialuna Reef, seaward slope, 17.935°,- 67.049°, B.C. Victor & C. Caldow, 4 August 2007; UF 179674, 3 paratypes 9.3–10.0 mm SL (plus 3 damaged specimens 8.8–10.1 mm SL), Puerto Rico, La Parguera, Medialuna Reef, seaward slope, 17.935°,- 67.049°, B.C. Victor & C. Caldow, 4 August 2007; UF 179675, 11.3 mm SL, Puerto Rico, La Parguera, Medialuna Reef, seaward slope, 17.935°,- 67.049°, B.C. Victor, 9 August 2007. *Cayman Islands*: UF 246133, (17) 11.2–19.4 mm SL, Cayman Islands, Grand Cayman, southwest shore, 19.286°, -81.392°, B.C. Victor, 27 April 2014. *Belize*: UF 246134, (3) 12.2–18.0 mm SL, Belize, Stann Creek District, Belize Barrier Reef, 16.9°, -88.1°, S. Brandl & J. Casey, 1–8 April 2016. *Honduras*: UF 246135, (7) 8.3-14.5 mm SL, Honduras, Bay Islands, Utila, SW corner, 16.076°, -86.938°, B.C. Victor, 1 July 2008. *Panama*: UF 246136, 9.8 mm SL, Panama, Colon, Portobelo Bay, 9.548°, -79.678°, D.R. Robertson, J. Van Tassell, L. Tornabene, B.C. Victor & E.A. Peña, 30 May 2007; UF 246137, (8) 12.6-16.5 mm SL, Panama, Bocas del Toro, 9.3°, -82.3°, S. Brandl & J. Casey, 18–24 February 2016.

Emblemariopsis ruetzleri Tyler & Tyler, 1997

Bluegold Glass Blenny
Tubícola Oro Azul

mtDNA COI sequence BIN https://doi.org/10.5883/BOLD:AAI5274 & AAB5631 & ABA4169 & ABZ5929

Figures 95–107; Tables 1 & 2

Holotype. USNM 337496, 14.4 mm SL, TP male, Belize, Carrie Bow Cay, 16.8025°, -88.0818°, 5 m, J. Tyler, D. Tyler & J. Sundberg, 1 March 1995.

Diagnosis. A species of *Emblemariopsis* with an orbital cirrus and no red banner (a set of 2 spp.); TP territorial males in holes with a black head; anterior dorsal fin black, with a short, thin, white margin reaching back to second membrane; first two membranes well incised; first dorsal-fin spine relatively short, reaching to about 5–6th spine base when adpressed, about 1/2 HL, third and fourth spines shorter, subsequent spines rising to midfin spines.

Dark-shaded and transitional TP with a relatively short first dorsal-fin spine, second spine usually equal, third spine about 2/3 of first, fourth spine less than 1/2 first spine, tenth spine about equal to first, profile of anterior dorsal fin with a moderate concavity, decreasing during transition; first three dorsal-fin membranes white tipped, tips rounded and membranes incised; often distinct large head spots; a prominent characteristic black spot a third way along lower lip; no dense speckling of dorsal-fin and pectoral-fin membranes; no row of dark spots along lateral midline, no rows of dark spots along proximal spinous-dorsal-fin membranes, and no opercular bands or lines.

IP with elongated first two dorsal-fin spines, first spine reaching to base of 5–8th spine base when adpressed, second spine about equal, third about 2/3 of first, first two membranes with white rounded tips; live colors greenish blue and gold; cranial pattern of bluish spots and reticulations with a greenish gold background; IP head spots usually reduced; melanophores near pectoral-fin base a short oblique band to none.

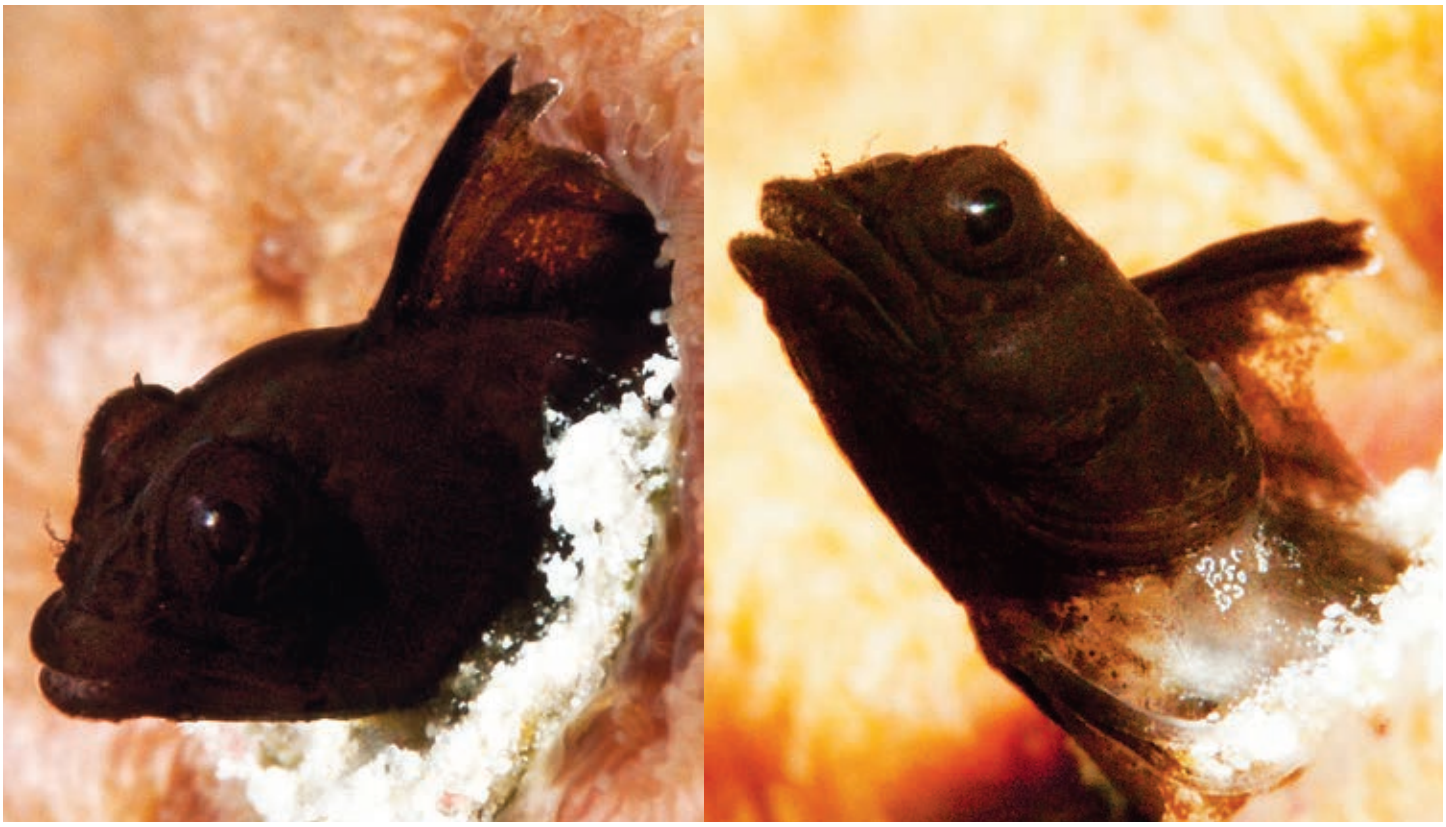

Figure 95. *Emblemariopsis ruetzleri*, black TP, Cayman Islands (Everett Turner).

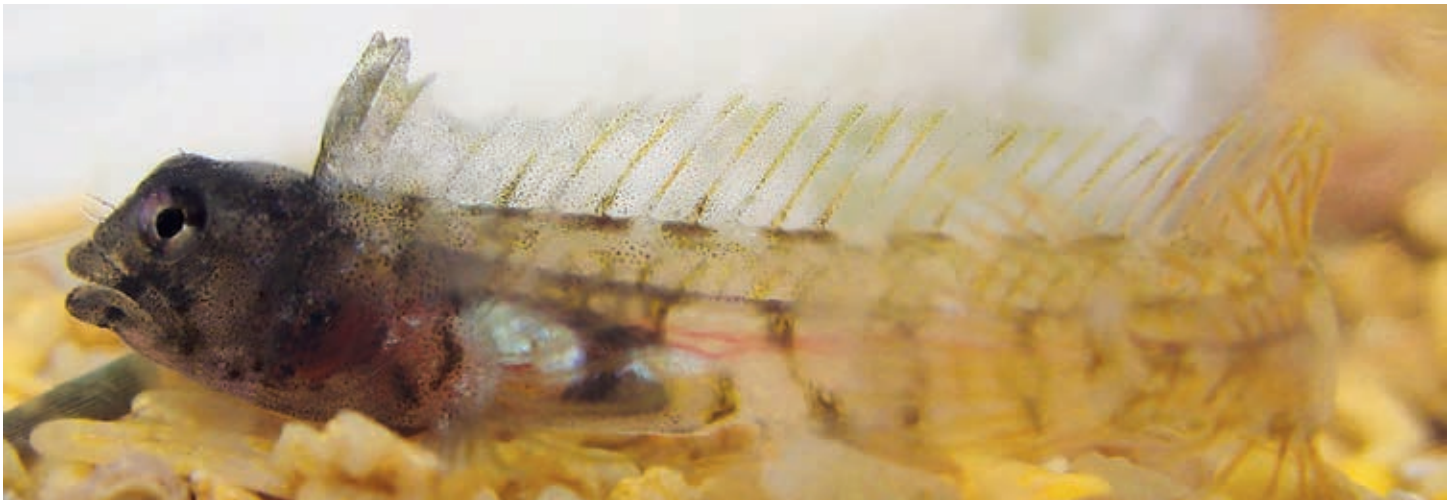

Figure 96. *Emblemariopsis ruetzleri*, transitional TP, aquarium photograph, Las Aves, Venezuela (Jose Gregorio Rodríguez).

Dorsal-fin elements IXX–XXI,10–13 (total 30–32); anal-fin elements II,19–21; pectoral-fin rays usually 14; caudal-fin procurrent rays usually 4/3; LIO pores 3; largest specimen 19.6 mm SL, Cayman Islands.

Distribution. (see Fig. 159) The species occupies a wide area of the central Caribbean: along the Central American coast from Belize (type series, Tyler & Tyler [1997]) and Honduras, i.e. Roatan (Mickey Charteris), Utila (collections), and Cayos Vivarios (Michele and Mark Kelly), south to Panama (collections); on the islands of the western Caribbean, including San Andres (Keri Wilk) and Cayman Islands (Everett Turner and collections); across to the northern Antilles, i.e. Mona Island (Keri Wilk), Puerto Rico (collections) and St. Croix (Smith-Vaniz & Jelks [2014] and collections), St. Barthélemy (Didier Laplace), and Isla Aves (Jose Gregorio Rodríguez), but stopping before Dominica. It is apparently absent from the southern Caribbean east of Panama, i.e. Colombia, Aruba, Bonaire, Curaçao, Venezuela, Trinidad, and the Windward (southern) Lesser Antilles (Dominica, Martinique, St. Lucia, Barbados, St. Vincent and Grenadines, Grenada, and Tobago). To the north, it is absent from the Gulf of Mexico, Florida, the Bahamas.

Figure 97. *Emblemariopsis ruetzleri*, transitional TP, note dark spot midway on lower lip, Cayman Islands (Everett Turner).

Figure 98. *Emblemariopsis ruetzleri*, transitional TP, note dark spot midway on lower lip, Cayman Islands (Everett Turner).

Habitat. In the Virgin Islands, these glass blennies are found both on outer-facing reef and inshore in bays. Surprisingly, they eluded detection there until 2001 when they were found in St. Croix (Smith-Vaniz et al. 2006). They were collected subsequently in St. Thomas as well. TP males were noted by Tyler & Tyler (1997) to prefer vacant vermetid gastropod holes in dead coral substrates in Belize; however photographs from Cayman Islands

Figure 99. *Emblemariopsis ruetzleri*, ethanol-preserved transitional TP, UF 246141, Cayman Islands, DNA-confirmed (Benjamin Victor).

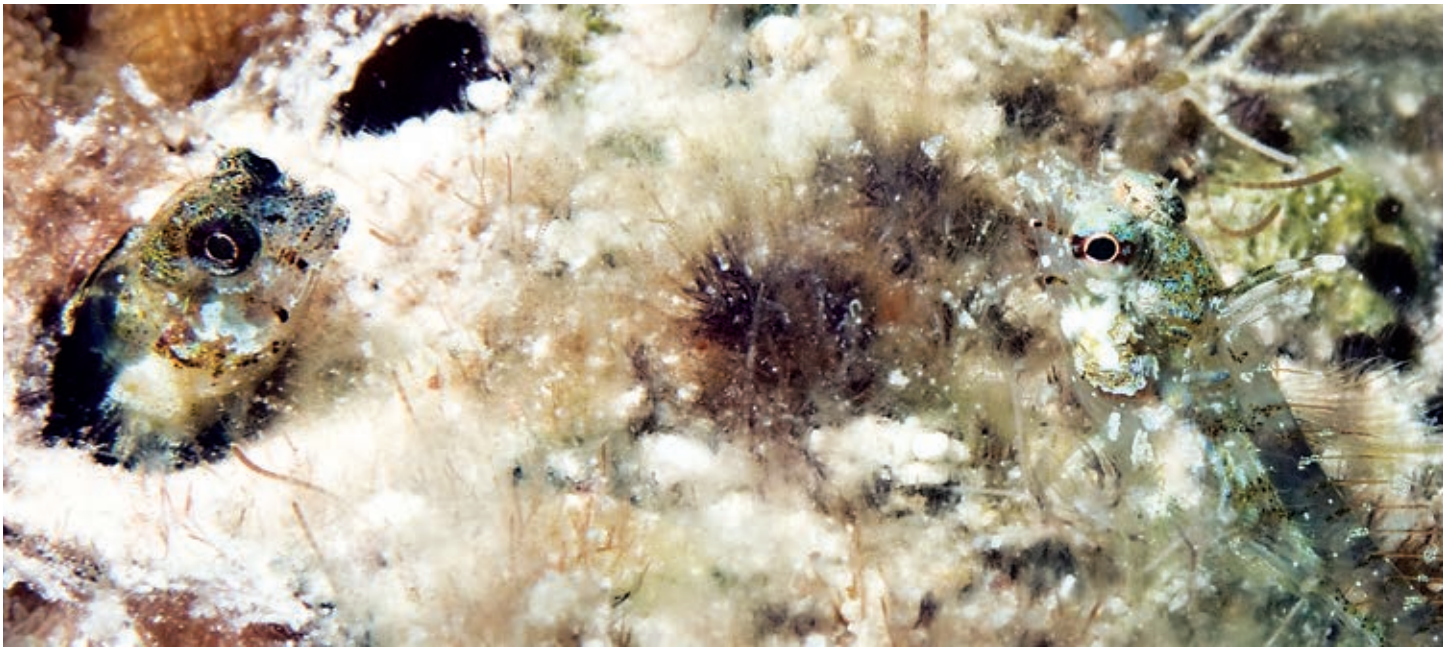

Figure 100. *Emblemariopsis ruetzleri*, early transitional TP at left confronts IP at right, Cayman Islands (Everett Turner).

(Everett Turner and Cindy Abgarian) and Mona Island (Keri Wilk) show TP males in holes among live corals. It is unclear what the significance of this difference may be. The depth range for the type specimens in Belize was 1–8 m (Tyler & Tyler 1997) and in the Cayman Islands they are found shallower than 10 m (Everett Turner, pers. comm.).

Remarks. This species was first described by Tyler & Tyler (1997) from Carrie Bow Cay on the Belize barrier reef and considered endemic to Belize for some time, until they were detected at several other widespread locations. The Cayman Islands population also shows high variation in the size of TP males, with some remarkably small individuals: one male was only 12.8 mm SL, about juvenile size for some other species. Tyler & Tyler (1997) noted this phenomenon in Belize populations, their smallest black-headed male was only 11.8 mm SL.

Recently, Everett Turner and Cindy Abgarian have extensively documented their life history stages and behavior with macrophotography in the Cayman Islands. In life, the IP glass blennies are perched out on live and dead coral surfaces and they intensify their white markings and wave their white, flag-like anterior dorsal fin back and forth vigorously when approached. The bright colors of greenish blue and gold are conspicuous on coral backgrounds, but are well camouflaged on algae-encrusted coralline rock substrate (Fig. 100).

Comparisons. Since *E. ruetzleri* occurs in central Caribbean locations with the most sympatric species, it is fortunate the IP and transitional stages are distinctively colored.

Figure 101. *Emblemariopsis ruetzleri*, transitional TP male, Isla Mujeres, Yucatan, Mexico (Nicholas Fowles, www.oceanworld.ca).

Figure 102. *Emblemariopsis ruetzleri*, IP, Cayman Islands (Everett Turner).

As a black TP, it shares cirri and no red banner with the much more common *E. leptocirris*, the differences are enumerated below.

The black TP of *E. ruetzleri* has, at most, a thin white rim on the first few anterior dorsal-fin membranes and thus is easily differentiated from the 8 red-bannered congeners. Of those, it is only sympatric with two: *E. dianae* in Belize and Honduras and *E. carib* in the Lesser Antilles. The former can look similar when black, but has a wider band of color (or pale in preservative) along the anterior dorsal-fin spines; and *E. carib* has a spiked dorsal

Figure 103. *Emblemariopsis ruetzleri*, IP, Cayman Islands (Everett Turner).

fin. The TP of the smoothhead species can all look similar to *E. ruetzleri* when blackened, but the absence of the orbital cirrus quickly separates them. That leaves the one remaining species, *E. leptocirris*, which also has a cirrus and no red band, and is broadly sympatric with *E. ruetzleri*. The two species can be difficult to separate when blackened: in that case the most distinctive difference is the clearly incised first two dorsal-fin membranes and the white rim concentrated on the scalloped tips vs. barely or not incised and a continuous thin white rim in *E. leptocirris*. *E. ruetzleri* also has 14 pectoral-fin rays (vs. 13).

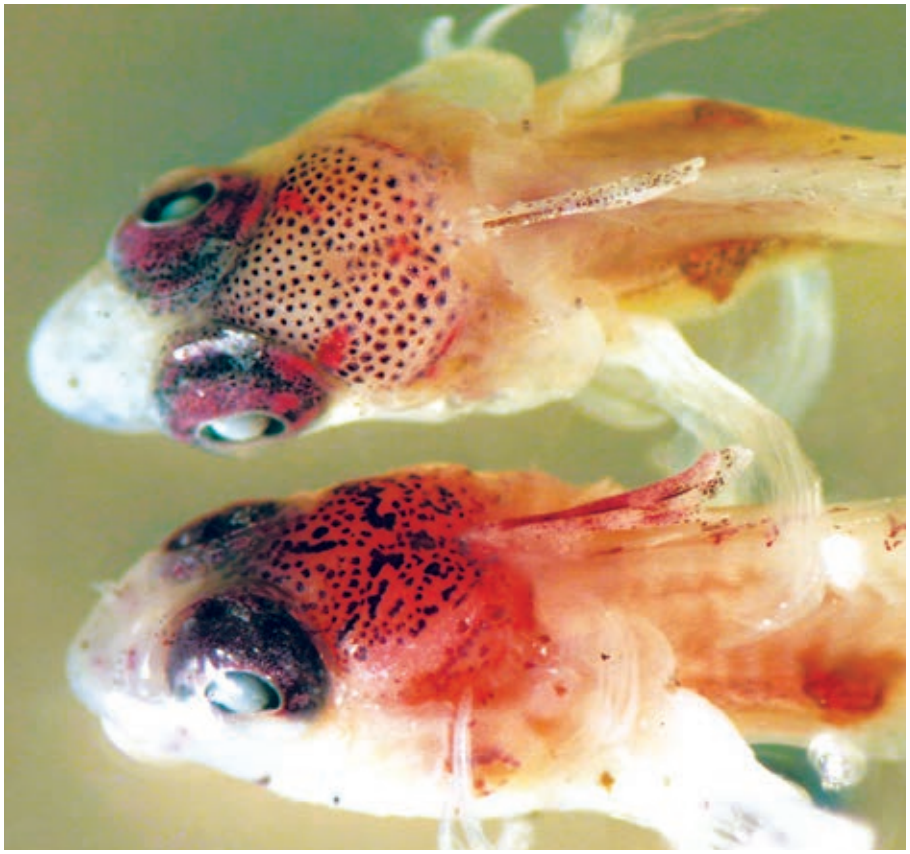

Figure 104. *Emblemariopsis leptocirris* above vs. *E. ruetzleri* below; IP cranial patterns, ethanol-preserved, from same vial, Colon, Panama (Benjamin Victor).

Dark-shaded, pale, and transitional TP *E. ruetzleri* can be distinguished from all but one of the congeners, because those species variously have a red banner, a banded operculum, spiked first dorsal-fin spines, and/or no orbital cirri. *E. leptocirris* is similar in this stage, and *E. ruetzleri* are best distinguished by the prominent black spot about a third way along the lower lip, in addition to a shorter fourth dorsal-fin spine, rounded white tips on the first two dorsal-fin spines with the membranes incised, and often blue or gold color remnants (and 14 pectoral-fin rays). In some locations (in the Antilles and Belize) *E. leptocirris* are distinguished by higher counts of dorsal-fin rays: , but not in the Cayman Islands or Panama.

The IP of *E. ruetzleri* is quite distinctive when live, with the diagnostic bright greenish blue and gold color pattern separating it from the other species with a red-based color pattern. In preserved fish, it can be more difficult to distinguish IP *E. ruetzleri*, but the very different cranial pattern is recognizable. The cranial pattern

Figure 105. *Emblemariopsis ruetzleri*, IP, Cayman Islands (Everett Turner).

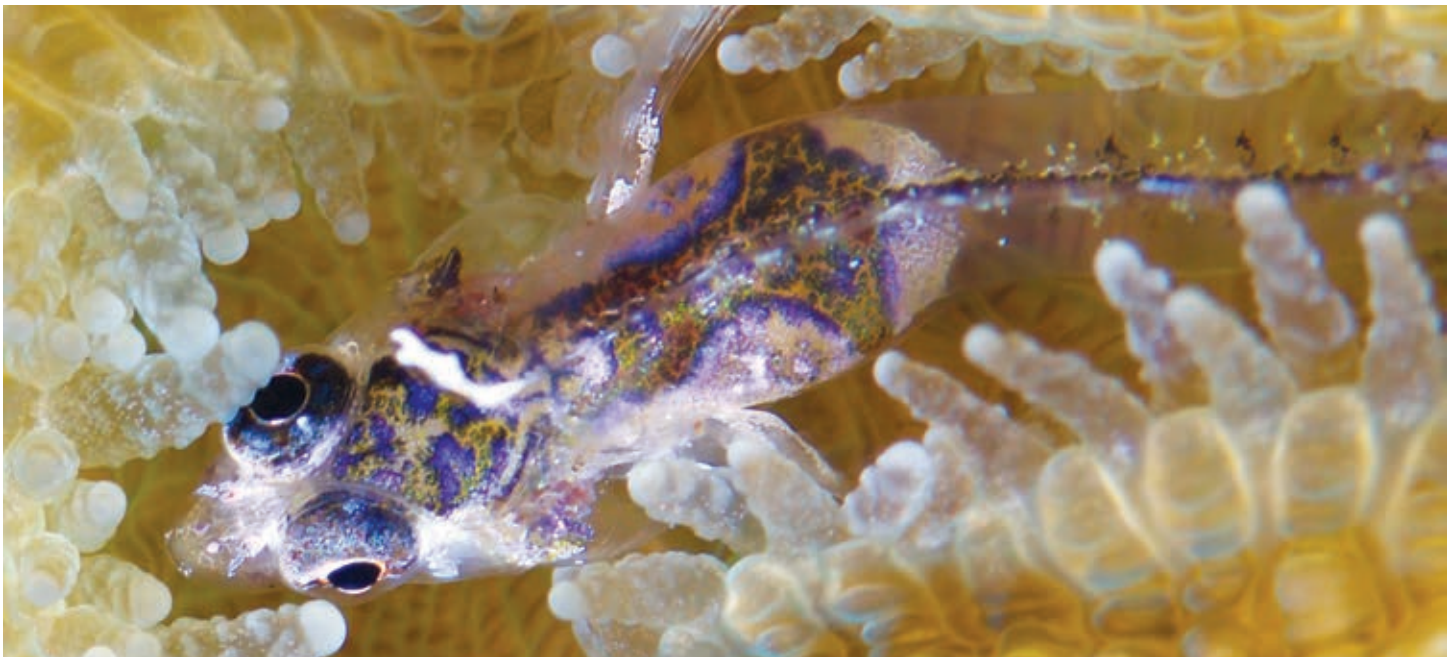

Figure 106. *Emblemariopsis ruetzleri*, IP, St. Barthélemy, Lesser Antilles (Didier Laplace).

on this species is different from other species: notably, the bluish areas have a condensed, iron-filings-like appearance, appearing dark and coagulated (Fig. 104). This likely represents a different molecular structure of the chromatophores in this species (since blue is not a pigment in reef fishes). The arrangement of the colored areas is also not the bracketing-band pattern of other species, but variable scattered small spots and reticulations. Lastly, while most photographs show the basic greenish blue and gold cranial pattern, some individuals, perhaps against differently colored substrates, show dark purple and brownish gold colors (Fig. 106) or purple and yellowish (Fig. 105). Other species can have an uncommon, somewhat bluish, color of the cranial pattern; it is seen occasionally on Florida *E. diaphana*, Bonaire *E. bottomei*, and Brazilian *E. signifer*, but that occurs in overall darkened fish that do not have any gold color or the peculiar condensed cranial pattern of *E. ruetzleri*.

Material examined. *Emblemariopsis ruetzleri*: *Puerto Rico*: UF 246138, 9.4 & 10.7 mm SL, Puerto Rico, Lajas, La Parguera, 17.53°, -67°, B.C. Victor & C. Caldow, 5 August 2007. *US Virgin Islands*: UF 246139, (3) 12.5–15.3 mm SL, US Virgin Islands, St. Thomas, Brewer's Bay, 18.34°, -64.98°, B.C. Victor, 16 March 2007; UF 246140, 13.8 & 15.4 mm SL, US Virgin Islands, St. Thomas, Brewer's Bay, 18.34°, -64.98°, B.C. Victor, 29 April 2009. *Cayman Islands*: UF 246141, (12) 9.4–19.6 mm SL, Cayman Islands, Grand Cayman, southwest shore, 19.286°, -81.392°, B.C. Victor, 27 April 2014. *Honduras*: UF 246142, 12.4 mm SL, Honduras, Bay Islands, Utila, SW corner, 16.076°, -86.938°, B.C. Victor, 2 July 2008. *Panama*: UF 246143, (12) 8.0–13.3 mm SL, Panama, Colon, Islas los Mogotes, Mogote Afuera, 9.637°, -79.524°, D.R. Robertson, J. Van Tassell, L. Tornabene, B.C. Victor & E. Peña, 29 May 2007.

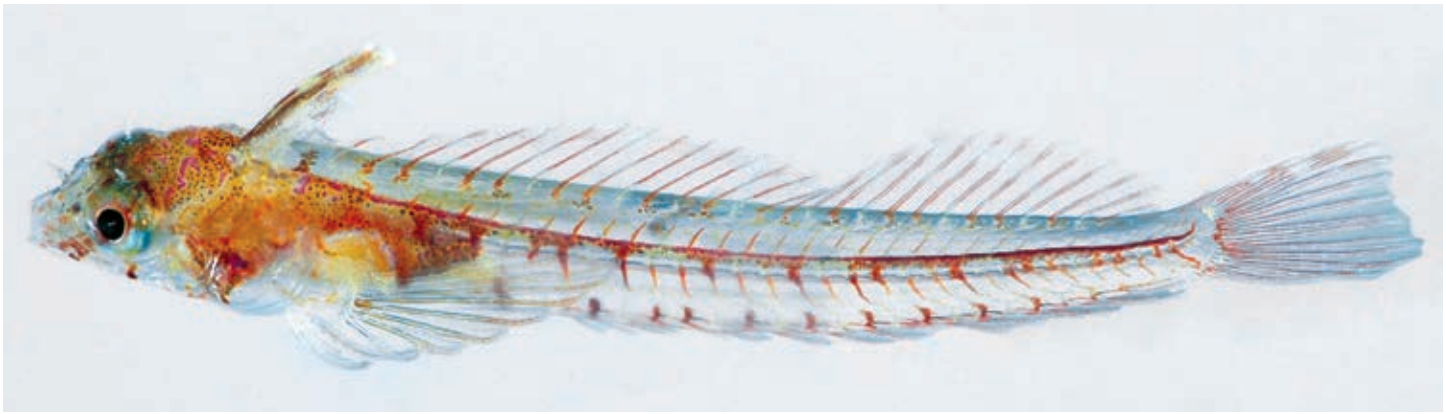

Figure 107. *Emblemariopsis ruetzleri*, freshly collected juvenile, UF 246143, 9.8 mm SL, Mogote Afuera, Colon, Panama, DNA-confirmed (James Van Tassell & D. Ross Robertson).

Emblemariopsis bottomei Stephens, 1961

Southern Smoothhead Glass Blenny
Tubícola Cabeza Lisa del Sur

mtDNA COI sequence BIN https://doi.org/10.5883/BOLD:AAF8918 & AAO1394

Figures 108–120; Tables 1 & 2

Emblemariopsis diaphana [*non* Longley] Butter et al. 1980; Tyler & Tyler 1999: 22 (Curaçao).
Emblemariopsis signifera [*sic*] [*non* Ginsburg] (in part) Smith 1997: 596–597 (Curaçao only)
Emblemariopsis bahamensis [*non* Stephens] (in part) Smith 1997: 597 (ABC islands and Venezuela only); Kells & Carpenter 2007: 346–347 (South America only).
Emblemariopsis cf. *bottomei* Rodriguez 2008: 249; Rodriguez 2012: 94 (Venezuela)

Holotype. USNM 195822, 29.6 mm SL, TP male, Venezuela, Los Roques Archipelago, Yonqui, 11.886°, -66.822°, 5 m, P. Bottome & W. Wallis, 5 July 1958.

Diagnosis. A species of *Emblemariopsis* without an orbital cirrus or a red banner (a set of 4 spp.); TP territorial males in holes with a black head; anterior dorsal fin black, with a long, thin, white margin reaching well back to midfin; first dorsal-fin spine short, reaching up to 4th spine base when adpressed, about 1/4 to 1/3 HL, subsequent spines rising to midfin spines; a variable row of small dark spots along anterior lateral midline, irregular rows of dark spots along spinous-dorsal-fin membranes.

Dark-shaded, pale, and transitional TP with a short first dorsal-fin spine, reaching up to 4th spine base when adpressed, subsequent spines rising to midfin with profile of anterior dorsal fin rising about linearly (except when

Figure 108. *Emblemariopsis bottomei*, black TP, Bonaire (Ned DeLoach).

Figure 109. *Emblemariopsis bottomei*, black TP, Bonaire (Jamie Holdorf).

transitional with dip for shorter fourth spine); first two or three dorsal-fin membranes white, followed by irregular row(s) of dark spots along spinous membranes; a variable row of small dark spots along anterior lateral midline; no opercular bands or lines; reduced head markings, as a dark band from eye across jaw, then paired white bands, on mid-upper jaw and just above, followed by an elongated dark moustache band above rear maxilla.

IP with elongated first two dorsal-fin spines, first spine reaching to base of 5–8th spine base when adpressed, second spine slightly shorter, third about 1/2 of first, fourth shortest (juvenile, earlier IP, and approaching transition with less elongate spines); live colors red, orange, and pink; cranial pattern with a pale or bluish oval or linear band 1 breaking up and reticulated with pieces of band 2, band 3 red ends of a broken-U band with a central Y, an extra pale spot behind band 3, a long pale band 4, and inconspicuous band 5; IP head spots usually full complement; melanophores near pectoral-fin base one to three spots or a short oblique band.

Dorsal-fin elements IXX–XXI,12–13 (total 31–33); anal-fin elements II,20–22; pectoral-fin rays almost always 13; caudal-fin procurrent rays usually 4/3–4; LIO pores 0; largest specimen 29.6 mm SL holotype.

Distribution. (see Fig. 158) The species occupies the southeast corner of the Caribbean Sea, from the ABC Netherlands Antilles (numerous photographs from Bonaire, collections from Curaçao); in Venezuela at the western offshore islands (Los Monjes and Los Roques collections) and along the central coast at Falcon, Carabobo,

Figure 110. *Emblemariopsis bottomei*, black TP, Bonaire (Jamie Holdorf).

Figure 111. *Emblemariopsis bottomei*, black TP, AMNH 249405, Monje del Sur, Los Monjes, Venezuela (top); black TP with white head spots, AMNH 238844, Curaçao (upper middle); pale TP, AMNH 277083 (from 271642 & 242844), 22.8 mm SL, Ocumare de la Costa, Aragua, Venezuela (lower middle); IP, prominent head spots, AMNH 249405, Monje del Sur, Los Monjes, Venezuela (bottom) (James Van Tassell & D. Ross Robertson).

Figure 112. *Emblemariopsis bottomei*, pale TP at left confronting a black TP in a hole, Bonaire: note white parasite occasionally found on individuals from Bonaire and Curaçao (Frank Krasovec).

Aragua, and Vargas (collections and Gabriela Carias), apparently sparing northeast Venezuela, i.e. not recorded in Anzoátegui (Rodríguez 2010b), Mochima (Mendez de E et al. 2006, Molins & Rodiguez-Quintal 2014) or farther eastward.Then there is a disjunct range in the Windward Lesser Antilles ending at Dominica, i.e. Tobago (Carlos and Allison Estapé and collections), St. Vincent (Keri Wilk), St. Lucia (Jason Phillip), Martinique (Ewan Tregarot and Cedric Pau), and Dominica (Ned DeLoach, Rudy Whitworth, and collections). A single smoothhead individual from St. Croix (UF 160686) with a longer first dorsal-fin spine than expected and many head spots may represent this species, but there is no DNA to confirm the identification (Smith-Vaniz & Jelks 2014).

Figure 113. *Emblemariopsis bottomei*, dark-shaded TP with moustache marking, Dominica (left) (Kris Wilk); Bonaire (right) (Jamie Holdorf).

Figure 114. *Emblemariopsis bottomei*, dark-shaded TP with moustache marking, Martinique (Cedric Pau).

Habitat. In the ABC Netherlands Antilles, this species appears to occupy a range of depths and most hard or sponge substrates: in Bonaire, photographs show TP males in holes in live and dead coral, as well as in sponges. IP fish are found perched on live corals and sponges, but also on dead coral and encrusted substrates. The depth range is broad, up to at least 40 m with no particular peak of occurrence (Ellen Muller & Chris Spray, pers. comm.).

Remarks. This species is the best-documented glass blenny underwater due to the large numbers of available photographs. Since there is only one species present in Bonaire, the full range of appearances within a species is easily apparent. Indeed, one can see the full range of extent of dark spotting, from hardly noticeable to large black blotches, with the darkest expression on fish sitting on black sponges and the lightest on white, dead-corals. The realization that a single species was represented by all of the varying colors, patterns, and stages of maturity found in Bonaire facilitated the recognition of the different phases in other glass blenny species.

The species was described from the offshore Los Roques Archipelago of Venezuela and mtDNA sequencing confirms that the ABC island populations share the same COI sequences as those from Los Roques Archipelago.

Figure 115. *Emblemariopsis bottomei*, IP, Bonaire (David J. Fishman).

Figure 116. *Emblemariopsis bottomei*, IP, Dominica (Kris Wilk).

Figure 117. *Emblemariopsis bottomei*, darkly marked IP on black sponge, Bonaire (Andre de Molenaar).

Figure 118. *Emblemariopsis bottomei*, juvenile, Bonaire (Jamie Holdorf).

The eastern population on the windward chain of islands from Dominica to Tobago has a divergent mtDNA lineage, but no apparent phenotypic difference, and is therefore regarded as a genovariant population of *E. bottomei*.

Butter et al. (1980) studied the behavior of the species in Curaçao, documenting the association with living corals. Curiously, they did not notice any TP males or report any hole-dwelling at all. They considered the species to be *E. diaphana*, since at the time *E. bottomei* was considered a Venezuelan species.

A curious finding is the occasional parasite on *E. bottomei*, from Bonaire and Curaçao only (it has not been photographed at any other location). It presents as a large (around 0.5 mm), white, ovoid, subcutaneous cyst that is not destructive and is present on otherwise healthy looking fish (Fig. 112). It occurs most often as a single isolated cyst, but some individuals have two or three, but they are clearly not proliferative. They are not associated with ulceration or gross inflammatory changes and appear to be benign, despite their relatively large size on such a tiny fish. Their etiology and pathology remains to be elucidated.

Comparisons. The black TP of *E. bottomei* has a long, thin, white rim on the blackened first half of the dorsal fin and thus is easily differentiated from the 8 red-bannered congeners (all of those but *E. randalli* with orbital cirri). The first dorsal-fin spine is short, also distinguishing *E. bottomei* TP from most other species, except the three other smoothhead species (and *E. randalli*). Among the smoothhead species, black *E. bahamensis* and *E. pricei* have no white rim on the dorsal fin; only *E. diaphana* shares the long white rim, but the rim is shorter, usually ending by the 7th spine (vs. the 10th or more, in fully black TP). Otherwise the black TP of *E. bottomei* and *E. diaphana* look about the same, although their ranges are very far apart, on opposite sides of the Caribbean.

Dark-shaded, pale, and transitional TP *E. bottomei* have a short first dorsal-fin spine and no cirri, excluding most congeners, except the three other smoothhead species. When the cranial pattern is apparent, those three species can be distinguished by having their distinctive Y-shaped or mosaic patterns. They also have less prominent or no moustache marking above the rear maxilla or paired white bars on and above the mid-jaw. Both *E. bahamensis* and *E. pricei* also do not develop the white rim along the first dorsal-fin membranes vs. *E. bottomei* and *E. diaphana*. All stages of TP *E. diaphana* are close in appearance, but they usually have dark areas on the rear maxilla itself and at the corner of the jaw vs. as a moustache along the rim above the rear maxilla; they also have characteristic complex dark mottling over the peritoneum and the different mosaic cephalic pattern, if that is still visible beneath shading.

The IP of *E. bottomei* have elongated first two dorsal-fin spines and the full complement of head spots, both shared by a set of species with orbital cirri, and very different from the two other smoothhead species that have short first dorsal-fin spines and reduced head spots. The absence of the cirrus is key to the identification, because otherwise IP *E. bottomei* looks almost the same as IP *E. carib*, *E. leptocirris*, *E. occidentalis*, and *E. signifer* (the banded-operculum group have a vertical bar at the pectoral-fin base on IP fish). If the cranial pattern is clearly visible, it can be used to distinguish those other species. The most similar congener is *E. diaphana*, which shares the absent cirrus, elongated spines, and sometimes has a full head spot pattern: their main difference is the V-shape

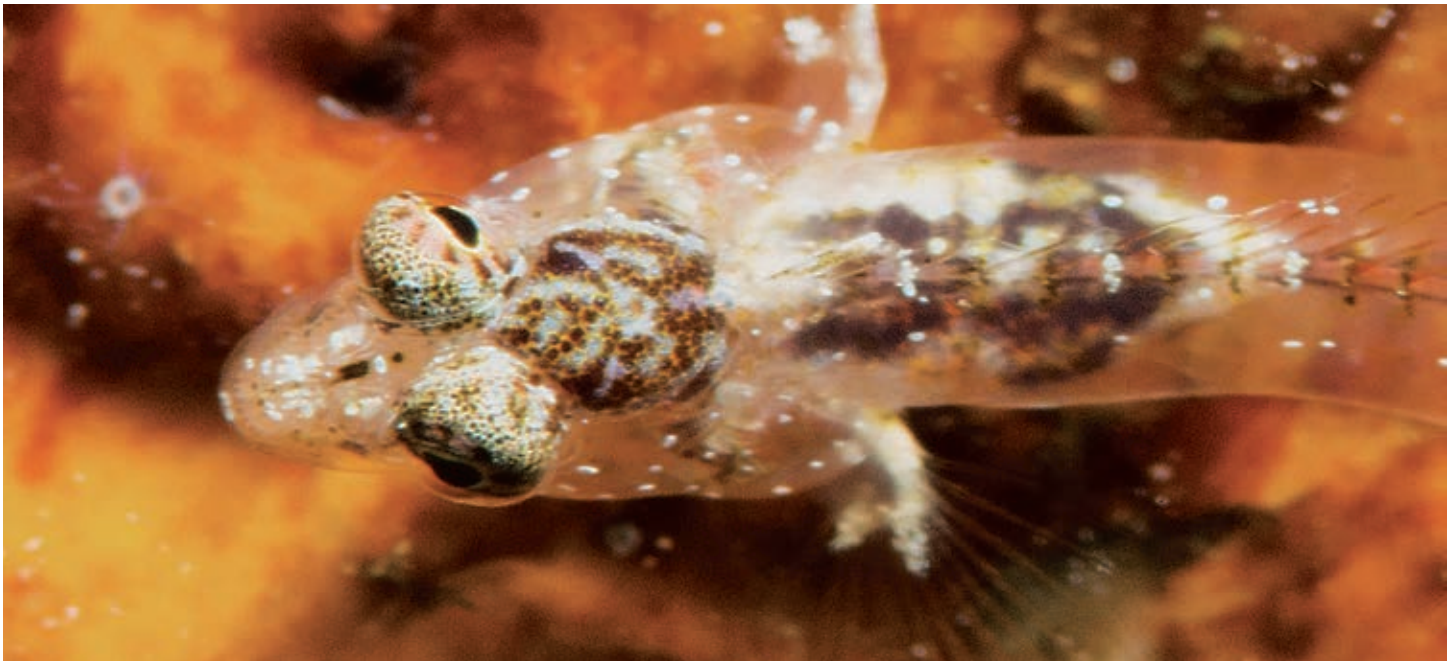

Figure 119. *Emblemariopsis bottomei*, IP, a rare somewhat darker variant with all-pale cranial pattern; with the extra spot behind band 3, Bonaire (Raul Fernandez).

cranial pattern developing into a mosaic, with complex mottling patterns over the peritoneum. *E. diaphana* also has a frequent dark variant, where black and brown replaces red and orange, which is rarely seen in *E. bottomei*.

The cranial pattern for *E. bottomei* has fewer red markings than most other species and consists of mostly pale or bluish bands; band 1 is not a central red spot, but a pale oval or broken segments often merging with pale segments of band 2 to form reticulations; band 3 is usually a red, widely broken-U, leaving a central small Y-joint, connecting to the midline red spot of band 4; there is an extra isolated pale spot (or branch) just behind band 3, between 3 and 4 (characteristic of *E. bottomei*); then a long pale band 4; and an inconspicuous short pale or reddish band 5, if any (Figs.115–120).

Material examined. *Emblemariopsis bottomei*: *Dominica*: UF 246144, (41) 9.7–24.9 mm SL, Dominica, off Soufriere, 15.22°, -61.37°, B.C. Victor, 11–21 July 2011. *Venezuela*: AMNH 277083, 22.8 mm SL male, Venezuela, Aragua, La Ciénaga de Ocumare, 10.4847°, -67.8372°, J. Van Tassell, D.R. Robertson & J. Posada, 23 June 2007.

Figure 120. *Emblemariopsis bottomei*, juvenile, showing cranial pattern, Bonaire (Ellen Muller).

Emblemariopsis diaphana Longley, 1927

Florida Smoothhead Glass Blenny
Tubícola Cabeza Lisa Florida

mtDNA COI sequence BIN https://doi.org/10.5883/BOLD:ACR7279

Figures 121–133; Tables 1 & 2

Emblemaria diaphana Böhlke 1957: 49.
Emblemariopsis bottomei [*non* Stephens] Starck 1968: 29 (Florida Keys species list).
Coralliozetus bahamensis [*non* Stephens] (in part) Robins & Ray 1986: 224 (southeast Florida); Humann & DeLoach 1997: 268–269, top fig. (Dry Tortugas, Florida)
Coralliozetus diaphanus Robins & Ray 1986: 224 (Florida Keys); Acero 1987: 8 (Florida).
Emblemariopsis bahamensis [*non* Stephens] (in part) McEachren & Fechhelm 2005: 619 (Florida Keys & Gulf of Mexico only); Kells & Carpenter 2007: 346–347 (Florida Keys, Tortugas, Veracruz only); Snyder & Burgess 2016: 264 (Florida listing).
Emblemariopsis diaphanus Patzner et al. 2009: 470.
Emblemariopsis sp. Del Moral-Flores et al. 2013: Table 1 (Veracruz, Mexico).

Holotype. USNM 88628, 25.4 mm SL (in description as 32 mm TL), TP male, United States, Florida, Tortugas, 24.6°, -82.9°, W.H. Longley, June–August 1927.

Diagnosis. A species of *Emblemariopsis* without an orbital cirrus or a red banner (a set of 4 spp.); TP territorial males in holes with a black head; anterior dorsal fin black, with a short, thin, white margin reaching at most to

Figure 121. *Emblemariopsis diaphana*, black TP, Florida Keys, Florida (Carlos Estapé).

Figure 122. *Emblemariopsis diaphana*, black TP, Florida Keys, Florida (Carlos Estapé).

about the 6th spine; first dorsal-fin spine short, reaching posteriorly to about 5th spine base when adpressed, about 1/3 HL, subsequent spines rising slightly to midfin spines; sometimes a short row of small dark spots along anterior lateral midline, a single row of dark spots along proximal membranes of front half of spinous dorsal fin.

Dark-shaded, pale, and transitional TP with a short first dorsal-fin spine, reaching to about 5th spine base when adpressed, subsequent spines rising slightly to middle of fin, a more notched profile in transition; a single row of dark spots along proximal spinous-dorsal-fin membranes; sometimes a short row of small dark spots along anterior lateral midline; no opercular bands or lines; reduced head markings, as a dark band from eye across jaw, darkened posterior maxilla (not a moustache line at rim above maxilla), and/or a black spot at corner of jaw.

IP with elongated first two dorsal-fin spines, first spine reaching to base of about 4–7th spine base when adpressed, often before 5th and well shorter than middle-fin spines, second spine slightly shorter, third about 1/2 of first, fourth shortest (juvenile, earlier IP, and approaching transition with less elongate spines); live colors red, orange, and pink; frequently a dark variation with brown and black replacing red and orange; mottled pattern over peritoneum with many spots, often a dorsal row, and irregular contrasting shapes; cranial pattern an oval or linear

Figure 123. *Emblemariopsis diaphana*, dark-shaded TP, Florida Keys, Florida (Carlos Estapé).

Figure 124. *Emblemariopsis diaphana*, pale TP, Marathon Key, Florida (James Van Tassell & D. Ross Robertson).

reddish band 1; a pale V-shaped band 2; a less prominent and breaking-up band 3; a long pale band 4, and a short band 5, often broken; on larger fish bands further fragment and spots isolate forming a mosaic pattern; IP head spots often reduced, but can be up to full complement; melanophores near pectoral-fin base one to three spots and/or a short, slightly oblique band.

Dorsal-fin elements XX–XXI,12–14 (total 32–34); anal-fin elements II,21–23; pectoral-fin rays almost always 13; caudal-fin procurrent rays 4–5/3–4; LIO pores 2–3; largest specimen 25.4 mm SL holotype.

Distribution. (see Fig. 158) This is the only glass blenny in south Florida, mainly found in Dade County, the Keys, and the Tortugas, with a separate population in the Gulf of Mexico off Mexico (Robertson & Pérez-España et al. 2019). The Gulf population was first documented at Veracruz with photographs by Kirk Kilfoyle in 2011 (photographed since by Carlos and Allison Estapé) and at the Campeche Bank reefs (Robertson & Domínguez-Domínguez et al. 2019), first documented with photographs by Kirk Kilfoyle at Alacranes Reef in 2010.

Habitat. This species occupies a wide range of substrates, photographs show them mostly on live coral surfaces of all morphologies, but also commonly on sponges, gorgonians, and dead hard bottoms. TP males occupy holes in live corals, dead corals, and sponges.

Figure 125. *Emblemariopsis diaphana*, transitional TP, mosaic cranial pattern, Pompano Beach, Florida (Ari Dimitris).

Figure 126. *Emblemariopsis diaphana*, transitional TP, South Florida (Svetlana Speransky).

Remarks. This species is the only glass blenny in Florida and does not overlap with any other species; no species with cirri occurs in Florida or the Gulf of Mexico. The glass blenny species found in Florida, as well as the range of *E. diaphana*, have been long confused because the first species were described based on so few specimens, from different life stages. Stephens' (1961) sample was 4 TP male *E. diaphana*, all larger than 20 mm SL and illustrated with slightly longer first dorsal-fin spines (an unusual finding), plus three small IP *E. bahamensis* from Bahamas described as colorless and with short first dorsal-fin spines and a single large black TP male of *E. bottomei* from Venezuela with a short first dorsal-fin spine. As a result, any of the glass blennies without a cirrus (vs. *E. signifer*) was assigned a name based on those features: if it had a longer first dorsal-fin spine it was *E. diaphana*; if it had a shorter spine and was transparent, it was *E. bahamensis*, and if it was black it was identified as *E. bottomei*. As a result, those three names are found on labels for fish from all over the region, resulting in misleading early records of *E. bahamensis* and *E. bottomei* from Florida (Starck 1968; corrected in Starck et al. 2017) and *E. diaphana* from the Caribbean Sea.

A curious feature of *E. diaphana* is the occurrence of a dark variant IP form, where red and yellow are lost and there are bluish cranial markings, and brown and black replace internal red features (Figs. 127 & 131). The only

Figure 127. *Emblemariopsis diaphana*, IP, dark variant with black replacing red and orange, Key West, Florida, USA (Rob McCall, Eco-Dives of Key West).

Figure 128. *Emblemariopsis diaphana*, IP, Florida Keys, Florida (Evan D'Alessandro).

other species with a similar dark variant phase is Brazilian *E. signifer* (and a rare individual of *E. bottomei*), and it is probably no coincidence that these are the most temperate populations in continental waters, typically more turbid and cooler than the Caribbean proper, and with more algal growth as the common substrate. This habitat would decrease the camouflage value of red, and red would anyway be scattered and absorbed more in turbid water.

Comparisons. The black TP of *E. diaphana* has a short, thin, white rim on the blackened first half of the dorsal fin and thus is easily differentiated from the 8 red-bannered congeners (all of those but *E. randalli* with orbital cirri). The first several dorsal-fin spines are about equal and relatively short, shorter than midfin spines, also distinguishing *E. diaphana* TP from most other species, except the three other smoothhead species. Among the smoothhead species, black *E. bahamensis* and *E. pricei* have no white rim on the dorsal fin; only *E. bottomei* shares the white rim, but the rim is longer, usually ending past the 10th spine or more (vs. less than the 7th, in fully

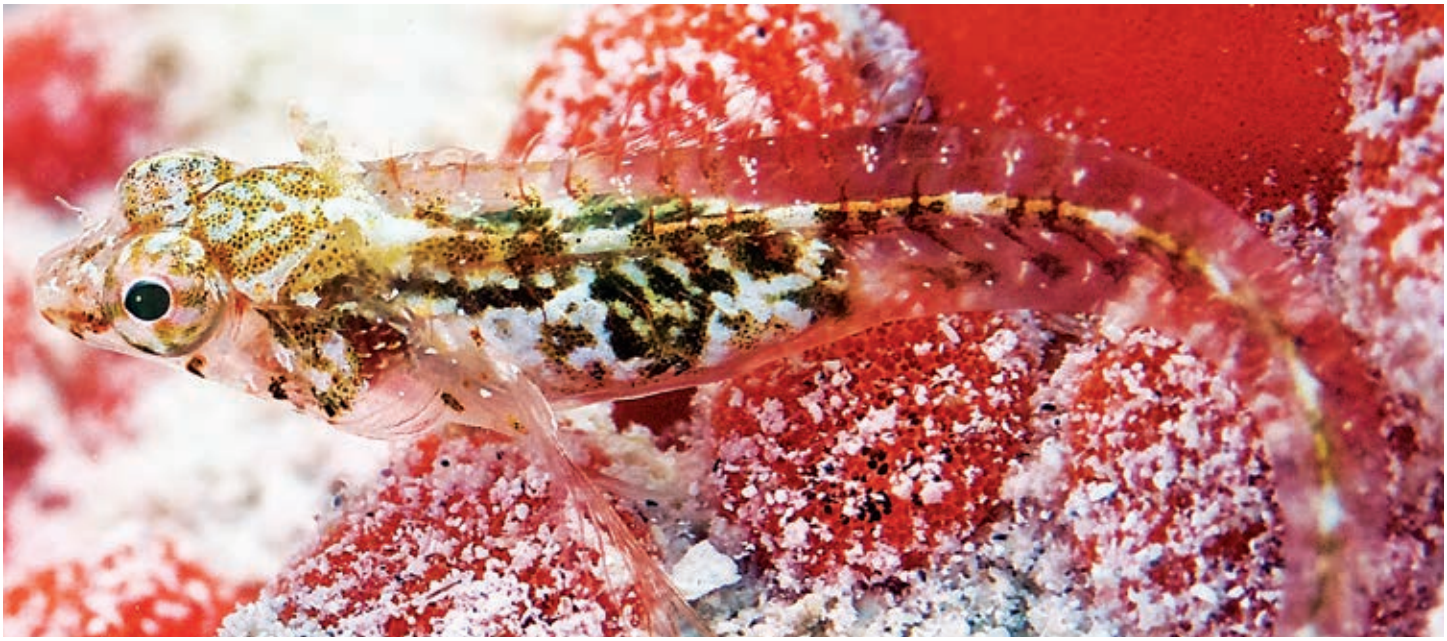

Figure 129. *Emblemariopsis diaphana*, IP, mottled peritoneal pattern, Florida Keys, Florida (Evan D'Alessandro).

Figure 130. *Emblemariopsis diaphana*, IPs, various degrees of mosaic cranial pattern development and peritoneal mottling, Florida Keys, Florida (top: Rob McCall, Eco-Dives of Key West, middle: Evan D'Alessandro, bottom: Carlos Estapé).

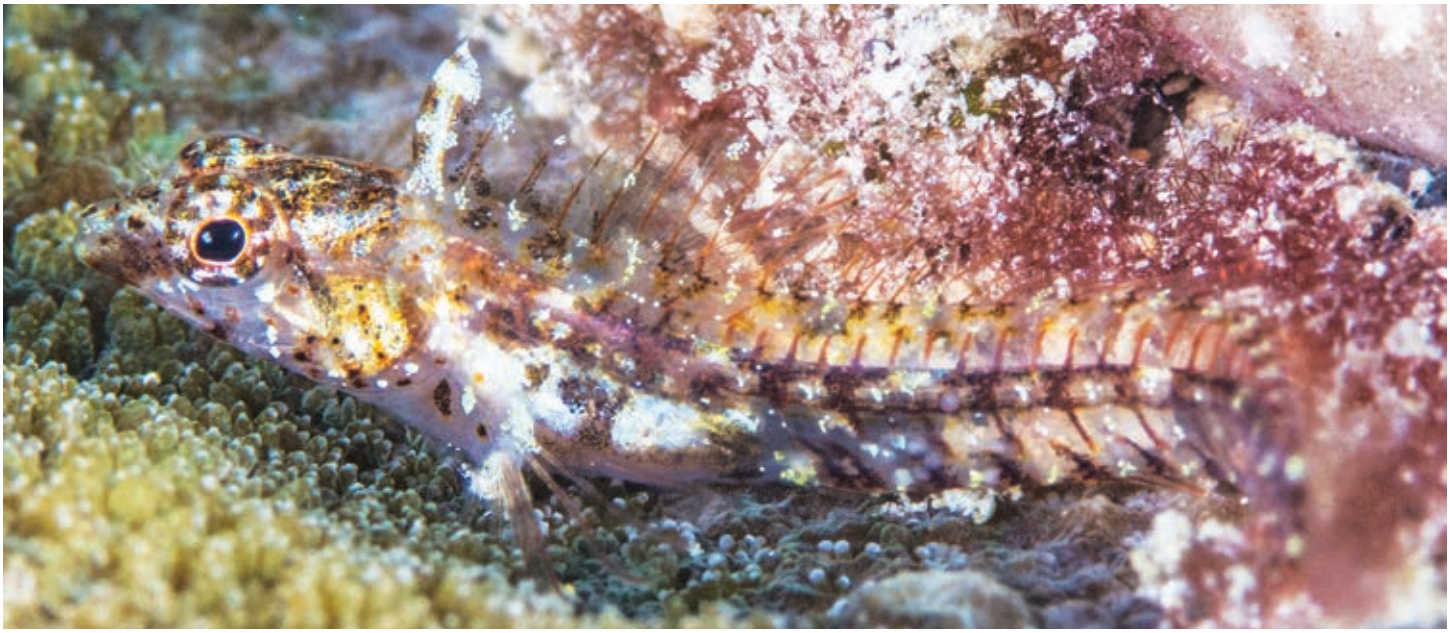

Figure 131. *Emblemariopsis diaphana*, IP, brownish variation, Hollywood, Florida (Keat Ooi).

black TP) and *E. diaphana* appears to only have a single row of spots along the spinous dorsal fin. Otherwise the black TP of *E. bottomei* and *E. diaphana* look much the same, although their geographic ranges are very far apart, on opposite sides of the Caribbean Sea.

Dark-shaded, pale, and transitional TP *E. diaphana* have short and about equal first dorsal-fin spines and no orbital cirri, excluding most congeners except the three other smoothhead species. *Emblemariopsis bahamensis* and *E. pricei* do not not develop the white rim along the anterior dorsal fin and have even shorter first dorsal-fin spines vs. *E. bottomei* and *E. diaphana*. TP *E. bottomei* are close in appearance in this phase, but they usually have a dark moustache band along the bony rim above the rear maxilla (vs. dark areas on the rear maxilla itself and at the corner of the jaw); multiple irregular rows of spots along the spinous dorsal fin (vs. single); and a typical (for the genus) peritoneum pattern of a saddle with a few white and red spots (vs. complex dark mottling over the peritoneum); and a wide-U cranial pattern (vs. a mosaic pattern).

The IP of *E. diaphana* has elongated first two dorsal-fin spines with shorter third and fourth spines (but often shorter than the midfin spines) and variable but up to a full complement of head spots, these features shared by a set of species with orbital cirri and *E. bottomei*, and very different from IP *E. bahamensis* and *E. pricei* which

Figure 132. *Emblemariopsis diaphana*, juvenile, Key West, Florida, USA (Rob McCall, Eco-Dives of Key West).

Figure 133. *Emblemariopsis diaphana*, IP, Key West, Florida (Carlos Estapé).

have first dorsal-fin spines shorter than the next few and often fewer head spots. The absence of the orbital cirrus is key, since otherwise IP *E. diaphana* look similar to IP *E. carib*, *E. leptocirris*, *E. occidentalis*, and *E. signifer* (the banded-operculum group have a vertical bar at the pectoral-fin base on IP fish), and then the cranial pattern is the main difference. IP *E. bottomei* share the absent cirrus, elongated first spines, and up to full head spot pattern, but can be distinguished by generally longer first dorsal-fin spines (to the 5th to 8th spines vs. many individuals only up to 5th spine base) and the cranial pattern is different, especially later when a mosaic develops on *E. diaphana*. Another distinguishing feature of IP *E. diaphana* is the peritoneal pattern, which breaks up into many spots and irregular contrasting shapes in white and reddish against dark, often with a long row of 6 to 8 pale spots along the dorsal aspect (vs. a triangular saddle and a few large colored spots in congeners). Also, the frequent dark or brownish variant, with black internal pigment, is rarely found on *E. bottomei*.

The cranial pattern for *E. diaphana* starts as a prominent central V-shape and later breaks up into a mosaic of spots. Band 1 is often oval or linear and reddish; band 2 is a prominent V-shape, usually pale and bluish, sometimes with the arms broken, with a separate, central, red, round spot behind the V; band 3 is reddish, less prominent than in other species, and broken up into two or three spots or a chain-of-beads row, per side; then a long pale band 4; and a reddish short band 5, sometimes broken into two spots (e.g. Fig.126). In larger fish, the spots isolate progressively into a prominent mosaic pattern (Fig. 125).

Material examined. *Emblemariopsis diaphana*: *Florida, USA*: UF 246145, (6) 15.5–21.9 mm SL, United States, Florida, Florida Keys, Islamorada, 24.9°, -80.6°, B.C. Victor, 30 September 2014.

Emblemariopsis bahamensis Stephens, 1961

Smoothhead Glass Blenny
Tubícola Cabeza Lisa

mtDNA COI sequence BIN https://doi.org/10.5883/BOLD:AAC9496 (in part)

Figures 134–143; Tables 1 & 2

Emblemaria diaphana [*non* Longley] Böhlke 1957: 49, plate 3, fig. 1 (this holotype from Bahamas).
Coralliozetus bahamensis Robins & Ray 1986: 224; Humann & DeLoach 1997: 268–269.
Emblemariopsis bottomei [*non* Stephens] Burgess et al. 1994: 219 (Cayman Islands); Dennis 2000: 171; Dennis et al. 2004: 79; Dennis et al. 2005: 724 (all Puerto Rico); Bolaños-Cubillos et al. 2015: 151 (San Andres & Providencia).
Emblemariopsis diaphana [*non* Longley] Burgess et al. 1994: 219 (Cayman Islands).
Emblemariopsis signifera [*sic*] [*non* Ginsburg] (in part) Ramos et al. 2003: 598 (UF 212598, Bahamas).

Holotype. ANSP 74773, 15.5 mm SL, female, Bahamas, New Providence, Lyford Cay, 25.031°, -77.536°, C.C.G. Chaplin, S.A. Waterman, C. Limbaugh & J.E. Böhlke, 8 May 1956.

Diagnosis. A species of *Emblemariopsis* without an orbital cirrus or a red banner (a set of 4 spp.); TP territorial males in holes with a black head; anterior dorsal fin plain black without a white rim; first dorsal-fin spine very short, reaching to 4th spine base when adpressed, about 1/4 HL, subsequent spines rising to midfin spines; occasionally a short row of small dark spots along anterior lateral midline, occasionally an irregular row of dark spots along proximal membranes of spinous dorsal fin.

Dark-shaded, pale, and transitional TP with a very short first dorsal-fin spine, reaching to 4th spine base when adpressed, subsequent spines rising to midfin; often an irregular row of dark spots along proximal spinous-dorsal-

Figure 134. *Emblemariopsis bahamensis*, black TP, Nassau, Bahamas (Jan Philip Morton).

Figure 135. *Emblemariopsis bahamensis*, transitional TP, Nevis (James Garin).

fin membranes, usually indistinct; occasionally a short row of small dark spots along anterior lateral midline; no opercular bands or lines; reduced head markings often only a dark band from eye across jaw, sometimes a moustache band at rim above maxilla.

IP with very short first dorsal-fin spines, first spine reaching to base of 3rd or 4th spine base when adpressed, spines rising sharply to midfin spines; live colors red, orange, and pink; cranial pattern a Y-shape: a rounded red band 1, band 2 a prominent Y with pale arms and a red stalk, a reduced band 3 often just one, sometimes two, isolated spots or segments, a long pale band 4 becoming red towards midline, and an inconspicuous band 5; IP head spots reduced, typically only a band from eye across jaws, sometimes a spot at corner of jaw; melanophores near pectoral-fin base usually diffuse, occasionally one or two spots.

Dorsal-fin elements IXX–XXII,11–15 (total 32–35); anal-fin elements II,21–23; pectoral-fin rays almost always 13; caudal-fin procurrent rays usually 3–4/2–3; LIO pores 0; largest specimen 26.0 mm SL.

Figure 136. *Emblemariopsis bahamensis*, transitional TP, Nevis (Mark Lessard).

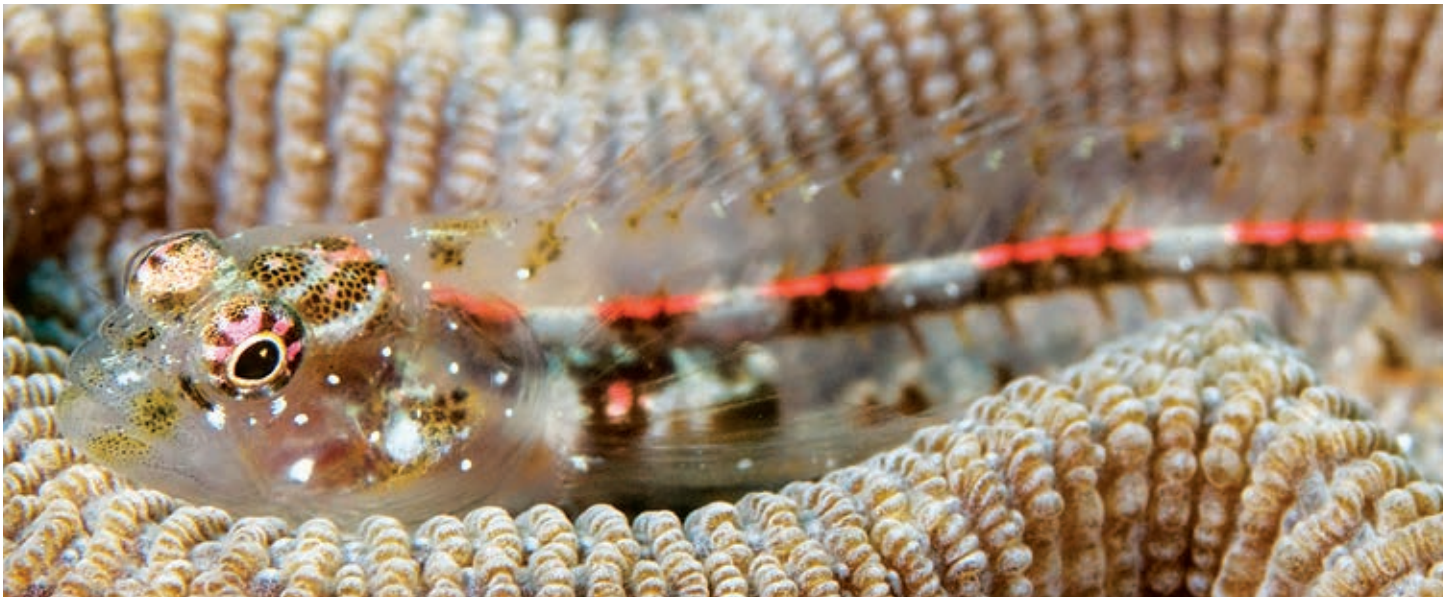

Figure 137. *Emblemariopsis bahamensis*, transitional TP, Dominican Republic (Jose Alejandro Alvarez).

Distribution. (see Fig. 158) This species is found in the Bahamas (Jan Philip Morton, Frank Krasovec, Doug Perrine), the Greater Antilles at Cuba (James R.D. Scott), Dominican Republic (Jose Alejandro Alvarez, Diego Forero, and Jack Israel), and Puerto Rico (collections); continuing down the Lesser Antilles chain, i.e. the Virgin Islands (Smith-Vaniz & Jelks [2014] and collections), St. Martin (Ron Eytan), Saba (Eric Kaye), St. Eustacius (Carlos and Allison Estapé), St. Kitts (Jason Phillip), and Nevis (Mark Lessard and James Garin); then the species is replaced by *E. bottomei* from Guadeloupe southwards through the SE Caribbean. On the islands of the western Caribbean, *E. bahamensis* is documented at Cayman Islands (Everett Turner and Cindy Abgarian and collections), San Andres (Les and Keri Wilk), and Little Corn Island, Nicaragua (Ellie Place). A single specimen is recorded from Panama (SIO 71-281).

Habitat. *Emblemariopsis bahamensis* are usually found on live corals or gorgonians, often photographed nestled in the grooves of brain corals. TP males occupy holes in live corals or sponges. Their depth range extends to 20 m at least.

Remarks. Described from three IP specimens by Stephens (1961), the species was first distinguished in his key by being transparent. The other two known species, *E. diaphana* and *E. bottomei*, were described from blackened TP males, leading to fish being identified based on color phase. Subsequently, Stephens (1970) described TP males

Figure 138. *Emblemariopsis bahamensis*, IP, Bahamas (Frank Krasovec).

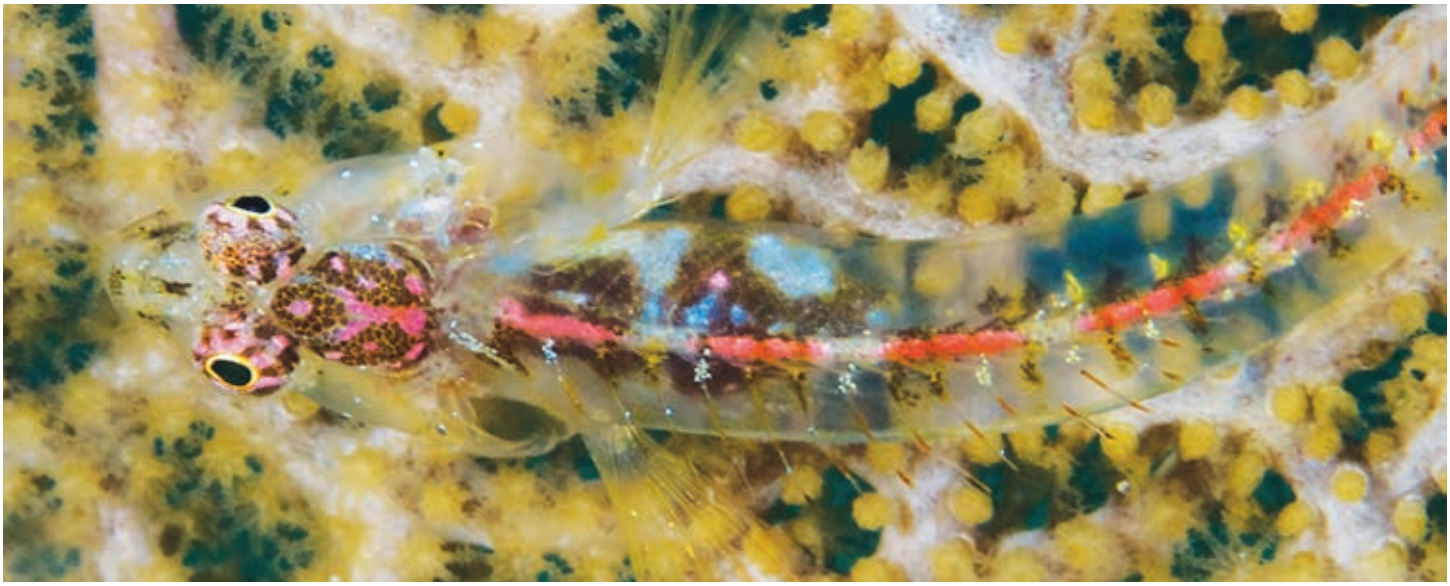

Figure 139. *Emblemariopsis bahamensis*, IP, Cuba (James R.D. Scott)

as *E. bahamensis*, but he split them from *E. bottomei* by relative head length, although based on only 3 specimens of the latter. In the key couplet (p. 284, couplet 8), *E. bahamensis* were separated from *E. bottomei* by HL 3.0–4.0 in SL vs. 4.2–5.0 in SL. Additional specimens do not hold up the dichotomy, relative head lengths measured here are broadly overlapping: *E. bahamensis* over 16 mm SL had a range of 3.8–5.0 vs. 4.1–5.3 in *E. bottomei*. Additionally, some *E. pricei* males have >5.2 HL in SL. Those three *E. bottomei* prompted the inappropriate common name of "shorthead blenny", and populations of *E. bahamensis* have been regularly misidentified as *E. bottomei* based on that measure, as recently as Dennis et al. (2004, 2005) in Puerto Rico, or following older museum misidentifications by Burgess et al. (2000) for Cayman Islands and Bolaños-Cubillos (2015) in the western Caribbean offshore islands of San Andres and Providencia. The species list of Burgess et al. (2000) is an example of taxonomic inflation as all three species are listed for Cayman Islands, following ANSP collection data, where all three species were apparently identified from the same collection in 1964 by Gilbert and Tyler.

Emblemariopsis bahamensis and *E. pricei* are clearly allopatric sibling species, with close mtDNA haplotypes sharing a lineage and generally a very similar appearance. Nevertheless, *E. pricei* has higher fin-ray counts, especially 14 pectoral-fin rays, and virtually all individuals can be assigned to their species by complete fin-ray counts. It is notable that the higher fin-ray counts in the Bay of Honduras does not parallell the general clinal pattern of higher meristic counts in more temperate populations of marine fishes. The two species also

Figure 140. *Emblemariopsis bahamensis*, IP, Bahamas (Frank Krasovec).

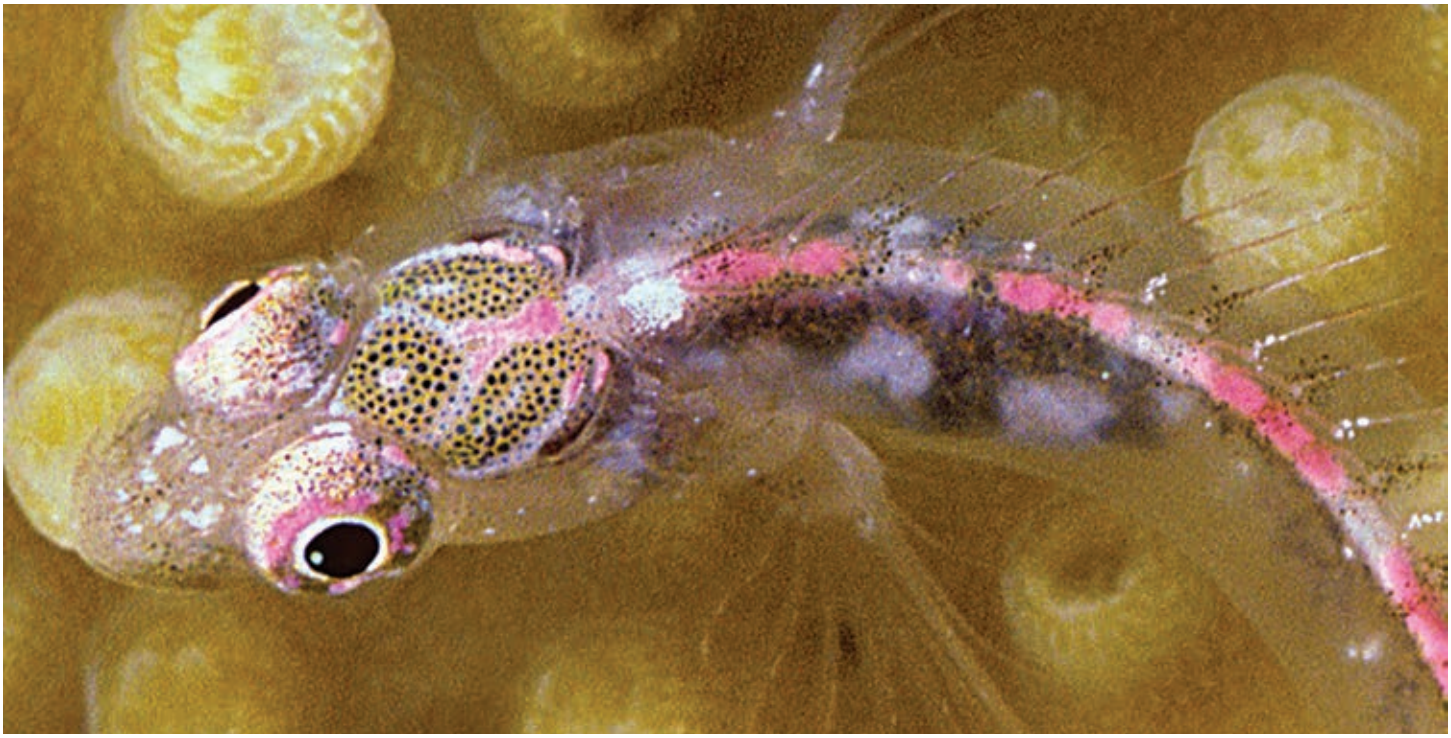

Figure 141. *Emblemariopsis bahamensis*, IP, Bahamas (Doug Perrine).

differ in morphology, specifically in pore patterns, with *E. pricei* typically having a pair of pores in front of the commissural (vs. none).

Comparisons. The glass blennies co-occurring with *E. bahamensis* all can be quickly distinguished by having orbital cirri and first dorsal-fin spines longer or equal to subsequent spines and non-Y-shaped cranial patterns (i.e. *E. leptocirris*, *E. carib*, and *E. ruetzleri*, with only *E. occidentalis* in Bahamas).

The black TP of *E. bahamensis* have a very short and plain black anterior dorsal fin, with no white rim and no red banner, and thus are easily differentiated from the 8 red-bannered congeners (all of those but *E. randalli* with orbital cirri), as well as the two smoothheads *E. bottomei* and *E. diaphana* with white rims on the anterior dorsal fin and somewhat longer first dorsal-fin spines. The all-black TP of *E. pricei* look much the same as *E. bahamensis* and likely cannot be distinguished in the field (but have 14 pectoral-fin rays vs. 13).

Dark-shaded, pale, and transitional TP *E. bahamensis* have no cirri and very short and rising first few dorsal-fin spines, excluding most congeners, except the three other smoothhead species. Of those, *E. bottomei* and *E. diaphana* develop an obvious white rim along the anterior dorsal fin and have a somewhat longer first dorsal-fin

Figure 142. *Emblemariopsis bahamensis*, IP, Cayman Islands (Everett Turner).

Figure 143. *Emblemariopsis bahamensis*, juvenile, Cuba (Jack Israel).

spine, in the process of shortening in transitional males. Only a few black or dark-shaded *E. bahamensis* have been photographed underwater, and they do not have grainy white patches on the dorsal fin, anterior body, and pectoral fins frequently encountered in *E. pricei* and some other smoothhead male but, if this is a species difference, it remains to be confirmed. Transitional *E. bahamensis* develop dark shading over the snout in particular (Fig. 135), a pattern not seen in other smoothhead males. Transparent males often have no moustache marking, or just a small line vs. prominent on *E. pricei* (and *E. bottomei*); *E. diaphana* have a darkened rear maxilla instead of the moustache. Unless fully blackened, TP *E. pricei* often have an obvious small dark spot, or several tightly arranged, directly behind the mid-level of the orbit that is infrequent on *E. bahamensis*.

The IP of *E. bahamensis* are separated from all IP congeners, except *E. pricei*, by having the first dorsal-fin spine shortest and the Y-shaped cranial pattern. The two species also are characterized by no pectoral-fin-base spots or bands and reduced head spots: in *E. bahamensis* often just the band from the eye across the jaws and a short midline streak down the snout, while *E. pricei* are more likely to have an additional spot also at the corner of the jaw (but occasional *E. bahamensis* exceptions, e.g. Fig. 142). The Y-shaped cranial pattern for the pair is distinctive: a round or oval band 1; a prominent Y-shaped band 2 with pale arms and a red stalk; a much reduced band 3, often only a spot (or two) or a short segment; a long pale band 4, becoming red towards the midline, often with a separated midline pale spot at the base of the Y-stalk; and a very short or absent band 5.

Material examined. *Emblemariopsis bahamensi*s: *Puerto Rico*: UF 246148, (3) 9.2–18.0 mm SL, Puerto Rico, La Parguera, Medialuna Reef, seaward slope, 17.935°,- 67.049°, B.C. Victor & C. Caldow, 4 August 2007; UF 246149, 13.7 mm SL, same data, 9 August 2007; UF 246150, (3) 10.8–21.0 mm SL, same data, 11 August 2007. *US Virgin Islands*: UF 159063, 18.0 mm, female, United States Virgin Islands, St. Croix, NW Buck Island, 17.7933°, -64.6273°, W.F. Smith-Vaniz & L. Rocha, 2.7–4.4 m, 1 August 2001; UF 159105, 20.0 & 23.5 mm SL, same data; UF 159097, (6) 12.2–21.0 mm SL, United States Virgin Islands, St. Croix, NE Buck Island, 17.7905°, -64.6138°, W.F. Smith-Vaniz & L. Rocha, 6.9–8.5 m, 2 August 2001; UF 164756, 20.6 mm SL, United States Virgin Islands, St. Croix, Buck Island, 17.8068°, -64.6100°, Spieler, Brian & Walker, 20 m, 9 April 2005; UF 246151, (3) 16.3–26.0 mm SL, United States Virgin Islands, St. Thomas, Outer Brass Island, 18.396°, -64.976°, B.C. Victor & T. Smith, 2 May 2009. *Bahamas*: UF 212598, 11.7 & 15.3 mm SL, Bahamas, Exuma Cays, E shore of Oyster Cay, 24.722°, -76.817°, H. Feddern et al., 21 August 1963. *Cayman Islands*: UF 246152, (7) 9.9–23.5 mm SL, Cayman Islands, Grand Cayman, southwest shore, 19.286°, -81.392°, B.C. Victor, 27 April 2014. *Panama:* SIO 71-281, 16.0 mm SL, Panama, Bocas del Toro, Isla Zapatilla, 9.267°, -82.063°, J.E. McCosker, 21 July 1971.

Emblemariopsis pricei Greenfield, 1975

Western Smoothhead Glass Blenny
Tubícola Cabeza Lisa del Oeste

mtDNA COI sequence BIN https://doi.org/10.5883/BOLD:AAC9496 (in part)

Figures 144–156; Tables 1 & 2

Emblemaria diaphana [*non* Longley] (in part) Birdsong & Emery 1968: 190 (Belize listing).
Emblemariopsis randalli [*non* Cervigón] Stephens 1970: 294 (Belize).
Coralliozetus bahamensis [*non* Stephens] (in part) Robins & Ray 1986: 224 (Central America only); Humann & DeLoach 1997: 268–269, middle fig. (Belize).
Coralliozetus pricei Acero 1987: 8 (Belize & Honduras).
Emblemariopsis bahamensis [*non* Stephens] (in part) Smith 1997: 597 (W. Caribbean only).
Emblemariopsis bahamensis [*non* Stephens] Smith et al. 2003: 54 (Belize).
Emblemariopsis diaphana [*non* Longley] Smith et al. 2003: 55 (Belize).

Holotype. FMNH 77481, 27.0 mm SL, TP male, Belize, Glover's Reef lagoon, 16.8°, -87.8°, 1–1.5 m, patch reef, D.W. Geenfield & T. Greenfield, 3 August 1975.

Diagnosis. A species of *Emblemariopsis* without an orbital cirrus or a red banner (a set of 4 spp.); TP territorial males in holes with a black head; anterior dorsal fin plain black without a white rim, sometimes irregular grainy white patches; first dorsal-fin spine very short, extending posteriorly to about 5th spine base when adpressed, about 1/4 HL, subsequent spines rising to midfin spines; occasionally an irregular row of dark spots along proximal membranes of spinous dorsal fin; occasionally a short row of small dark spots along anterior lateral midline.

Dark-shaded, pale, and transitional TP with a very short first dorsal-fin spine, reaching to 4th spine base when adpressed, subsequent spines rising to midfin; often large irregular grainy white patches on dorsal fin, anterior

Figure 144. *Emblemariopsis pricei*, black TP, Roatan, Honduras (Carlos Estapé).

Figure 145. *Emblemariopsis pricei*, black TP, Roatan, Honduras (Stephen Gill).

body, and pectoral fins; often an irregular row of dark spots along proximal spinous-dorsal-fin membranes, usually indistinct; occasionally a short row of small dark spots along anterior lateral midline; no opercular bands or lines; reduced head markings with a dark band from eye across jaws, a moustache band at rim above maxilla (from a single spot to a thick curve under eye), and typically an obvious discrete black spot (or small collection) just behind mid-orbit.

IP with very short first dorsal-fin spines, first spine reaching to base of 4–5th spine base when adpressed, spines rising sharply to midfin spines; live colors red, orange, and pink; cranial pattern a Y-shape: an oval band 1, band 2 a prominent Y with pale arms and a red stalk, a reduced band 3 of one or two isolated spots or segments, a long pale band 4 becoming red towards midline, and an inconspicuous band 5; IP head spots reduced, typically only a band from eye across jaws and a spot at corner of jaw, one under jaw; melanophores near pectoral-fin base diffuse, sometimes one or two spots.

Figure 146. *Emblemariopsis pricei*, black TP, Roatan, Honduras (Mickey Charteris).

Figure 147. *Emblemariopsis pricei*, dark-shaded TP, Roatan, Honduras (Mickey Charteris).

Dorsal-fin elements XX–XX,12–14 (total 33–35); anal-fin elements II,21–23; pectoral-fin rays usually 14; caudal-fin procurrent rays usually 4/3–4; LIO pores 1 (pair in front of commisural); largest specimen 28.6 mm SL.

Distribution. (see Fig. 158) This species is found on the Mesoamerican Barrier Reef and the Bay of Honduras, encompassing the Yucatan coast (collected at Chinchorro and Xcalak by Lourdes Vásquez-Yeomans and José Angel Cohuo of ECOSUR at Chetumal, Quintana Roo, Mexico), Belize (Tyler & Tyler [1999] and photographs and collections by Jordan Casey and Simon Brandl), and the Bay Islands of Honduras at Utila (Brad Ryon and collections) and Roatan (Mickey Charteris and Carlos and Allison Estapé). It replaces *E. bahamensis* in this corner of the Caribbean and is the only species within the range without a cirrus.

Habitat. *Emblemariopsis pricei* occupies a wide depth range, Greenfield & Johnson (1981) reported it from 1–30 m in mostly coral-rich habitats. They added that TP males occupy holes in living *A. palmata* corals (Greenfield & Johnson 1990). Tyler & Tyler (1999) documented that most semitransparent fish were found on the surface of gorgonian seafans and the black TP males in holes on nearby living coral heads. The holes were determined to be

Figure 148. *Emblemariopsis pricei*, dark-shaded TP, Roatan, Honduras (Carlos Estapé).

Figure 149. *Emblemariopsis pricei*, pale TP, Roatan, Honduras (Allison Estapé).

Figure 150. *Emblemariopsis pricei*, freshly collected transitional TP, UF 246146, 21.9 mm SL, Belize, 16-884, DNA-confirmed (Jordan Casey & Simon Brandl).

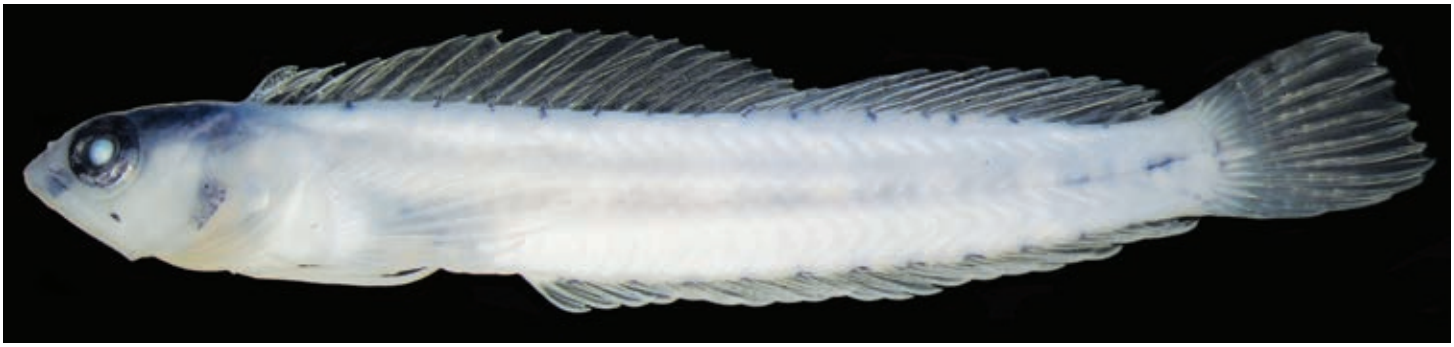

Figure 151. *Emblemariopsis pricei*, ethanol-preserved transitional TP, 17 mm SL, ECO-CH LP 4560, Chinchorro Bank, Quintana Roo, Mexico, DNA-confirmed (Lourdes Vásquez-Yeomans & José Angel Cohuo).

Figure 152. *Emblemariopsis pricei*, IP, Roatan, Honduras (Mickey Charteris).

the cavities of the serpulid worm *Spirobranchus giganteus* (Pallas). Underwater photographs of black TP males show them in holes mostly in live corals, but also in dead coral surfaces or sponges (perhaps increased recently due to widespread death of hard corals in the Caribbean Sea).

Remarks. This species was first described by Greenfield (1975) from just two large black TP males. Subsequently, Greenfield & Johnson (1981), in their survey of the blennioid fishes of Belize and Honduras, added 8 more specimens, but still all TP males, presumably IP fish had not been collected at that point. The report described and illustrated two kinds of males, the first documentation of the pale TP phase: the two were called dark and light morphs (morphs implies a degree of permanence, but pale males can become dark-shaded and black behaviorally, as soon as they obtain a hole). They furthermore noted for the first time that black was associated with territorial males in holes and the paler phases were out in the open.

There were no published collections of glass blennies from Belize and Honduras prior to the description in 1975, other than a couple of small transparent fish that were variously assigned to *E. diaphana* (Birdsong & Emery 1968) or *E. randalli* (Stephens 1970). Since then, there has been some taxonomic inflation as some specimens

Figure 153. *Emblemariopsis pricei*, IP, Roatan, Honduras (Mickey Charteris).

Figure 154. *Emblemariopsis pricei*, IP, Roatan, Honduras (Mickey Charteris).

were singled out as *E. bahamensis* or *E. diaphana* based on features that were not diagnostic, in retrospect, leading to excessive species listed for Belize. Tyler & Hastings (2004: 49) reported 8 species, 7 on the barrier reef (but not named) plus the new species from the midshelf: at least 4 would have to be smoothheads. There is no genetic or photographic evidence of any other smoothhead species occurring in Belize and Honduras. Indeed, there are only 4 *Emblemariopsis* species in the area (*E. pricei* without cirri, plus *E. leptocirris*, *E. ruetzleri*, and *E. dianae*).

Tyler & Tyler (1999) thoroughly explored the natural history of *E. pricei* in Belize. They explained the several phases of females and males and experimentally documented the transformation of pale males as they occupied a hole after a black TP male was removed.

Comparisons. The three glass blennies co-occurring with *E. pricei* (*E. leptocirris*, *E. dianae*, and *E. ruetzleri*) can be easily distinguished by having orbital cirri and first dorsal-fin spines longer or equal to subsequent spines and non-Y-shaped cranial patterns.

Figure 155. *Emblemariopsis pricei*, IP, Turneffe, Belize (Allison Estapé).

Figure 156. *Emblemariopsis pricei*, freshly collected juvenile, UF 246146, 11.2 mm SL, Belize, 16-915, DNA-confirmed (Jordan Casey & Simon Brandl).

The black TP of *E. pricei* have a very short and plain black anterior dorsal fin, with no white rim and no red banner, and thus are easily differentiated from the 8 red-bannered congeners (all of those but *E. randalli* with orbital cirri), as well as the two smoothheads, *E. bottomei* and *E. diaphana*, with white rims on the anterior dorsal fin and somewhat longer first dorsal-fin spines. The all-black TP of *E. bahamensis* look much the same as *E. pricei* and likely cannot be distinguished in the field (but have 13 pectoral-fin rays vs. 95% with 14 and no LIO pores vs. usually the pair in front of the commisural).

Dark-shaded, pale, and transitional TP *E. pricei* have no cirri and very short and rising first few dorsal-fin spines, excluding most congeners, except the three other smoothhead species. Of those, *E. bottomei* and *E. diaphana* have a somewhat longer first dorsal-fin spine, in the process of shortening in transitional males, and develop an obvious white rim along the anterior dorsal fin. Dark-shaded *E. pricei* do not have a distinct white rim, but do have prominent irregular grainy white patches on the anterior dorsal fin, that can extend to the edge of the fin, as well as scattered patches on the anterior body and pectoral fins (also on *E. bottomei* and *E. diaphana* to some degree). Pale and transitional *E. pricei* have a dark moustache line along the rim above the rear maxilla, sometimes just a spot, but can be a thick band from the eye to the corner of the mouth; the moustache is shared with *E. bottomei*, but not *E. diaphana*, on which the rear maxilla itself is darkened. At this stage, *E. pricei* typically also have an obvious small dark spot, or several tightly arranged, directly behind the mid-level of the orbit: that spot is not diagnostic but is more frequent in *E. pricei*. The spot is not on most *E. bahamensis* and their head spots are usually more reduced, often missing the moustache or spot at corner of the jaw.

The IP of *E. pricei* can be separated from all IP congeners, except *E. bahamensis*, by having the first dorsal-fin spine shortest and the Y-shaped cranial pattern. The two species also are distinguished by usually having no pectoral-fin-base spots or bands and reduced head spots: in *E. pricei* often just the band from the eye across the jaws, a short midline streak down the snout, and a spot at the corner of the jaw; and *E. bahamensis* are often missing the latter. The Y-shaped cranial pattern for the pair is distinctive: a round or oval band 1; a prominent Y-shaped band 2 with pale arms and a red stalk; a much reduced band 3, usually two spots or short segments; a long pale band 4, becoming red towards the midline, often with a separated midline pale spot at the base of the Y-stalk; and a very short or absent band 5.

Material examined. *Emblemariopsis pricei*: *Belize:* UF 246146, (7) 10.8–20.8 mm SL, Belize, Stann Creek District, Belize Barrier Reef, 16.9°, -88.1°, S. Brandl & J. Casey, 1–8 April 2016. *Honduras*: UF 246147, (9) 9.2–25.8 mm SL, Honduras, Bay Islands, Utila, SW corner, 16.076°, -86.938°, B.C. Victor, 1 July 2008.

Biogeography

The genus *Emblemariopsis* breaks up into complexes of species within the Caribbean Sea, unlike most other reef fishes of the region which have species that range through much of the Greater Caribbean, or at least most of the Caribbean Sea proper. In this feature, the genus is similar to a set of other small blennioid and gobioid fishes which have reduced dispersal abilities and often form allopatric species complexes within the Caribbean (Victor 2015). The list, in rough chronological order of discovery of complexes, includes *Elacatinus* (Colin 1975, 2002, 2010, Taylor & Hellberg 2005, 2006, Victor 2014), *Acanthemblemaria* (Smith-Vaniz & Palacio 1974), *Starksia* (Greenfield 1979, Williams & Mounts 2003, Baldwin et al. 2011, Victor 2018), *Tigrigobius* (Victor 2010b, 2014), and *Enneanectes* (Victor 2013, 2019). Some other small gobioids do not break up into allopatric complexes of species, e.g. *Bathygobius* (Tornabene et al. 2010) and *Coryphopterus* (Baldwin et al. 2009).

The patterns of distribution of these species are not particularly consistent, with a surprising variety of range subdivisions, yielding few fast rules. In general, there are some broad divisions such as Florida/Gulf of Mexico, the southern Caribbean, Central America or the Lesser Antilles and local areas of endemism, such as the Bahamas, the southeastern Lesser Antilles, and Venezuela (Floeter et al. 2008, Robertson & Cramer 2014). Other than those patterns, almost any combination of adjacent locations can be found in at least in some member of these groups.

The species complexes of *Emblemariopsis* can be basically divided into two large sets and three species that do not fit into the other two complexes. The larger set is the 6 red-bannered species with orbital cirri, mostly allopatric and occupying much of the Caribbean Sea (Fig. 157), sparing only southern Central America. Only one location has two species, in St. Vincent, where there is a photograph of a single TP *E. carib*, although all subsequent red-bannered glass blenny photographs from St. Vincent are *E. lancea*.

The second species complex of 4 smoothhead species without red banners divides up the region cleanly, with no overlap and representatives in all quadrants of the Caribbean Sea (Fig. 158). The three remaining species are the red-bannered *E. randalli* without a cirrus and endemic to Venezuela, as well as E. *leptocirris* and *E. ruetzleri*

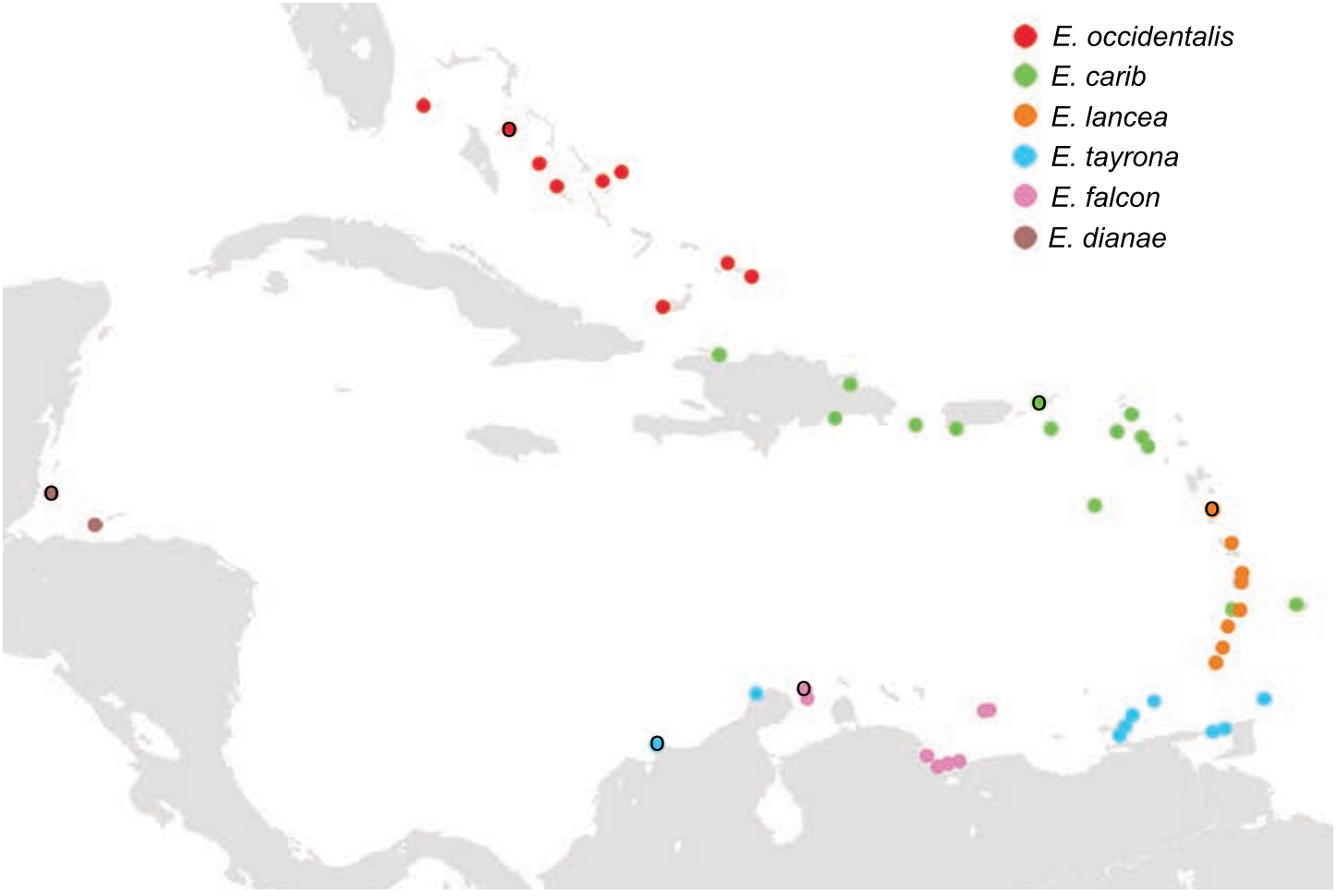

Figure 157. Distribution map of red-bannered *Emblemariopsis* species with orbital cirri (black rings indicate type locations).

Figure 158. Distribution map of smoothhead, non-red-bannered *Emblemariopsis* species (black rings indicate type locations).

which are widely distributed across the central Caribbean Sea, sparing northern waters of Florida, the Gulf of Mexico, and the Bahamas as well as the southern Caribbean east of Panama to the southwestern quadrant in the Windward Lesser Antilles (Fig. 159).

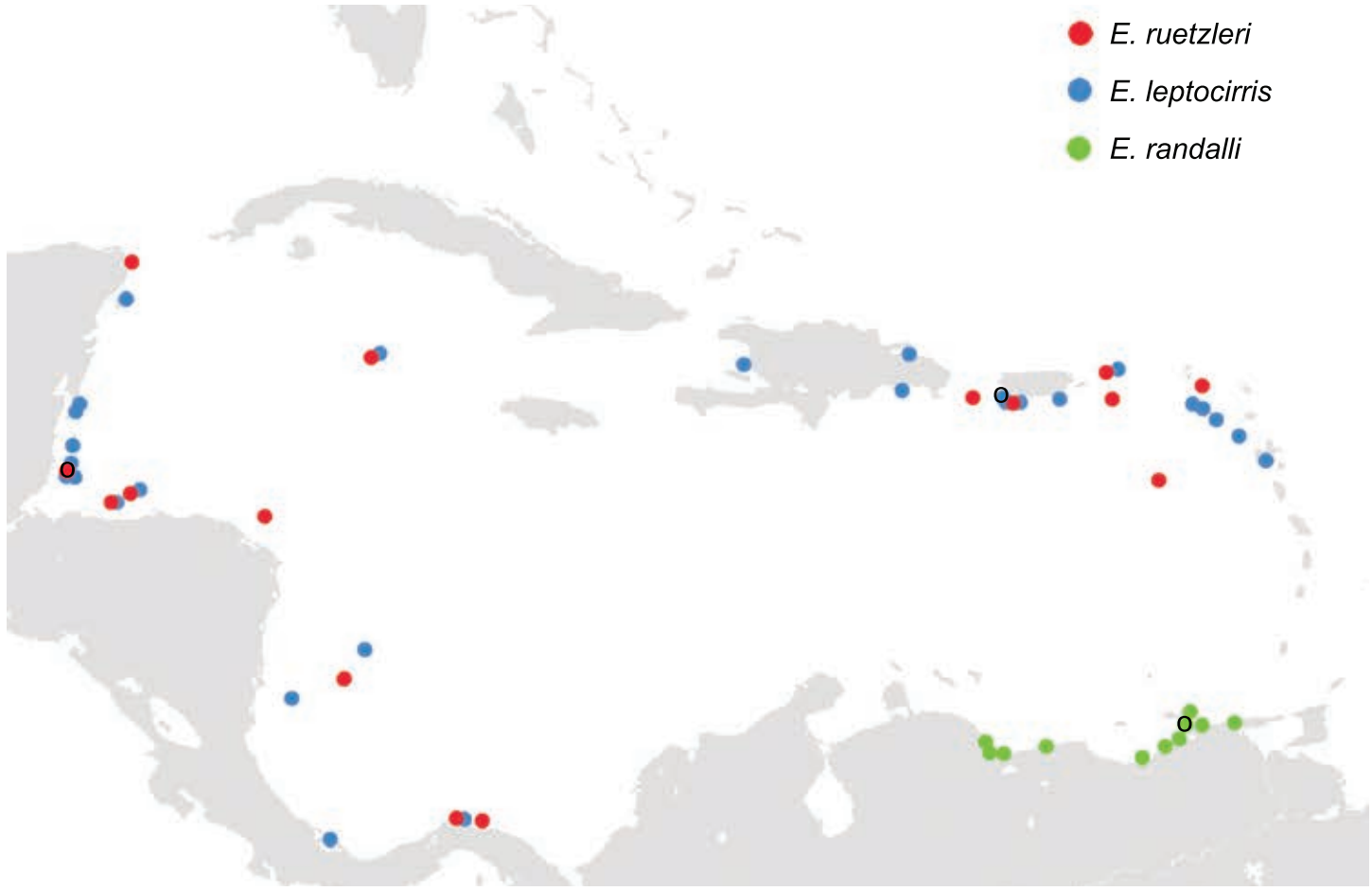

Figure 159. Distribution map of three *Emblemariopsis* species not in other complexes (black rings indicate type locations).

Genetics

The mtDNA barcode marker, a segment of the cytochrome c oxidase I gene, has been used as a standardized sequence for assembling a database of genetic sequences from all animals in the Barcode of Life database, BOLD (www.boldsystems.org) (Ratnasingham & Hebert 2007, Ward et al. 2009). Coverage for marine shorefishes is relatively high, and Greater Caribbean fishes have been extensively barcoded by several research groups (Valdez-Moreno et al. 2010, Weigt et al. 2012, Victor et al. 2015, E. Leyva-Cruz et al. 2016), with about 80–90% of the species barcoded for Greater Caribbean coral-reef associated fishes.

The mtDNA lineages for 13 of the 14 species of *Emblemariopsis* (*E. tayrona* has not been sequenced) show a similar pattern to those found in other large genera of reef fishes: most species are clearly delineated, with monophyletic lineages several percent apart (Fig. 160). However, as in many other reef-fish genera, some species have very close or even overlapping mtDNA lineages. In addition, species sometimes break up into multiple lineages that apparently show no reliable phenotypic differences and are thus considered populations of a single species, i.e. genovariant populations *sensu* Victor (2015). In *Emblemariopsis*, these genovariant populations are allopatric, but some Caribbean blennioids and gobies occasionally do have sympatric genovariants, as in *Starksia lepicoelia* (Baldwin et al. 2011, Victor 2018).

The sequence divergence between pairs of *Emblemariopsis* species ranges from zero up to 21.5% minimum interspecific p-distance (note average distances are widely reported but of limited utility since they can diverge even when lineages share haplotypes). Because there are several *Emblemariopsis* species breaking up into distinct genovariant populations, the variation within species is technically high and broadly overlaps with the variation between species. In this genus, therefore, there is no "barcode gap", or overall separation of intraspecific divergences from interspecific divergences. There is also clearly no meaningful "threshold" percentage divergence between species. The oft-cited, and arbitrary, two percent is not supported in this genus (nor in most other reef-fish genera; note that any putative threshold would apply to COI only– other mitochondrial markers show different rates of divergences). Of course, the degree of mtDNA-sequence divergence is not part of any practical species definition.

Notably, *E. bahamensis* and *E. pricei*, an allopatric sister species pair, share the same COI lineage, yet exhibit both meristic differences (13 vs. 14 pectoral-fin rays) and morphological differences (paired interorbital pores in the latter). Another pair sharing a lineage, the sympatric species *E. randalli* and *E. tayrona*, are quite different-appearing species with meristic and morphological differences as well.

Genovariant populations are found in disjunct populations of *E. bottomei* and the widespread central Caribbean species *E. leptocirris* and *E. ruetzleri*. The genetic divergences between populations in different locations are similar to those between species in other complexes, but there are insufficient phenotypic differences to elevate those populations to species. There is an indication of divergence in modal fin-ray counts, for example in various *E. leptocirris* populations, but generally broad overlap means that individuals cannot be assigned to their lineage. This phenomenon is characteristic of shorefish species with drab or silvery coloration, that do not develop visible reproductive isolating mechanisms, such as male-display colors or patterns.

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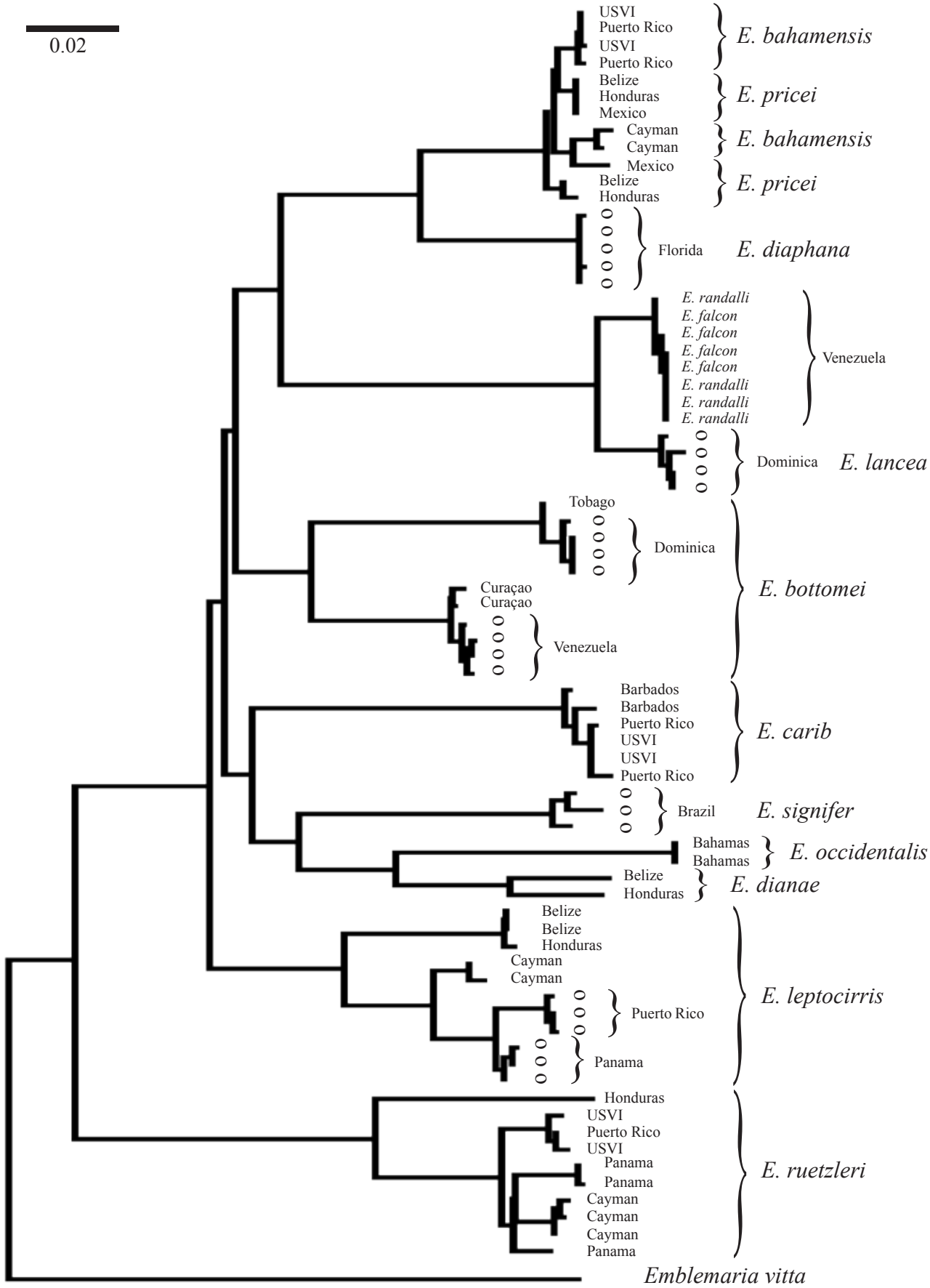

Figure 160. The neighbor-joining phenetic tree of the glass blenny genus *Emblemariopsis* based on mtDNA COI sequences, following the Kimura two-parameter model (K2P) generated by BOLD (Barcode of Life Database). The scale bar at left represents a 2% sequence difference. Collection locations for specimens are indicated. GenBank accession numbers and collection data for the sequences in the tree are listed in Appendix 1. The sequence of *Emblemaria vitta* is used an outgroup.

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Appendix 1. Specimen data and GenBank accession numbers for the mtDNA COI barcode sequences used in the phenogram in Figure 160, following the order in the tree.

species	Collection site	Voucher	GenBank #	Source
bahamensis	St Thomas, USVI	UF 413225	HQ654573	Victor/Smith
bahamensis	La Parguera, Puerto Rico	UF 413225	HQ654569	Victor/Caldow
bahamensis	St Thomas, USVI	UF 413225	HQ654572	Victor/Smith
bahamensis	La Parguera, Puerto Rico	UF 413225	MT467459	Victor/Caldow
pricei	Carrie Bow, Belize	UF 413225	MW126452	Brandl/Casey
pricei	Utila, Honduras	UF 413225	HQ654577	Victor
pricei	Quintana Roo, Mexico	ECOCHLP 4508	HQ573394	Vásquez Yeomans
bahamensis	Grand Cayman	UF 413225	MW126446	Victor
bahamensis	Grand Cayman	UF 413225	MW126459	Victor
pricei	Quintana Roo, Mexico	ECOCHLP 4560	HQ573438	Vásquez Yeomans
pricei	Curlew Reef, Belize	UF 413225	MW126462	Brandl/Casey
pricei	Utila, Honduras	UF 413225	MT467458	Victor
diaphana	Florida Keys	UF 413225	MW126443	Victor
diaphana	Florida Keys	UF 413225	MW126444	Victor
diaphana	Florida Keys	UF 413225	MW126447	Victor
diaphana	Florida Keys	UF 413225	MW126451	Victor
diaphana	Florida Keys	UF 413225	MW126455	Victor
randalli	Mochima, Venezuela	CPC 356	MT467547	Rodriguez/Molins
falcon	Carabobo, Venezuela	CPC 477	MT467541	Rodriguez/Molins
falcon	Carabobo, Venezuela	CPC 479	MT467522	Rodriguez/Molins
falcon	Morrocoy, Venezuela	CPC 334	MT467515	Rodriguez/Molins
falcon	Carabobo, Venezuela	CPC 476	MT467542	Rodriguez/Molins
randalli	Paraguana, Venezuela	CPC 480	MT467553	Rodriguez/Molins
randalli	Morrocoy, Venezuela	CPC 440	MT467507	Rodriguez/Molins
randalli	Carabobo, Venezuela	CPC 381	MT467465	Rodriguez/Molins
lancea	Dominica	UF 413225	MT467532	Victor
lancea	Dominica	UF 413225	MT467497	Victor
lancea	Dominica	UF 413225	MT467490	Victor
lancea	Dominica	UF 413225	MT467518	Victor
bottomei	Tobago	USNM 415859	AFN00523	Baldwin et al.
bottomei	Dominica	UF 413225	MT467539	Victor
bottomei	Dominica	UF 413225	MT467514	Victor
bottomei	Dominica	UF 413225	MT467498	Victor
bottomei	Dominica	UF 413225	MT467534	Victor
bottomei	Curaçao, Neth. Antilles	USNM 414428	JQ842086	Baldwin et al.
bottomei	Curaçao, Neth. Antilles	USNM 415845	JQ842085	Baldwin et al.
bottomei	Los Roques, Venezuela	CPC 460	MT467477	Rodriguez/Molins
bottomei	Los Roques, Venezuela	CPC 433	MT467471	Rodriguez/Molins
bottomei	Los Roques, Venezuela	CPC 429	MT467495	Rodriguez/Molins
bottomei	Los Roques, Venezuela	CPC 428	MT467520	Rodriguez/Molins
carib	Barbados	UF 413225	HQ654580	Vallès
carib	Barbados	UF 413225	MT467470	Vallès
carib	La Parguera, Puerto Rico	UF 179456	HQ654556	Victor/Caldow
carib	St Thomas, USVI	UF 179454	HQ654565	Victor/Smith
carib	St Thomas, USVI	UF 179455	HQ654562	Victor/Smith
carib	La Parguera, Puerto Rico	UF 179456	HQ654554	Victor/Caldow
signifer	Brazil	UF 413225	MW126461	Victor
signifer	Brazil	UF 413225	MW126463	Victor
signifer	Brazil	UF 413225	MW126454	Victor
occidentalis	Green Cay, Bahamas	ANSP 191865	MN750694	Ilves et al.
occidentalis	Green Cay, Bahamas	ANSP 192008	MN750695	Ilves et al.
dianae	S. of Carrie Bow, Belize	USNM 415847	JQ841544	Baldwin et al.
dianae	Utila, Honduras	UF 413225	MT467488	Victor
leptocirris	Inner Barrier, Belize	UF 413225	MW126458	Brandl/Casey
leptocirris	Inner Barrier, Belize	UF 413225	MW126453	Brandl/Casey
leptocirris	Utila, Honduras	UF 413225	MT467502	Victor
leptocirris	Grand Cayman	UF 413225	MW126445	Victor
leptocirris	Grand Cayman	UF 413225	MW126456	Victor
leptocirris	La Parguera, Puerto Rico	UF 179675	HQ654549	Victor/Caldow
leptocirris	La Parguera, Puerto Rico	UF 179674	MT467467	Victor/Caldow
leptocirris	La Parguera, Puerto Rico	UF 179674	MT467496	Victor/Caldow
leptocirris	Bocas del Toro, Panama	UF 413225	MW126449	Brandl/Casey
leptocirris	Bocas del Toro, Panama	UF 413225	MW126442	Brandl/Casey
leptocirris	Bocas del Toro, Panama	UF 413225	MW126450	Brandl/Casey
ruetzleri	Utila, Honduras	UF 413225	MT467556	Victor
ruetzleri	St Thomas, USVI	UF 413225	HQ654557	Victor
ruetzleri	La Parguera, Puerto Rico	UF 413225	HQ654560	Victor/Caldow
ruetzleri	St Thomas, USVI	UF 413225	HQ654552	Victor
ruetzleri	Colon, Panama	UF 413225	MT467519	Robertson et al.
ruetzleri	Colon, Panama	UF 413225	MT467478	Robertson et al.
ruetzleri	Grand Cayman	UF 413225	MW126460	Victor
ruetzleri	Grand Cayman	UF 413225	MW126457	Victor
ruetzleri	Grand Cayman	UF 413225	MW126448	Victor
ruetzleri	Colon, Panama	UF 413225	MT467455	Robertson et al.
E. vitta	La Parguera, Puerto Rico	LIDMA241-10	HQ654543	Victor/Caldow