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INVERTEBRATE
ZOOLOGY
Crustacea

STUDIES ON DECAPOD CRUSTACEA FROM THE
INDIAN RIVER REGION OF FLORIDA. I. *ALPHEUS*
THOMASI, NEW SPECIES, A NEW SNAPPING SHRIMP
FROM THE SUBTROPICAL EAST COAST OF FLORIDA
(CRUSTACEA: DECAPODA: CARIDEA)

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Snapping shrimps of the genus *Alpheus* are a common and colorful component in the tropical and subtropical waters of the Florida peninsula. Until recently, however, no systematic survey of this genus as it occurred in Floridan waters had been undertaken. During the course of such a survey in south Florida in 1970, one of us, (GYH) collected specimens of a form which was recognized as being undescribed. Unfortunately, the press of time and other matters prevented immediate publication of the new species, (Hendrix, 1971:137 unpubl.). Subsequently, the second author collected additional material of the new species while carrying out a survey of the decapod crustaceans of the Indian River region on the east central Florida coast. We present here a complete description based both on this new material and that already cited in Hendrix.

A more comprehensive report of the decapod crustaceans of the Indian River is presently undergoing preparation.

In the following description, the abbreviation cl refers to carapace length measured from the tip of the rostrum to the truncated posterior margin of the carapace; USNM refers to the National Museum of Natural History, Washington, D. C.; HBFL refers to The Harbor Branch Foundation Laboratory, Ft. Pierce, Florida.

Grateful appreciation and thanks are extended to Dr. Fenner

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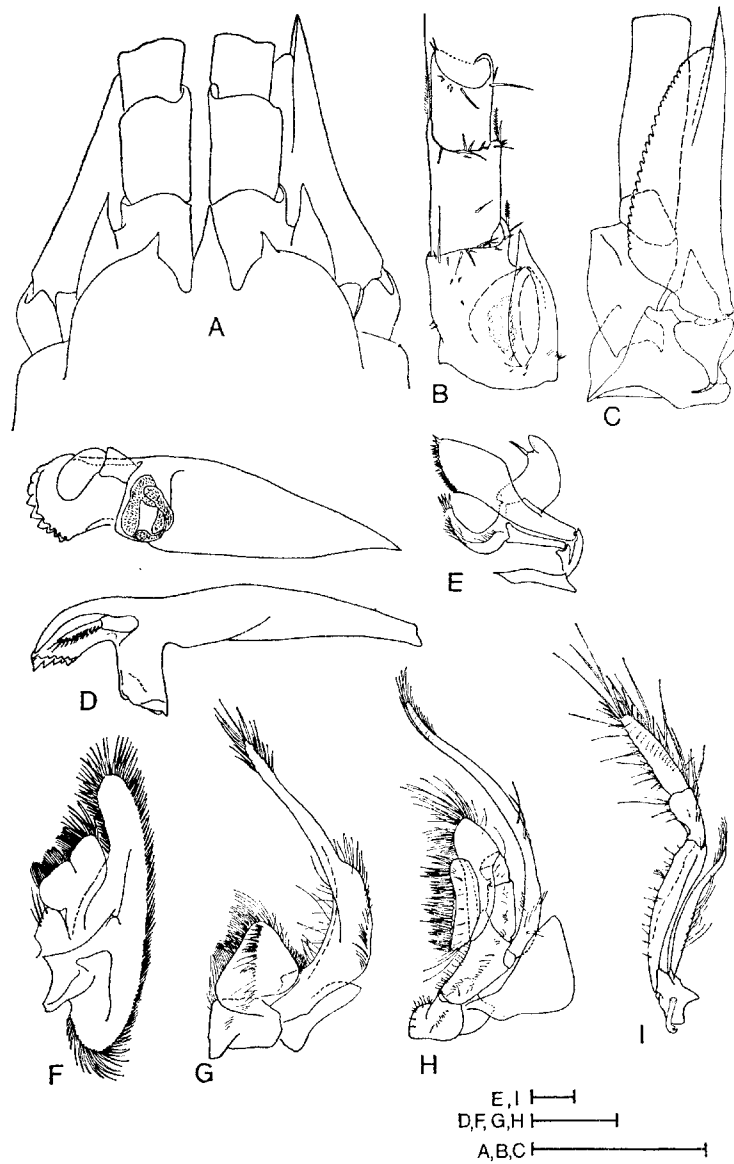


FIG. 1. *Alpheus thomasi*, new species. Paratypic and Holotypic females: A, anterior carapace region. B, antennular peduncle. C, antennal peduncle and scale. D, right mandible, posterior view (upper), dorsal view (lower). E, left maxillule. F, left maxilla. G, left maxilliped

A. Chace, Jr., (USNM) for his generous aid and advice concerning the new species. Dr. Lawrence G. Abele, Smithsonian Tropical Research Institute, Balboa, Canal Zone, critically read the manuscript. We also acknowledge the very able and willing help of Mrs. Bonnie Wicken (HBFL) during a collecting trip on which the paratypic material from Ft. Pierce was obtained, and that of Messrs. R. Grant Gilmore and Gregg Stanton for obtaining the paratypic specimens from Jupiter Inlet.

Alpheus thomasi, new species

Figures 1 to 3

Material: Holotype: female, ovigerous, cl 9.3 mm; Virginia Beach, Virginia Key, Miami, Florida; 1 m depth, among tubes of sabellariid polychaete worms; 14 August 1970; coll. Gary Hendrix; USNM 134698.—Paratypes: mated pair; male, cl 4.8 mm, female cl 3.8 mm; Cape Florida, Key Biscayne, Florida; 1 m depth, among tubes of sabellariid polychaete worms; 22 August 1969; coll. Gary Hendrix; USNM 134699.—female, cl 5.0 mm; Bear Cut, Key Biscayne, Florida; 1–3 m depth, near rocky platform, among tubes of sabellariid polychaete worms; 10 June 1969; coll. Gary Hendrix; USNM 134700.—2 males, cl 6.0 and 7.5 mm; 1 female, ovigerous, cl 7.7 mm; Atlantic Ocean, St. Lucie County, Florida; Walton Rocks, in phragmatopomid worm reef in surf zone along shore; 19 January 1973; coll. Robert H. Gore, Bonnie S. Wicken; HBFL 89:432.—2 juveniles, cl 2.2 and 3.4 mm; Jupiter Inlet, Palm Beach County, Florida; intertidal area by jetties, south side of inlet, inside coquinoid limestone rocks; 8 March 1973; coll. R. Grant Gilmore, Gregg R. Stanton; HBFL 89:505.

Diagnosis: Rostrum dorsally rounded, with adrostral depressions; ocular hoods spined; ventrolateral tooth on basicerite not overreaching stylocerite; major first chela not noticeably twisted, a sinus on proximo-lateral dorsal surface, palm without sharp tooth at lateral articulation with movable finger, merus with sharp tooth on distal mesial flexor margin; pereopods 3 and 4 with movable spine on ischium.

Description: Rostrum (Fig. 1,A) triangular, dorsally rounded, falling short of disto-mesial margin of proximal article of antennular peduncle, separated anteriorly from ocular hoods by shallow adrostral depressions blending into carapace just posterior to ocular hoods. Latter prominent,

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1. H, left maxilliped 2. I, left maxilliped 3. Female, paratype, USNM 134700, A–C. Female, holotype, USNM 134698, D–I. Scale lines equal 1 mm.

anteriorly produced, armed on anterior margin with short, small sharp tooth directed forward and slightly mesially, shorter than rostrum. Anterior carapace margin descending vertically from ocular hood to ventral margin of basal antennal segment, continuing ventrad and posteriad to base of maxilliped 3. Posterior carapace margin with distinct dorsolateral notch.

Eyes entirely concealed by ocular hoods.

Antennule (Fig. 1,B) with stylocerite dorsally flattened, prolonged anteriorly into sharp point reaching to or just beyond anterolateral margin of basal antennular segment; basal segment with triangular-shaped carina on ventromesial surface; second segment subequal to basal, about twice as long as third.

Scaphocerite (Fig. 1,C) three times longer than wide; distal portion of stout spine overreaching antennular peduncle but equal to carpocerite; lamella well developed, distal portion narrow, falling short of tip of spine, but equal to antennular peduncle. Basicerite with sharp lateral tooth below articulation of scaphocerite, tooth equal to about one-fifth length of same, but shorter than stylocerite.

Mouth parts (Fig. 1,D-I) as illustrated; mandible (Fig. 1,D) with nine or ten teeth on incisor process. Maxilliped 3 (Fig. 1,I) falling short of carpocerite tip, exopod of same overreaching anterior margin of antepenultimate article of endopod.

Major first pereiopod (Fig. 2,A,B) overreaching carpocerite by most of chela; latter compressed; subcylindrical, lacking dorsal or ventral notches, but with faint shallow groove on lateral and mesial surfaces; movable finger slightly less than one-fourth length of chela, compressed, slightly rotated to plane of chela, distally arched, one and one-half times longer than high, tip compressed and truncate, ventral margin with sinus distal to molar process; molar process at angle to long axis of finger, mesial surface bulbous, a low setose ridge encircling proximal ventral surface, ventral margin nearly parallel to long axis of finger; lateral surface of palm with shallow flattened depression extending from opposable margin of fixed finger along same, onto, and blending with general area at midlength of palm; depression blends additionally into ridge along ventral margin of palm causing same to appear more flat than round; palm narrowing distally proximal to articulation of fingers; mesial surface of palm with narrow, shallow dorsal groove deepening distally but not forming dorsal notch; distomesial margin of palm convex and serrate prior to articulation with movable finger; fixed finger with socket to receive molar process on dactyl, opposable margin short, carinate, tip of finger somewhat concave mesially, directed laterally to accommodate movable finger; merus with small sharp tooth on distal mesial flexor margin.

Minor first pereiopod (Fig. 2,C,D) overreaching carpocerite by most of chela; latter subcylindrical, without dorsal or ventral notches, faint groove on dorsomesial margin; fixed finger slightly more than half length

of chela, subcylindrical; mesial surface of palm with low indistinct ridge extending distally from middorsal surface onto distal margin, ending at articulation with movable finger; distal margin there produced into prominent acute tooth, shallow depression produced between dorsal margin and aforementioned ridge; merus with small sharp tooth on distomesial flexor margin.

Pereiopod 2 (Fig. 2,E) extending beyond carapocerite by length of chela and distal four articles of carpus; fixed finger equal to half chela length; latter nearly as long as distal three articles of five comprising carpus; ratio of same in decreasing length as follows: 1, 2 = 5, 3 = 4; merus equal to proximal two articles of carpus, about equal to ischium.

Pereiopod 3 (Fig. 2,F) longer than carapocerite by dactyl and two thirds of propodus; dactyl unarmed, but extensor margin with few setae arising from notch, flexor margin entire; propodus four times longer than dactyl, ventral margin armed with row of six or seven stout spines; carpus two-thirds length of propodus, distal extensor margin projecting somewhat beyond articulation with propodus; merus about four times longer than wide, distal flexor margin unarmed, this article about twice as long as carpus, three times longer than ischium; latter armed with ventral movable spine.

Pereiopod 4 longer than carapocerite by dactyl and distal third of propodus, similar to pereiopod 3 but shorter and more slender; ischium with ventral movable spine.

Pereiopod 5 (Fig. 2,G) not reaching end of carapocerite; dactyl unarmed; propodus three times length of dactyl, armed ventrally with row of five or six stout spines, distal third with several lateral bands of comb-like setae; merus about one and one-half times longer than carpus, twice as long as ischium; latter unarmed.

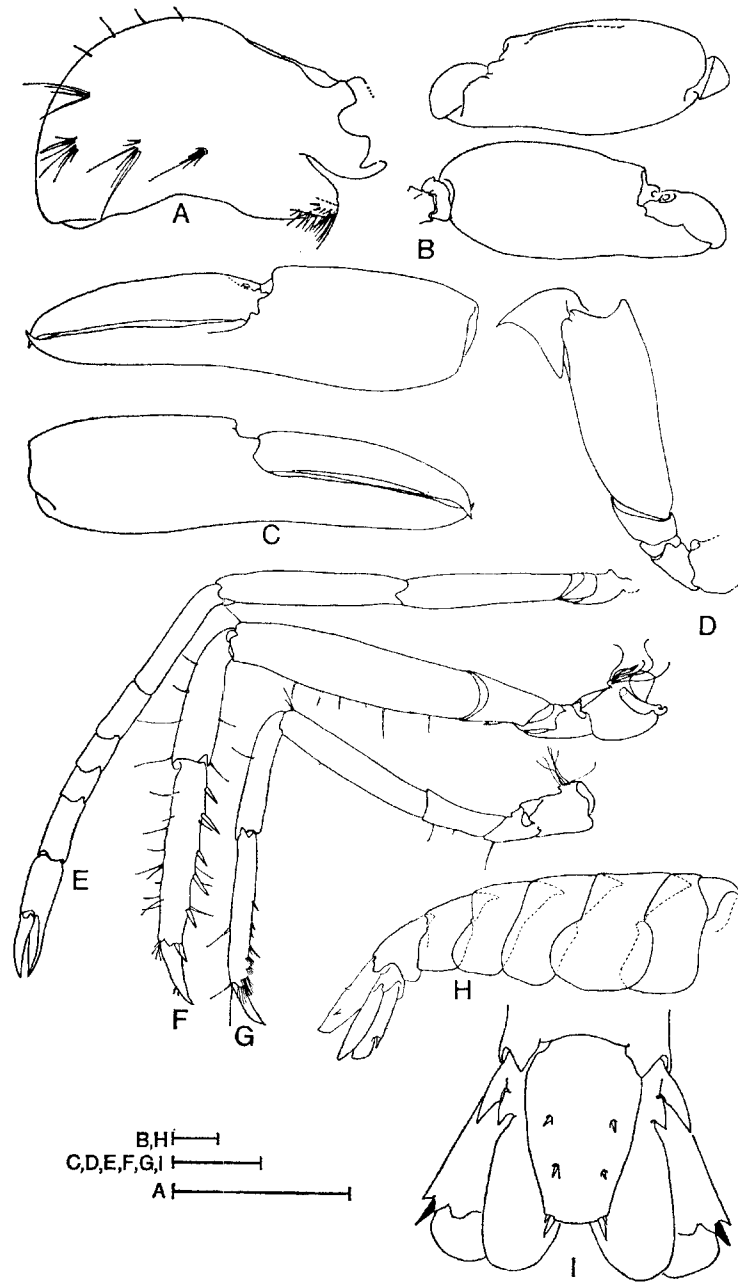
Abdominal pleura (Fig. 2,H) of four anterior somites broadly rounded, fifth subrectangularly so, sixth truncate above, sharply rounded below articulation of uropod.

Male pleopod 2 with appendix masculina subequal to appendix interna.

Telson (Fig. 2,I) about one-third longer than wide, anterior margin nearly twice as wide as posterior, lateral margin faintly sinuous or straight; dorsal surface with two pairs of stout spines, anterior pair slightly anterior to telson midlength, posterior pair halfway between preceding and posterior telson-margin; latter weakly convex with two pairs of stout lateral spines, mesial pair twice as long as adjacent pair, with double row of elongate setae between.

Uropodal basal segment with two stout, pointed teeth directed posteriorly, separated by narrow cleft. Exopod of same with conspicuous, dark-colored spine at posterolateral margin in socket formed by two stout triangular teeth; spines dark-colored in both sexes.

Color: Carapace and abdomen (Fig. 3) with nine distinct transverse bands of brown, blue gray or orange on clear to white background as follows: first, extending along anterior margin of carapace, including



rostrum, and outlining mesial and posterior margin of eyes; a small spot of brown immediately posterior to rostrum; second, originating in region of pereopod 3, bordered by a narrow band of yellow or orange; third, originating in region of pereopod 5, also with yellow or orange border; fourth, band extreme posterior margin of carapace and anterior portion of abdominal somite 1; pair of yellow spots anterior to band on either side of carapace, yellow border of band broken posteriorly; fifth, on abdominal somite 2, bifurcating conspicuously on pleura of somite, also bordered in yellow anteriorly and posteriorly; sixth through ninth, on abdominal somites 3 to 6, respectively, not bifurcate but bordered as before in yellow or orange. Telson with yellow T-shaped mark on antero-dorsal surface, midregion with broad dark blue, blue-gray or brown transverse band connecting similar band on uropods; posterior margin of telson bordered in yellow. Uropodal lateral tooth yellow, speckled yellow or clear; lateral and posterior margins of exopod and endopod yellow; conspicuous dark-colored spine at posterolateral margin of exopod.

Carpocrite brown, scaphocrite clear, flagellum faint blue. Maxilliped 3 with scattered red chromatophores. Major first chela with three irregular reddish-brown or tan bands separated by clear to yellow, pale yellow-white, or white areas; midportion of movable finger dark gray or brown, finger with white tip; carpus and merus brown. Minor first chela with one broad reddish-brown band across middle of palm, dark gray or blue-gray band across midlength of both fingers.

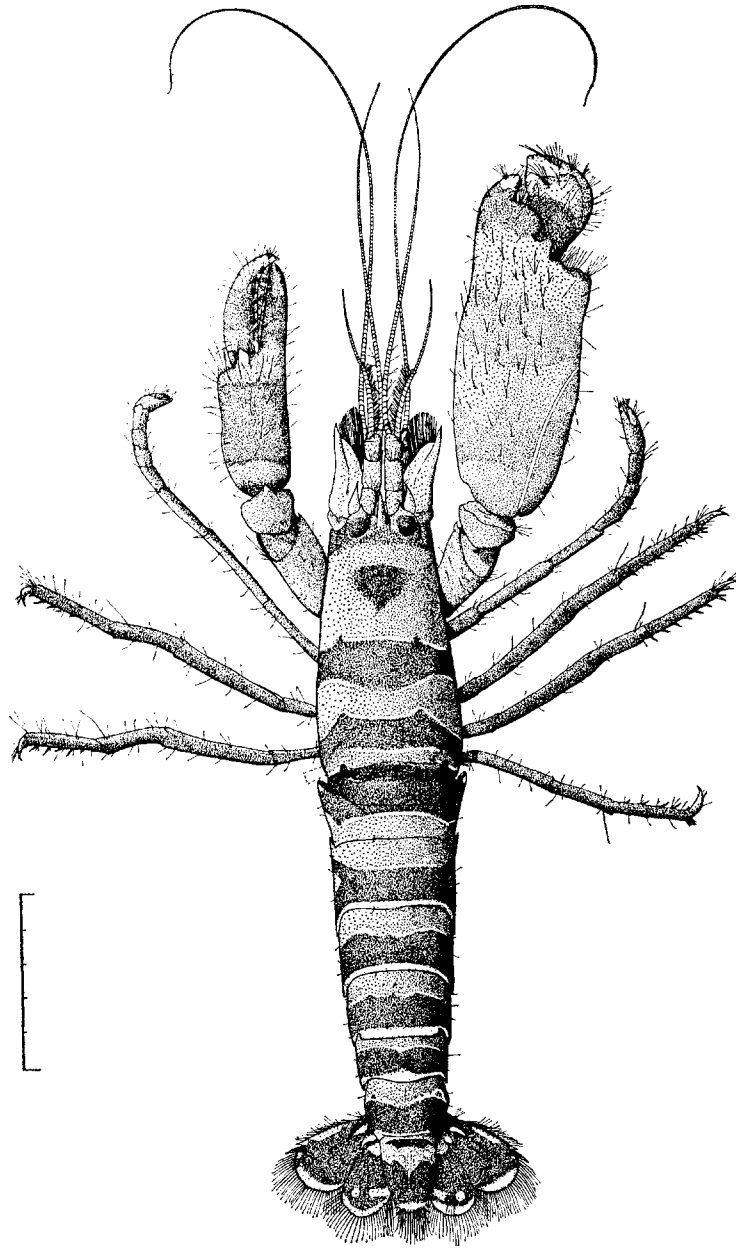
Measurements: Smallest ovigerous female from St. Lucie County, Florida was 7.7 mm; juveniles from Jupiter Inlet measured 2.2 and 3.4 mm respectively.

Habitat: This species appears to be restricted to shallow water, among the crevices and spaces of sand grain tubes constructed by sabellariid polychaete worms (*Phragmatopoma lapidosa* Kinberg, 1867). These worms form extensive "reefs" adjacent to sandy and grassy areas of sufficient tidal flow in south Florida, as well as in the surf zone along exposed shores in east central Florida.

Distribution: Presently known from the type-locality and nearby vicinity of Cape Florida, Key Biscayne, Dade County; and from Jupiter Inlet in Palm Beach County, and Walton Rocks, St. Lucie County, about 5 miles south of Ft. Pierce, Florida. All localities are on the southeastern or central eastern coast of Florida.

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FIG. 2. *Alpheus thomasi*, new species. Paratypic male and female: A, dactyl, major chela. B, right major chela, mesial view (upper), lateral view (lower). C, left minor chela, lateral view (upper), mesial view (lower). D, merus, left pereopod 1. E, left pereopod 2. F, left pereopod 3. G, left pereopod 5. H, abdomen, lateral view. I, telson and uropods. Male, paratype, USNM 134699, A-D. Female, paratype, USNM 134700, E-I. Scale lines equal 1 mm.



Etymology: We honor colleague, friend, and fellow sybarite in naming this species after Dr. Lowell P. Thomas, University of Miami, Rosenstiel School of Marine and Atmospheric Sciences, Miami, Florida.

Discussion: The possession of armed ocular hoods and a conspicuous dark-colored spine at the posterolateral corner of the uropodal exopod shows that *Alpheus thomasi* belongs to the *Macrochirus* group of the genus. Other species sharing these characters include *Alpheus formosus* Gibbes, 1850, and *A. armatus* Rathbun, 1901. The new species may be separated from *A. formosus* by its dorsally rounded rostrum, its more massive major chela, and by its non-balaeniceps minor chela. In *A. formosus* the rostrum is flattened, the major chela is not as deep-bodied, and the minor chela is balaeniceps in the male. *Alpheus armatus* also differs from the new species by its flattened rostrum, plus an extra ocular tooth and a noticeable tooth posterior to the rostrum. In addition, the chelipeds of *A. armatus* are conspicuously tuberculate, while those of *A. thomasi* are smooth. Other closely related species include *Alpheus ridleyi* Pocock, 1890 (= *A. nigrospinatus* Rankin, 1898), *A. fagei* Crosnier and Forest, 1965, *A. rugimanus* A. Milne Edwards, 1878, and *A. amblyonyx* Chace, 1972. However, all but the latter species lack ischial spines on pereopods 3 and 4. In addition, the major first chela in *A. ridleyi* is notched dorsally whereas only a sinus appears in *A. thomasi*; the major chela is more noticeably setose overall in *A. fagei* and *A. rugimanus* while being more or less setose primarily near the articulation of the movable finger in *A. thomasi*. The scaphocerite spine does not surpass the carpocerite and is nearly equal to the length of the antennular peduncle in *A. fagei*, whereas it equals the carpocerite and surpasses the antennular peduncle in *A. thomasi*. *A. rugimanus* possesses two small spinules on the distal extensor margin of pereopods 3 and 4, which are lacking in *A. thomasi*. The basicerite lateral spine clearly extends beyond the stylocerite in *A. rugimanus*, whereas in *A. thomasi*, as in *A. fagei*, the stylocerite is longer. While *A. amblyonyx* has ischial spines on pereopods 3 and 4, and the basicerite spine is also shorter than the stylocerite, this species may be separated from *A. thomasi* by its twisted major first chela, and by the presence of a distinct sharp tooth on the palm of that appendage at the mesiolateral articulation with the movable finger; both features are lacking in the new species.

Remarks: *Alpheus fagei* and *A. rugimanus* are eastern Atlantic species which are not, so far as is known, found in sabellariid worm reefs, but seem instead to prefer hard bottom of rocks, coral, and calcareous algae (Crosnier and Forest, 1966:234). Both *A. ridleyi* and *A. amblyonyx* are found in the Caribbean but have not yet been reported from Florida,

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FIG. 3. *Alpheus thomasi*, new species. Male, paratype, HBFL 89:432. Left pereopod 5 missing, but position indicated. Scale equals 5 mm.

and both have also been collected in coral or coral-associated habitats (see Chace, 1972).

Perhaps the most distinctive field character separating the previously mentioned Caribbean species from *A. thomasi* is the distinctly banded color pattern of the new species (Fig. 3). As such, it enables immediate identification since only *Alpheus armillatus* H. Milne Edwards, 1837, is similarly banded, and that species can be distinguished both by color and by other morphological features from *A. thomasi*. *Alpheus armillatus* is also more properly an estuarine or grass flat species which would not be expected to occur in the sabellariid worm reef habitat in Florida.

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