

REDESCRIPTION, ECOLOGICAL OBSERVATIONS,
AND DISTRIBUTION OF THE CARIDEAN SHRIMP
Plesionika escatilis (STIMPSON, 1860)
(DECAPODA, PANDALIDAE)

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Abstract. — Thirty-four shrimp specimens of *Pandalus escatilis* Stimpson, 1860 were collected using a research submersible in the Bahama Islands and during trawling operations elsewhere. The taxon, heretofore considered of obscure identity, belongs in the genus *Plesionika* Bate, 1888. The species is redescribed, and observations on the ecology, color pattern, and affinities are included. The distribution of Stimpson's species and that of the similar *Plesionika narval* (Fabricius, 1787), is briefly discussed.

On 31 Mar 1981, several specimens of a brightly colored shrimp were obtained west of Nassau Harbor, Bahama Islands, by a lock-out diver working from a research submersible. These shrimps, collected from a depth of 143 m, initially were considered by one of us (RHG) to represent *Parapandalus narval* (Fabricius, 1787), a species not known from the western Atlantic. Subsequently, Lemaitre (1984) reported a damaged specimen from Cay Sal Bank, Bahama Islands, as *Parapandalus* sp. The latter specimen appeared similar to *P. narval*, but because of its condition it was not possible to identify it with certainty.

In order to clarify the identity of these specimens, we compared them with material from various institutions and found that the Bahamas' specimens actually represent *Pandalus escatilis*, a species briefly described by Stimpson (1860). Stimpson's species was placed subsequently in the genus *Parapandalus* Borradaile, 1899. Some carcinologists (e.g., Holthuis 1949, Crosnier & Forest 1973), however, questioned this arrangement and noted that Stimpson's species might belong in *Plesionika* Bate, 1888. The present study will show that Stimpson's taxon has been confused with

Plesionika narval (= *Parapandalus narval*) on the western coast of Africa.

Recently, Chace (1985) synonymized these two genera based on his opinion that the genus *Parapandalus*, retained in the past for those pandalids that differ from *Plesionika* in lacking epipods on the pereopods (e.g., Holthuis 1955), is of no phylogenetic significance. Because of the problems of identity and distribution that have existed with Stimpson's *Pandalus escatilis*, we redescribe his species. Ecological observations obtained by a lock-out diver are also included, as well as some brief remarks on the distribution of this species and *Plesionika narval*.

Specimens used for this study came from the collection of: British Museum (Natural History) (BMNH); Florida International University (FIU); Florida Department of Natural Resources, Bureau of Marine Research, St. Petersburg, Florida (FSBC D); National Museum of Natural History, Washington, D.C. (USNM); and Rijksmuseum van Natuurlijke Historie, Leiden (RMNH). The abbreviation CL indicates carapace length excluding rostrum, measured from posterior dorsal margin of carapace to posterior margin of orbit.



Fig. 1. *Plesionika escatilis* (Stimpson, 1860). ♂, USNM 204597. Scale equals 10 mm.

Plesionika escatilis (Stimpson, 1860),
new combination
Figs. 1-4

Pandalus escatilis Stimpson, 1860:37.

Parapandalus escatilis: de Man, 1920:107.

Parapandalus narval: Crosnier & Forest,
1973:221, fig. 69a (in part, see Remarks).

Parapandalus sp.: Lemaitre, 1984:444.

Type material.—Two dry syntypes (sex undeterminable), off Madeira, BMNH 61.44.

Material examined.—Western Atlantic: 1 ♂ (CL = 16.4 mm), 1 ♀ ovig. (CL = 15.7 mm), off Mississippi River mouth, Jan 1976, USNM 155377. — 1 ♀ ovig. (CL = 15.6 mm), west of Anna Maria Island, Manatee Coun-

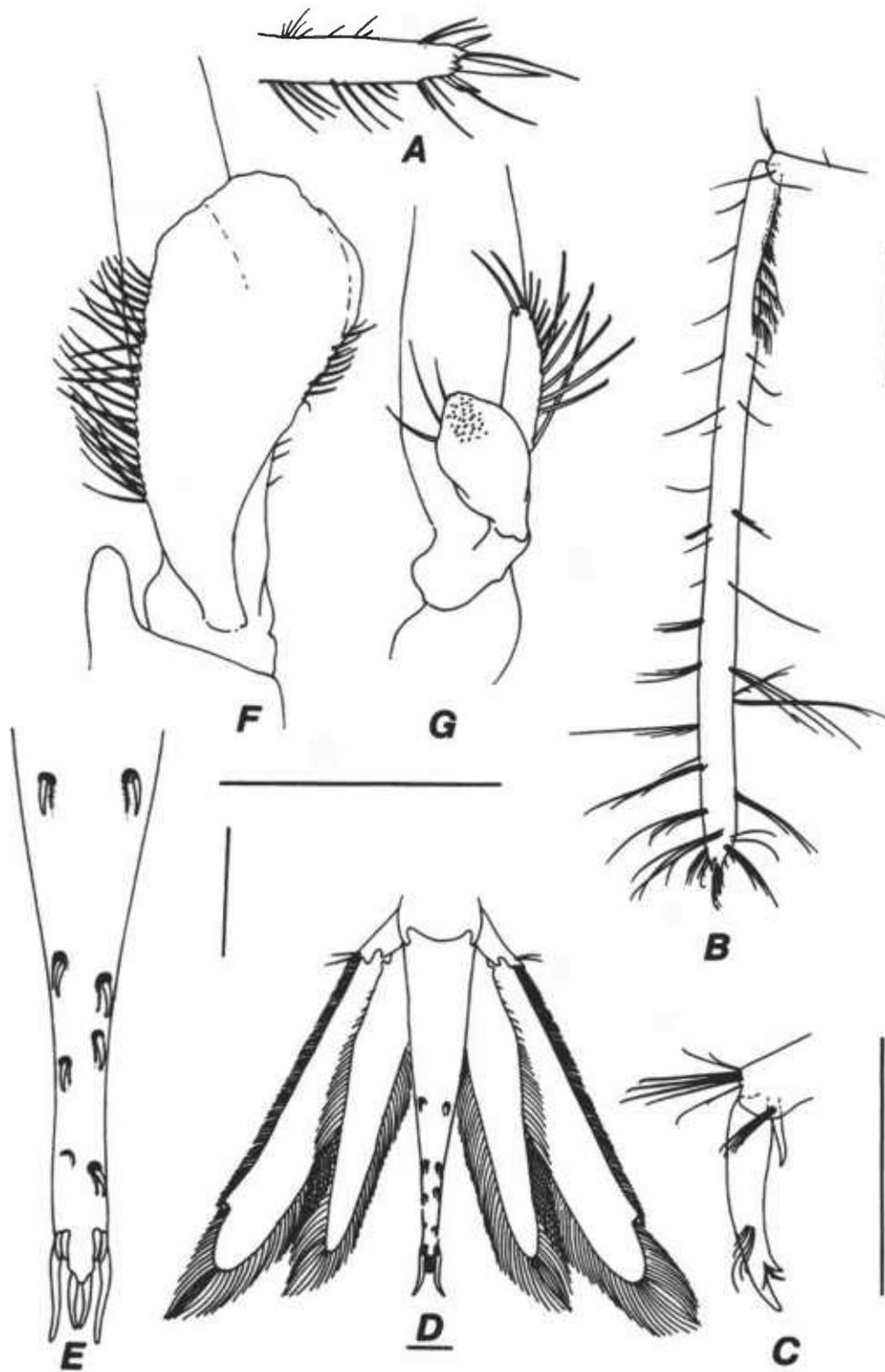




Fig. 3. A-J, *Plesionika escatilis* (Stimpson, 1860), ovig. ♀, USNM 172101. A-H, Mouthparts (left, external view): A, Mandible; B, Maxillule; C, Maxilla; D, first Maxilliped; E, second Maxilliped; F, third Maxilliped; G, Distal end of same; H, Basal part of same. I, Right antennular peduncle and eye (dorsal view); J, Right antennal scale (dorsal view). K-M, *Plesionika narval* (Fabricius, 1787), ♀, USNM 184993, right third maxilliped (external view): K, Distal segments; L, Basal part (arrow indicates epipod); M, Epipod. Scales equal 2 mm (A-E, I), 5 mm (F, J, K), 0.5 mm (G, M), and 1 mm (H, L).

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Fig. 2. *Plesionika escatilis* (Stimpson, 1860). ♂, USNM 204597. A, Ultimate article of third maxilliped; B, Propodus and dactyl of left first pereopod; C, Dactyl of left third pereopod; D, Telson and uropods; E, Telson in dorsal view (posterior setae omitted); F, Endopod of right first pleopod; G, Endopod and appendix masculina of right second pleopod. Scales equal 1 mm.

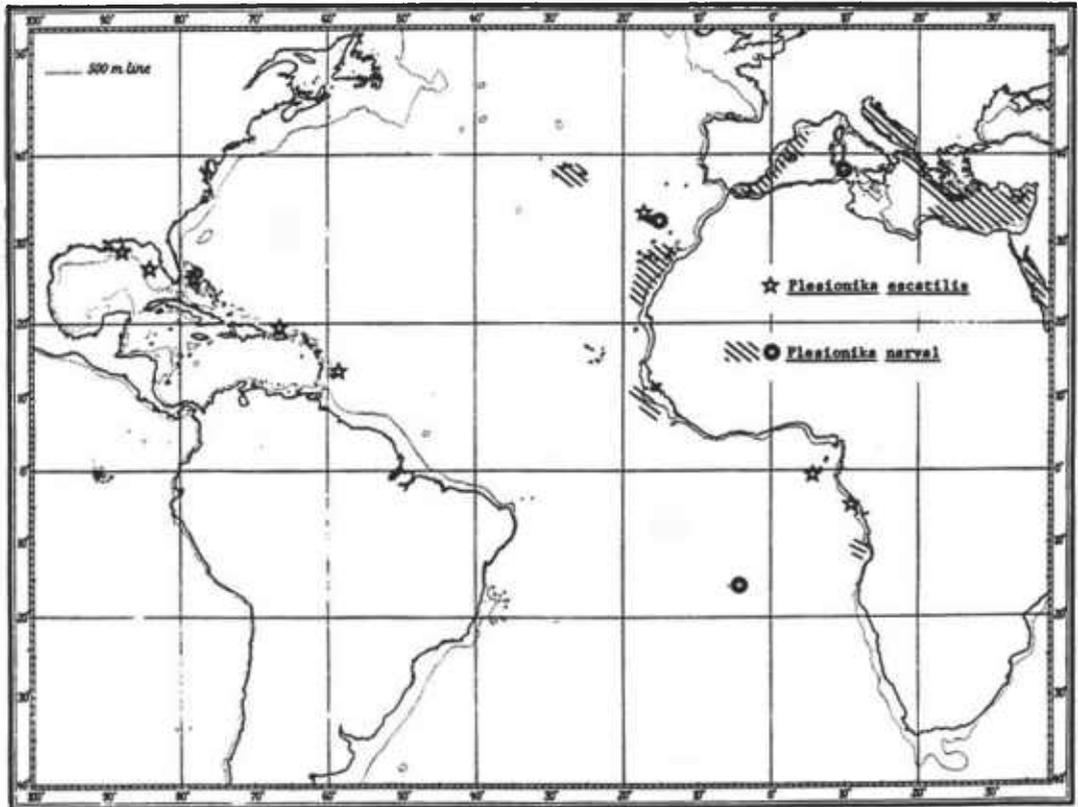


Fig. 4. Distribution of *Plesionika escatilis* (Stimpson, 1860), and *Plesionika narval* (Fabricius, 1787). [Hatched area based on Holthuis (1980). Circled stars based on the following material examined: 2 ♀, southern Sardinia, 70 m, 4 Nov 1978, USNM 184933.—5 ♀, 3 ♀ ovig., Funchal, Madeira (fish market), 29 Sep 1956, RMNH 11595.—2 ♂, 2 sex indet. (damaged), 3 ♀ ovig., James Bay, St. Helena, 17 Nov 1964, USNM 125502, 125503.]

ty, Florida, R/V *Hernan Cortez*, 27°31'N, 84°31'W, 136 m, 25 Apr 1981, FSBC I 29931.—1 ♂ (CL = 9.3 mm), 5 ♀ (CL = 7.7–16.7 mm), *Johnson Sea Link*, 25°07'06"N, 77°26'06"W, 143 m, 31 Mar 1981, coll. R. S. Jones, RMNH D.33969; USNM 184577, 204597.—1 ♀ ovig. (CL = 13.2 mm), R/V *Bellows*, Cay Sal Bank, sta 79-13, 281 m, FIU.—7 ♂ (CL = 9.2–13.1 mm), 4 ♀ ovig. (CL = 12.7–14.2 mm), off San Juan, Puerto Rico, 18°30'N, 66°07'W, 90 m, from traps, 30 Aug 1978, coll. C. Boardman, USNM 172101.—1 ♂ (CL = 13.5 mm), 1 ♀ (CL = 14.5 mm), 1 ♀ ovig. (CL = 13.0 mm), off St. James, Barbados, from fish pots, Jan 1976, coll. J. Lewis, USNM 216172.—Eastern Atlantic: 3 ♂ (CL = 8.9–12.4 mm), 3 ♀

(CL = 11.0–13.6 mm), 2 ♀ ovig. (CL = 13.0–15.0 mm), R/V *Geronimo*, Gulf of Guinea, sta 184, 00°30.5'S, 08°43'E, 99 m, 1 Sep 1963, USNM 216173.—1 ♂ (CL = 13.0 mm), 1 ♀ (CL = 7.2 mm), off Congo, R/V *Geronimo*, sta 235, USNM 216174.

Description.—Rostrum (Fig. 1) directed dorsad, far overreaching antennal scale, 2–2.5 times as long as carapace, armed dorsally throughout length with 31–57 fixed teeth including 4–5 on carapace above or posterior to orbital margin, armed ventrally with 28–50 fixed teeth. Orbit sloping ventrally, concave posteriorly, nearly straight dorsally. Antennal spine stronger than pterygostomial spine. Carapace smooth, naked, usually with minute median dorsal tubercle

on posterior sixth; median postrostral ridge extending posteriorly to about midlength of carapace.

Abdomen (Fig. 1) with third somite dorsally rounded, unarmed, without median dorsal carina. Pleura of anterior 3 somites rounded, those of fourth and fifth with acute posterolateral angle. Sixth somite 2–2.5 times as long as fifth, and 2.3–2.7 times as long as maximum height. Telson (Fig. 2D, E) subequal in length to sixth somite, or slightly shorter, with 2–3 pairs (rarely 4) of small movable spines dorsally; posterior process with 4 pairs of movable spines.

Eye (Fig. 3I) subpyriform, ocellus subcircular, in broad contact with cornea. Antennular peduncle (Fig. 3I) extending to about midlength of antennal scale; stylocerite not exceeding distal margin of first antennular segment, terminating in blunt or sharp tip; flagellum greatly exceeding body length. Antennal peduncle's basal segment with lateral ventrodorsal spine; antennal scale (Fig. 3J) slightly exceeding carapace length, mesial margin with long setae, lateral margin with distal spine reaching to distal margin of blade; flagellum greatly exceeding body length.

Mouthparts as illustrated (Figs. 2A, 3A–H). Third maxilliped overreaching antennal scale by length of ultimate segment, or more; basal part with well developed coxal flange, lacking epipod; penultimate segment 1.3–1.6 times as long as ultimate; ultimate segment terminating in 1 or more long spines.

Pereopods (Fig. 1) long, slender, first and second distinctly shorter than others. First pereopod with minute chela (Fig. 2B); propodus with row of short setae on ventral margin proximally, and tufts of setae distally. Second pereopod chelate, reaching to about midlength of carpus of first pereopod; carpus subdivided into 19–31 articles (most frequently 24–28), not always consistent left to right in the same specimen. Third to fifth pereopods similar to each other, each exceeding first pereopods by at least length of propodus; merus with row of 9–17 spines

ventrally; carpus with scattered setae; dactyl short, bifid.

Endopod (Fig. 2F) of first pleopod of male much wider distally than proximally, distal part unevenly convex. Appendix masculina on second pleopod (Fig. 2G) overreaching appendix interna, with long spines on anteromesial and distal margins. Uropod (Fig. 2D) elongate, setose; endopod shorter than exopod; exopod with short setae on lateral margin, and fixed distolateral spine.

Branchial formula:

	maxil- liped			pereopod				
	1	2	3	1	2	3	4	5
Pleurobranchs	–	–	–	1	1	1	1	1
Arthrobranchs	–	–	2	1	1	1	1	–
Podobranchs	–	1	–	–	–	–	–	–
Epipods	1	1	–	–	–	–	–	–
Exopods	1	1	1	–	–	–	–	–

Distribution (Fig. 4).—In the western Atlantic from the Gulf of Mexico and the Bahamas to the Antilles; in the eastern Atlantic from Madeira to off Congo, western Africa. Depth range: 90–400 m.

Coloration.—The following color pattern is based on the specimens (RMNH D.33969; USNM 184577, 204597) collected with the submersible. Body transparently white, streaked longitudinally with very clear, bright red stripes, and with 4 gilded yellow lines dorsally between the darker rays. Two dark red stripes extend longitudinally along the dorsal midline of the carapace and just below it, ending adjacent to the rostral spine and the dorsal margin of the orbit, respectively; 3 lighter stripes curve obliquely downward from the posterior carapace margin, extending to just behind the pterygostomian spine, about midway along the ventral margin of the carapace, and parallel to the posterolateral margin, respectively. This striping continues longitudinally along the abdominal somites. When the specimens were removed from formalin and placed in

70% ethanol, the stripes faded completely within 24 hours. A similar coloration has been described for *Plesionika narval* (as *Parapandalus narval*), by Dieuzeide (1931).

Affinities.—This species is morphologically very similar to *Plesionika narval*. The two can be differentiated however, by the following characters: 1) the third maxilliped in *Plesionika escatilis* lacks an epipod (Fig. 3F, H), whereas an epipod is present in *P. narval* (Fig. 3L, M); and 2) the number of dorsal teeth on the rostrum is fewer in *P. escatilis* (31–57), than in *P. narval* (58–70). *Plesionika escatilis* is also very similar to the Indo-Pacific *P. serratifrons* (Borradaile, 1899). But as Chace (1985) pointed out, the lack of an epipod on the third maxilliped in *P. escatilis* seems to be the only reliable means of separating this species from the Indo-Pacific one.

Ecological observations.—*Plesionika escatilis*, a relatively large deep-water shrimp, grows to about 100 mm total length, and inhabits continental and island shelf areas. It may be associated with rocky areas, as shown by the following observations made from a deep sea submersible in 143 m by Dr. Robert S. Jones. According to him, the shrimp became visible when the submersible light was switched on. At that time a dive was being made at the base of a limestone wall just above a talus slope off Nassau. This type of wall is characteristic of the offshore Bahamian plateau and rises nearly vertically toward the surface; the talus slope at the base drops off quickly toward extremely deep water. The wall itself is excavated with grooves and holes, and supports a varied epizoic and epiphytic community consisting predominantly of sponges and crinoids. The shrimp were standing on a sand covered ledge, and all were observed associated with some form of ledge or undercutting in the rock. The observer's attention was immediately drawn to the shrimp because they were "aligned in ranks, like soldiers, approximately 5–6 per rank in about 10 or so ranks." The

shrimp assemblage exhibited a type of bouncing movement, in unison, which reminded the observer of a behavioral motion seen in harvestmen spiders inside terrestrial caves. It was not possible to determine whether feeding was occurring, or whether the shrimp were aligned toward or away from any water currents. Dr. Jones noted that the striking "candy-cane striping" was very apparent.

Remarks.—The synonymization of Stimpson's *Pandalus escatilis* with *Parapandalus narval* was questioned by Holthuis (1949), Crosnier & Forest (1973), and Chace (1985), all of whom suspected that Stimpson's taxon, although very similar to *Parapandalus narval*, might prove to be a distinct species. Subsequent examination of two of Stimpson's syntypes revealed that they lack an epipod on the third maxilliped, so that this character clearly sets Stimpson's species apart from *P. narval*. Crosnier & Forest (1973:221) eliminated Stimpson's name from the synonymy of *Parapandalus narval* because "l'avant-dernier article des troisièmes maxillipedes est plus court que le dernier" in *P. escatilis*. However, in his description Stimpson (1860:37) only indicated "Maxillipedes externi exognatho instructi; endognatho ei *P. annulicornis* simili" and noted in his final sentence, "A *P. priste* differt in maxillipedibus externis." From this description it is clear that the penultimate segment of the third maxilliped is shorter than the distal one in *Pandalus annulicornis* (= *P. montagui*). Unfortunately, Stimpson did not indicate how the appendages of the two species resembled each other. The measurement of Stimpson's syntypes has shown that the penultimate segment of the third maxilliped is longer than the ultimate, thereby indicating that Crosnier and Forest misinterpreted Stimpson's description. Examination of part of the material reported by them as *Parapandalus narval* from western Africa has shown that it actually represents *Plesionika escatilis*.

Distributional Remarks Fig. 4

This study now clarifies the distribution of *Plesionika escatilis* and *P. narval*: *P. escatilis* is distributed in the eastern and western Atlantic, whereas the numerous reports of *P. narval*, summarized by Holthuis (1980), are only from the eastern Atlantic, Mediterranean, and Red Sea. *Plesionika escatilis* has been confused with *P. narval* on the west coast of Africa; therefore, records of the latter species from the area need to be reexamined. In fact, because *P. narval* has been found in the Atlantic only near oceanic islands (Madeira, Canary Islands, and St. Helena, Fig. 4), it appears that this species is distributed primarily in the Mediterranean. If Balss' (1915) record is correct it also occurs in the Red Sea.

The wide distribution of *P. escatilis* and *P. narval* may be a result of the oceanic dispersal of their pelagic larvae. However, the mode of life of these two species may also be a factor that has contributed to their distribution. Both species have been found living in close association with caves or other cryptic or stygobiont habitats (*P. escatilis*: this study; *P. narval*: Thessalou-Legaki & Hatzinikolaou 1985; Thessalou-Legaki et al. 1986).

In shrimps and other crustacean groups, the cryptic or crevicular way of life has recently been invoked to explain the wide distribution of closely related species in oceanic islands of the Atlantic and Pacific. According to this hypothesis, populations of these crevicular organisms are able to survive adverse ecological conditions by living in caves and crevasses which serve as refugia over long periods of time. The species may have subsequently achieved their present day distribution by means of the spreading of the sea floor (Iliffe et al. 1983, Hart et al. 1985, Manning et al. 1986). In the case of *P. escatilis* and *P. narval*, more information is certainly needed (e.g., degree of dependance on cryptic habitats and dura-

tion of pelagic larval development), before the effect of such hypothetical dispersal mechanism can be evaluated. It is conceivable, however, that the cryptic mode of life, in conjunction with enhanced larval survival of these two species, may have contributed to their present day distribution.

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Literature Cited

- Balss, H. 1915. Die Decapoden des Roten Meeres. I. Macruren. — Denkschriften der Akademie der Wissenschaften, Wien, supplement 91:1–38.
- Chace, F. A., Jr. 1985. The caridean shrimps (Crustacea: Decapoda) of the Albatross Philippine Expedition, 1907–1910, Part 3: Families Thalassocarididae and Pandalidae. — Smithsonian Contributions to Zoology 411:1–143.
- Crosnier, A., & J. Forest. 1973. Les crevettes profondes de l'Atlantique oriental tropical. — Faune Tropicale (O.R.S.T.O.M.) 19:1–409.
- Dieuzeide, R. 1931. Sur la répartition de deux Crustacés des côtes algériennes du genre *Parapandalus*. — Compte Rendu Association Française pour l'Avancement des Sciences, Alger:127–132 (1930).
- Hart, C. W., Jr., R. B. Manning, & T. M. Iliffe. 1985. The fauna of Atlantic marine caves: Evidence

- of dispersal by sea floor spreading while maintaining ties to deep waters.—Proceedings of the Biological Society of Washington 98(1):288–292.
- Holthuis, L. B. 1949. The Caridean Crustacea of the Canary Islands.—Zoologische Mededeelingen, Leiden 30:227–225.
- . 1955. The recent genera of the caridean and stenopodidean shrimps (Class Crustacea, Order Decapoda, Supersection Natantia) with keys for their determination.—Zoologische Verhandlungen, Leiden 26:1–157.
- . 1980. FAO species catalogue. Vol. 1. Shrimps and prawns of the world. An annotated catalogue of species of interest to fisheries.—Food and Agricultural Organization, United Nations, Fisheries Synopsis (125)1:1–271.
- Iliffe, T. M., C. W. Hart, Jr., & R. B. Manning. 1983. Biogeography and the caves of Bermuda.—Nature 302(5904):141–142.
- Lemaitre, R. 1984. Decapod crustaceans from Cay Sal Bank, Bahamas, with notes on their zoogeographic affinities.—Journal of Crustacean Biology 4(3):425–447.
- Man, J. G. de 1920. Families Pasiphaeidae, Stylo-dactylidae, Hoplophoridae, Nematocarcinidae, Thalassocaridae, Pandalidae, Psalidopodidae, Gnatophyllidae, Processidae, Glyphocrangonidae and Crangonidae. The Decapoda of the Siboga Expedition, Part IV.—Siboga-Expeditie, monographie 39a3:1–318.
- Manning, R. B., C. W. Hart, Jr., & T. M. Iliffe. 1986. Mesozoic relicts in marine caves of Bermuda.—Stylogia 2(1/2):156–166.
- Stimpson, W. 1860. Podromus descriptionis animalium evertibratorum, quae in Expeditione ad Oceanum Pacificum Septentrionalem, a Republica Federata missa, (Cadwaladar) Ringgold et Johanne Rodgers Ducibus, observavit et descripsit, Pars VIII: Crustacea Macrura.—Proceedings of the Academy of Natural Sciences of Philadelphia 12:22–47.
- Thessalou-Legaki, M., & S. Hatzinikolaou. 1985. On the occurrence of *Parapandalus narval* (Fabricius, 1787) in the eastern Mediterranean (Greece). III Colloquium Crustacea Decapoda Mediterranea, Barcelona 25–29 March [Abstract].
- Thessalou-Legaki, M., A. Frantzis, K. Nassiokas, & S. Hatzinikolaou. 1986. Observations on *Parapandalus narval* (Fabricius, 1787) (Crustacea, Decapoda, Pandalidae) from Rhodos Island (Greece).—Rapport et Procès-Verbaux des Réunions Commission Internationale pour l'Exploration Scientifique de la Mer Méditerranée, Monaco 30(2):13.

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