

auth

REEXAMINATION OF THE MATERIAL OF *MUNIDA*  
LEACH (CRUSTACEA: ANOMURA: GALATHEIDAE)  
COLLECTED BY THE H.M.S. *CHALLENGER*  
(1872-1876) ALONG THE BRAZILIAN COAST

Gustavo Augusto S. de Melo-Filho and Gustavo Augusto S. de Melo

*Abstract.* — The material of the genus *Munida* collected by the H.M.S. *Challenger* along the Brazilian coast during its voyage of circumnavigation (1872-1876) is reexamined. Two species: *Munida sanctipauli* Henderson and *M. spinifrons* Henderson are redescribed. Part of the material of *M. stimpsoni* A. Milne Edwards collected at station 122 is in reality *M. flinti* Benedict, and specimens from the same station previously reported as *M. miles* Henderson are actually *M. forceps* A. Milne Edwards, *M. constricta* A. Milne Edwards and *M. valida* Smith. *Munida miles* and *M. stimpsoni* are not presently thought to occur off the Brazilian coast; and *M. flinti*, *M. forceps*, *M. constricta* and *M. valida* are reported for the first time from this area.

H.M.S. *Challenger* departed from Sheerness (England) on 7 December 1872, returning on 26 May 1876. During this period, on a voyage of circumnavigation, it traveled 68,890 nautical miles, establishing 362 collecting stations. The importance of this expedition was expressed by Marshall (1954): "After the world voyage of H.M.S. *Challenger*, the scientific study of the seas was given the name of Oceanography and deep-sea biology in the modern sense was firmly founded."

Among the Galatheididae of the *Challenger* collection, the genus *Munida* is prominent, with a large number of species. Although preferentially archibenthonic (Ekman 1953), this group may also be encountered in relatively shallow waters. Species of this broadly distributed genus were collected by the *Challenger* at 26 stations at depths varying from 18 to 1080 m. This material is deposited at The Natural History Museum, London (BMNH).

Along the Brazilian coast, several specimens of *Munida* were collected at Saint Paul's Rocks (St. 109, according to Saint

Laurent & Macpherson 1988), Fernando de Noronha (St. 113 A), and "off Pernambuco" (St. 122). The co-ordinates 09°05'S, 34°50'W, given by Henderson (1888) for station 122 as off Pernambuco, actually correspond to Alagoas. These specimens were compared with the type material collected from the U.S. Coast Survey Steamer *Blake* (1877-1879), deposited at the Museum of Comparative Zoology, Harvard (MCZ) and the Muséum national d'Histoire naturelle, Paris (MNHN), as well as with the type material collected from the U.S. Fish Commission Steamer *Albatross* (1883), deposited at the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM).

The determinations made by Henderson (1888) for the specimens from station 122 (off Alagoas) were questioned by various authors (A. Milne Edwards & Bouvier 1894a, 1897; Faxon 1895; Benedict 1902; Chace 1942; Williams 1984). This material is reexamined in the present work.

The morphological description of the sternites follows the nomenclature of Zari-

quiey Alvarez (1952). All the specimens described, measured and figured are from the *Challenger* Expedition series.

*Munida sanctipauli* Henderson, 1885

Figs. 1-7

*Munida sancti-pauli* Henderson, 1885:411; 1888:142, pl. 3, fig. 6, 6a, b.—A. Milne Edwards & Bouvier, 1894a:256.—Benedict, 1902:251.—Chace, 1942:38.—Zariquiey Alvarez, 1952:156.—Pequegnat & Pequegnat, 1970:127.

*Munida Sancti-pauli*.—A. Milne Edwards & Bouvier, 1894b:85, pl. 8, figs. 11-23; 1899:74; 1900:293, pl. 6, fig. 8, pl. 29, figs. 19-21.—Bouvier, 1922:44, pl. 4, figs. 12-13.

*Munida sanctipauli*.—Holthuis et al., 1980:37.—Abele & Kim, 1986:36, figs. C-D.—Saint Laurent & Macpherson, 1988:109, text-figs. 2b, d; 3b, c, e, k-o.

*Munida stimpsoni*.—A. Milne Edwards, 1880:47 (part.).—A. Milne Edwards & Bouvier, 1897:48 (part.).

*Munida miles*.—Chace, 1942:37 (part.).

Non *Munida sancti-pauli*.—Stebbing, 1902:30; 1910:364 (= *M. benguela* Saint Laurent & Macpherson, 1988).—Barnard, 1950:489, fig. 92b (= *M. benguela* Saint Laurent & Macpherson, 1988).

Non *Munida sanctipauli*.—Kensley, 1981:34 (= *M. benguela* Saint Laurent & Macpherson, 1988).

*Material examined*.—*Challenger* St. 109 (according to Saint Laurent & Macpherson 1988); 00°55'38"N, 29°22'33"W; off Saint Paul's Rocks; 29 Aug 1873; 18-108 m; 1 young male (lectotype), 1 ovig. female (paralectotype), BMNH 1888:33.

*Description* (based on male lectotype).—Small specimen. Carapace with slightly arched margins. Outer orbital spine on antero-lateral angle, followed by 6 strong lateral spines, decreasing gradually in size; first of these situated on posterior part of hepatic border. Gastric area with transverse row of spines on epigastric region, including 1 small

pair medial to largest pair. One para-hepatic spine on each side. Anterior branchial areas each with 1 spine. Remainder of carapace unarmed. Transverse lines few, well defined, with granulose margins.

Rostrum markedly descendant. Supra-ocular spines ascendant, subparallel and long, reaching distal margin of cornea.

Eyes with corneas wider than peduncles.

Second abdominal tergite with row of 9 spines on anterior margin. Remaining tergites unarmed.

Antennular peduncle with outer terminal spine longer than inner terminal spine. Outer lateral margin with 2 spines, distal spine much longer.

Peduncle of antenna with 1 inner spine on first (basal) segment; 1 long inner spine and another short outer spine on second segment. Remaining segments unarmed.

Third maxilliped with merus bearing 2 strong spines on ventral margin, and additional tubercle between them.

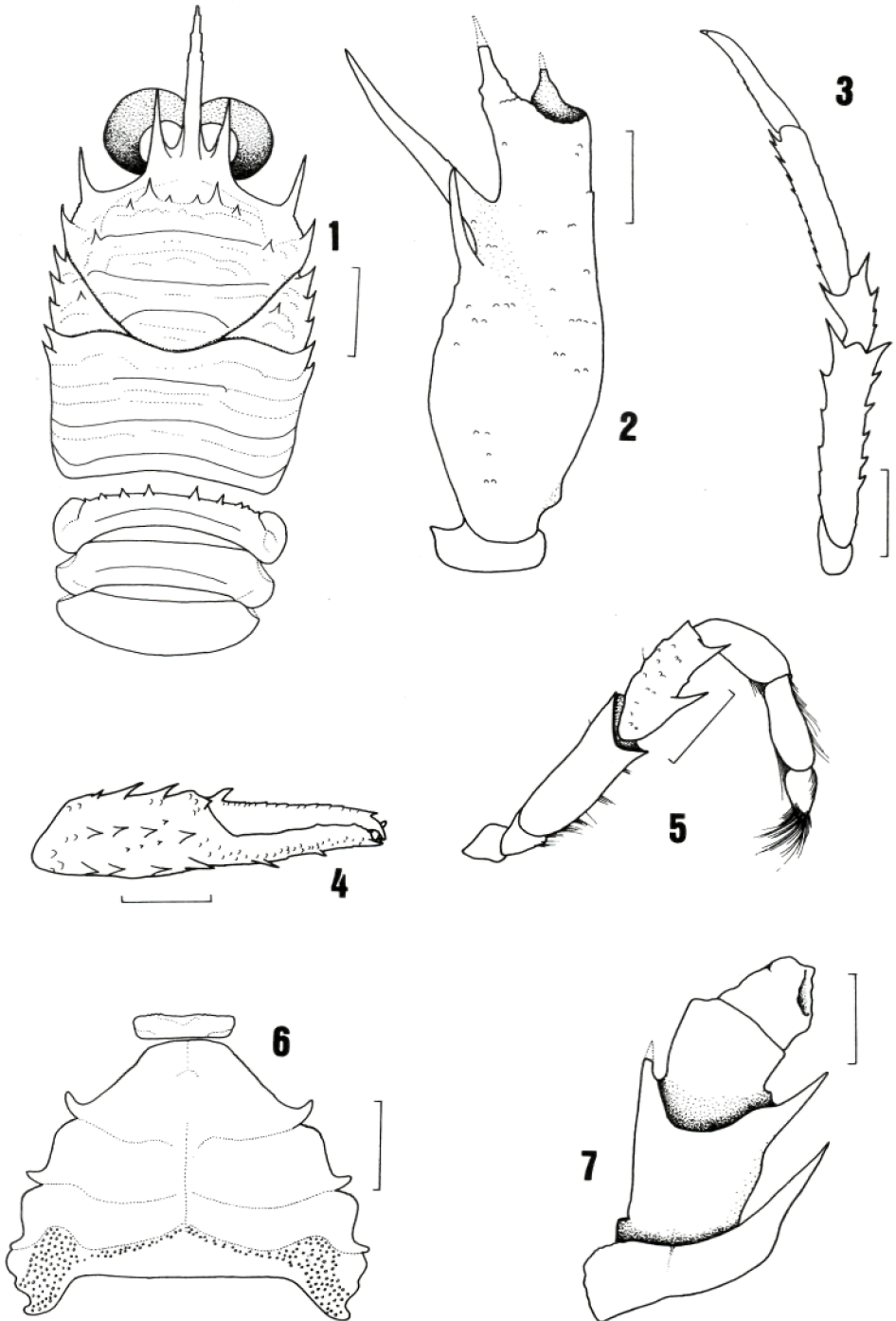
Chelipeds similar in form and size, strong, short, and spinous. Fingers without hiatus, little longer than palm.

Sternum unarmed. Sternite of third ambulatory leg strongly granulate. Sternal sulci thin, shallow, apparently naked.

*Measurements in mm*.—Male lectotype: Length of carapace + rostrum 10.2; carapace breadth 5.4; rostrum length 3.3; length of supra-ocular spines 1.4; cornea diameter 1.7; right cheliped: length 16.6, palm length 3.9, palm height 1.9, length of dactyl and fixed finger 4.2; left cheliped: length 16.8, palm length 3.6, palm height 1.6, length of dactyl and fixed finger 4.2.

Female paralectotype: Carapace length 9.8 (rostrum broken); carapace breadth 8.2; length of supra-ocular spines 1.7; cornea diameter 2.5; left cheliped: length 25.5, palm length 5.4, palm height 2.3, length of dactyl and fixed finger 6.2.

*Distribution*.—Western Atlantic: Florida, Antilles, and Brazil. Eastern Atlantic: Azores, Canaries and Moroccan coast. Commonly occurs at depths of 400-900 m;



Figs. 1-7. *Munida sanctipauli* Henderson. Lectotype male: 1, carapace and abdominal somites 2-4, dorsal view; 2, right antennular peduncle; 3, ambulatory leg; 4, right chela, dorsal view; 5, right third maxilliped; 6, sternum; 7, right antennal peduncle. Scales equal: 0.5 mm (2, 7), 1.0 mm (5, 6), 2.0 mm (1, 3, 4).

the type locality is unusually shallow (18–108 m).

*Remarks.*—Henderson (1888) did not specify the station number at which *M. sanctipauli* was collected, but according to Saint Laurent & Macpherson (1988), it was station 109. These authors designated as lectotype the male specimen collected at Saint Paul's Rocks; however, the specimen figured by Saint Laurent & Macpherson (figs. 2b, d; 3b, c, e, k–o) was the paralectotype ovigerous female from that same station. This specimen, besides having the rostrum broken, differs from the male lectotype by its larger size, by possessing two spines on each anterior branchial area, as well as one post-cervical spine on each side of the carapace.

*Munida sanctipauli* is very similar to *M. benguela* Saint Laurent & Macpherson. A good comparative study can be found in Saint Laurent & Macpherson (1988). Other similar species are: *M. constricta* A. Milne Edwards, *M. miles* Henderson, *M. valida* Smith and *M. microphthalma* A. Milne Edwards. *M. sanctipauli* differs from the first three of these species by its abdominal armature (*M. miles* with second and third tergites armed; *M. constricta* and *M. valida* with second, third and fourth tergites armed), and by the well developed form of the lateral row of spines of the carapace. Comparison of the lectotypes and paralectotypes of *M. sanctipauli* with one of the syntypes of *M. microphthalma* (Blake St. 35, ovig. female, MNHN Ga 960) revealed a remarkable similarity between these two species, however, the characteristically small cornea of *M. microphthalma* immediately differentiates it from *M. sanctipauli*.

The specimen collected by the *Blake* (St. 215, ovig. female, syntype of *M. stimpsoni*) determined by Chace (1942) as *M. miles*, is in reality *M. sanctipauli*.

In spite of having been first found in Brazilian waters by Henderson (1888), *M. sanctipauli* has not since been reported from this region of the Atlantic.

*Munida spinifrons* Henderson, 1885

Figs. 8–14

*Munida spinifrons* Henderson, 1885:412; 1888:144, pl. 15, figs. 1, 1a, b.—A. Milne Edwards & Bouvier, 1894a:256.—Moreira, 1901:21 and 83.—Pequegnat & Pequegnat, 1970:127.—Coelho & Ramos, 1972:171 (part.).—Abele & Kim, 1986: 36, fig. a:401.—Baba & Camp, 1988:414, fig. 1a, d–e, g, i–j, m–n.

*Material examined.*—*Challenger* St. 113A; 03°47'00"S, 32°24'30"W; Fernando de Noronha; 2 Sep 1873; 13–46 m; ovig. female holotype, BMNH 1888:33.

*Description* (based on female holotype).—Small specimen. Carapace strongly convex, with arched margins. Anterior margin strongly oblique. Outer orbital spine followed by 6 smaller spines. Epigastric row composed of 6 spines. One para-hepatic spine on each side of carapace. Anterior branchial region each with 1 spine. Remainder of carapace unarmed. Transverse lines well spaced and marked.

Rostrum long, ascendant, strongly sinuous, with distinct spines and spinules on margin. Supra-ocular spines subparallel and short, reaching only distal part of ocular peduncle. Eyes not much wider than peduncles.

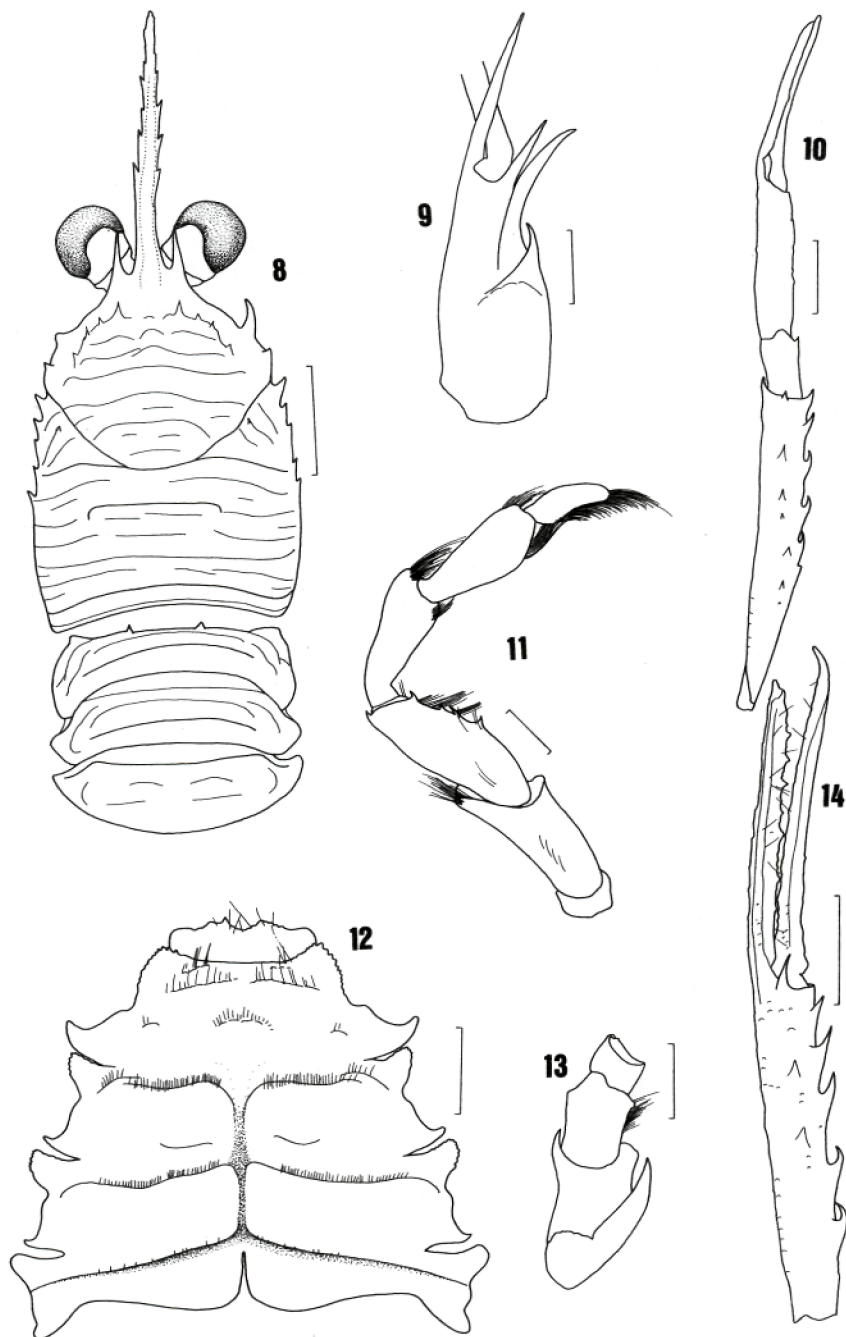
Second abdominal tergite armed with 1 pair of median spinules (0-2-0). Remaining tergites unarmed.

Antennular peduncle with inner terminal spine much longer than outer terminal spine. Outer margin with 2 spines, distal spine longer.

Antennal peduncle with inner border of first segment tapered and armed with 1 terminal spine. Second segment with 1 outer distal spine. Remaining segments unarmed.

Third maxilliped with 4 spines on ventral face and 1 terminal spine on dorsal border of merus.

Chelipeds unequal, right cheliped more robust, length of fingers similar to that of palm and with weakly developed denticles



Figs. 8-14. *Munida spinifrons* Henderson. Holotype ovigerous female: 8, carapace and abdominal somites 2-4, dorsal view; 9, left antennular peduncle; 10, left cheliped; 11, left third maxilliped; 12, sternum; 13, right antennular peduncle; 14, right cheliped. Scales equal: 0.5 mm (9, 11, 13), 1.0 mm (12), 2.0 mm (8, 10, 14).

on cutting faces. Left cheliped with fingers longer than palm, curved inward, lacking denticles on cutting face which appears only crenulate. Both chelae without hiatus.

Sternum with spinules on upper face of sternite of maxilliped and on anterior margins of sternite of cheliped. Sternal surface smooth.

*Measurements in mm.*—Holotype, ovig. female: length of carapace + rostrum 10.9; carapace breadth 4.9; rostrum length 4.8; length of supra-ocular spines 0.8; cornea diameter 1.4; right cheliped: palm length 6.1, length of dactyl and fixed finger 6.2, palm height 1.2; left cheliped: length 20.1, palm length 3.9, palm height 1.0, length of dactyl and fixed finger 5.3.

*Distribution.*—Western Atlantic: Florida and Brazil (from Ceará to Rio Grande do Norte, Fernando de Noronha and Rocas). Depth 13–91 m.

*Remarks.*—*Munida spinifrons* is very similar to *M. pusilla* Benedict and *M. angulata* Benedict. According to Baba & Camp (1988), *M. spinifrons* is distinguished from *M. pusilla* by having the rostrum relatively longer and with more accentuated lateral spinulation, the post-cervical spines absent, the merus of third maxilliped with 3–4 ventral spines, as well as the fingers equal to or longer than the palm. In contrast, *M. angulata* has the rostrum shorter and without lateral spinulation, besides having 1 spine on the ventral face of the antennular peduncle near the outer margin, such a spine being absent in *M. spinifrons*.

The statement of Henderson (1888) that *M. spinifrons* has 5 segments on the antennal peduncle is inaccurate. Four segments occur in species of the genus.

In spite of A. Milne Edwards & Bouvier (1897) having compared this species with *M. iris*, there is no similarity between the two.

*Munida flinti* Benedict, 1902  
Figs. 15–16

*Munida flinti* Benedict, 1902:258, text-fig. 9.—Chace, 1942:57.—Pequegnat & Pe-

quegnat, 1970:130.—Takeda & Okutani, 1983:87, text-fig. (color).

*Munida Stimpsoni.*—A. Milne Edwards, 1880:47 (part.).—A. Milne Edwards & Bouvier, 1897:48 (part.), pl. 4, fig. 1.

*Munida stimpsoni.*—Henderson, 1888:126, pl. 14, fig. 1a–b.—Moreira, 1901:21 and 83.—Coelho & Ramos, 1972:172.—Coelho, Ramos & Melo, 1989:25.

*Material examined.*—*Challenger* St. 122; 09°05'S, 34°50'W; off Alagoas; 10 Sep 1873; 630 m; 1 male, BMNH 1888:33. (Determined by Henderson as *M. stimpsoni*.)

*Description.*—Carapace with arched margins. Outer orbital spine followed by 4 small lateral spines. Gastric area with 2 pairs of spines behind supra-oculars: 1 well-developed epigastric pair, and another smaller protogastric pair. One para-hepatic spine on each side of carapace, forming hexagon with preceding spines. Anterior hepatic and branchial areas unarmed. One spine on meso-cardiac sulcus. Posterior margin of carapace with 1 pair of spines. Remainder of carapace unarmed. Transverse lines continuous, indistinct and with regularly spaced cilia.

Rostrum ascendant. Supra-ocular spines subparallel and ascendant, of medium length, reaching middle of cornea.

Eyes with corneas distinctly wider than peduncles.

Second and third abdominal tergites armed respectively with 6 (2-2-2) and 4 (1-2-1) spines on anterior margin. Fourth tergite with 2 (0-2-0) spines on anterior margin and 1 (0-1-0) on posterior margin, forming a triangle with anterior spines.

Antennular peduncle with 1 inner terminal spine little longer than outer spine. Lateral margin with 2 spines of average development. Distal part of peduncle relatively short.

Peduncle of antenna with small outer distal spine on segment 2. Remaining segments unarmed.

Third maxilliped with strong spine at middle of ventral margin.

Right cheliped long, tapered. Fingers

without hiatus, shorter than palm. Left cheliped missing.

Sternum unarmed. Anterior lateral margins of sternites crenulate. Surface of sternites adorned with crescentiform crenulations. Sternal sulci shallow, with short cilia.

*Measurements in mm.*—Length of carapace + rostrum 16.0; carapace breadth 10.2; rostrum length 4.8; supra-ocular spines length 2.3; cornea diameter 3.2; right cheliped: length 67.7, palm length 17.5, palm height 2.0, length of dactyl and fixed finger 12.4.

*Distribution.*—Western Atlantic: Gulf of Mexico, Antilles, Guianas and Brazil. Depths 108–220 m. The depth of 630 m of *Challenger* St. 122 is exceptionally great for this species.

*Remarks.*—The specimen collected by the *Challenger* and determined by Henderson (1888) as *M. stimpsoni* is in reality *M. flinti*; however, it differs from the holotype of the latter (USNM 9778) by having longer supra-ocular spines, more developed outer lateral spines of the antennular peduncle, and the entire sternal surface with crenulations. Nevertheless, examination of the specimens of *M. flinti* (syntypes of *M. stimpsoni*) collected by the *Blake* indicates that these characters are variable. Preliminary results of a study in progress (Melo-Filho & Melo, in prep.) of variations in *M. flinti* show that besides the characters mentioned, others commonly utilized to separate *M. flinti* from similar species, as for example the spinulation of the abdominal tergites (Pequegnat & Pequegnat 1970), are inadequate.

*Munida flinti* is very similar to *M. stimpsoni* A. Milne Edwards, *M. benedicti* Chace, and *M. striata* Chace, all species which apparently do not occur along the Brazilian coast. Thus, records of *M. stimpsoni* for Brazilian waters (Henderson 1888, Moreira 1901, Coelho & Ramos 1972, Coelho, Ramos & Melo 1989) actually represent variations of *M. flinti*.

*Munida constricta* A. Milne Edwards, 1880  
Fig. 17

*Munida constricta* A. Milne Edwards, 1880: 52.—A. Milne Edwards & Bouvier, 1894a: 256; 1897:40, pl. 3, fig. 5.—Benedict, 1902:307.—Chace, 1942:34, text-fig. 14.—Pequegnat & Pequegnat, 1970:127.

*Munida miles.*—Henderson, 1888:126 (part.).—Moreira, 1901:21 and 83 (part.).

*Material examined.*—*Challenger* St. 122; 09°05'S, 34°50'W; off Alagoas; 10 Sep 1873; 630 m; 2 males, 1 female; BMNH 1888:33. (Determined by Henderson as *M. miles*.)

*Description* (based on larger male).—Carapace margins parallel. Outer orbital spine on antero-lateral angle of carapace, followed by 6 smaller spines. Gastric area with transverse row of epigastric spines, including 1 pair of small spines medially to larger pair. Two para-hepatic spines on each side of carapace. Hepatic area with few spinules. One small post-cervical spine on each side. Remainder of carapace unarmed. Transverse lines numerous, distinct.

Rostrum ascendant. Supra-ocular spines divergent and ascendant, reaching middle of cornea.

Eyes with corneas wider than peduncles.

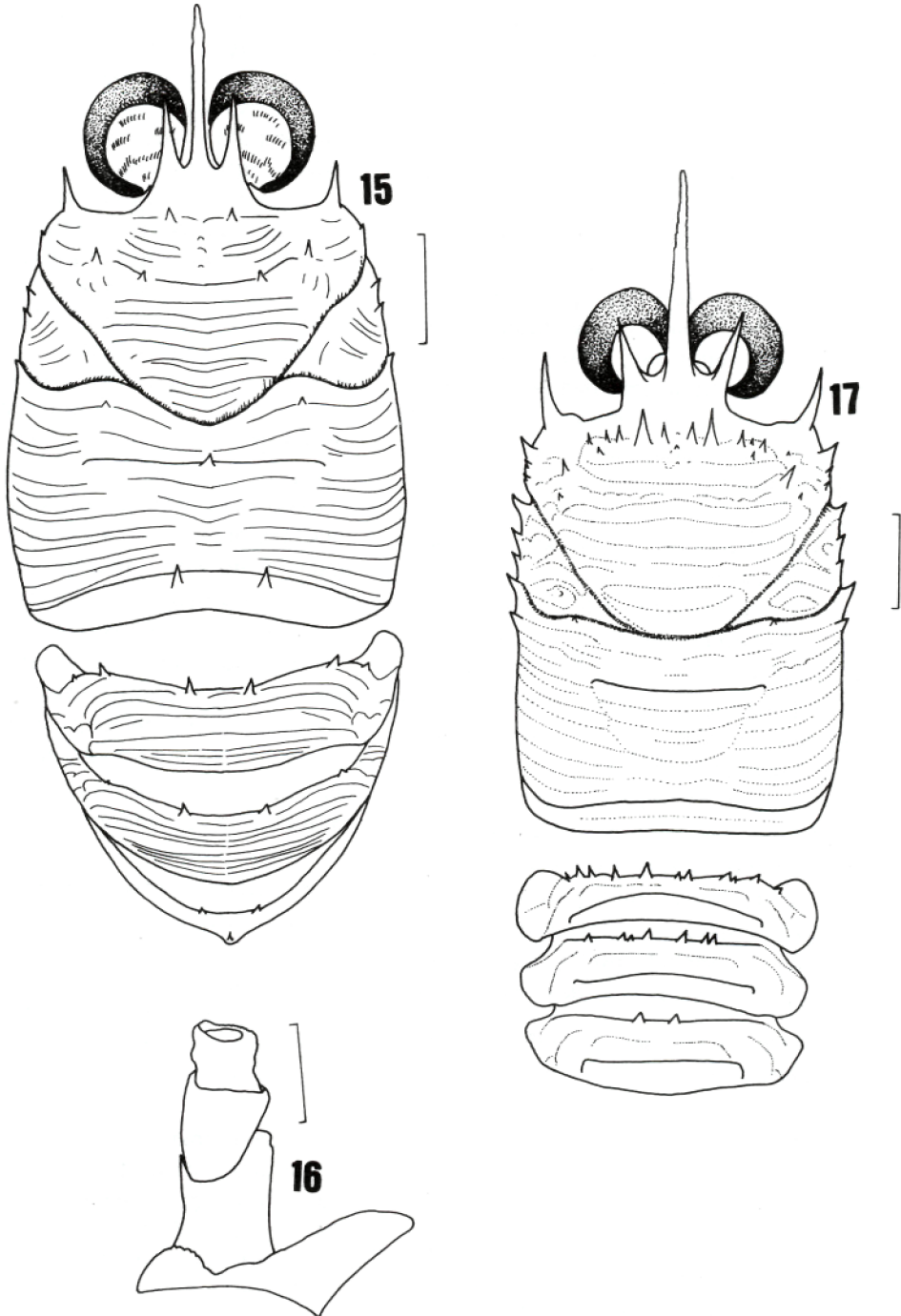
Second, third and fourth abdominal tergites armed with 11, 7 and 2 spines respectively.

Antennular peduncle with outer terminal spine slightly larger than inner terminal spine. Lateral margin with 1 long proximal spine and another very long dorsolateral spine.

Antennal peduncle with inner terminal spine on first segment (basis); second segment with 2 terminal spines, inner spine longer than outer spine.

Third maxilliped with 2 spines on ventral face of merus, distal spine smaller.

Chelipeds similar in form and size, strong, short and spinous. Chelae each with discrete proximal hiatus.



Figs. 15-17. 15-16. *Munida flinti* Benedict. Male: 15, carapace and abdominal somites 2-4, dorsal view; 16, right antennal peduncle; 17. *Munida constricta* A. Milne Edwards. Larger male: carapace and abdominal somites 2-4, dorsal view. Scales equal: 1.0 mm (16), 3.0 mm (15), 4.0 mm (17).



Sternum smooth, unarmed. Sternal sulci large, with cilia barely visible.

*Measurements in mm.*—Male: Length of carapace + rostrum 24.3; carapace breadth 12.0; rostrum length 7.5; supra-ocular spines length 2.3; cornea diameter 4.0; right cheliped: length 66.5, palm length 15.2, length of dactyl and fixed finger 13.2, palm height 5.9; left cheliped: length 63.5, palm length 14.9, length of dactyl and fixed finger 12.9, palm height 5.9.

Male: Length of carapace + rostrum 24.0; rostrum length 7.5; carapace breadth 11.6.

Female: Length of carapace + rostrum 18.0; rostrum length 5.9; carapace breadth 8.5.

*Distribution.*—Western Atlantic: Cuba, Lesser Antilles and Brazil. Depth: 227–835 m.

*Remarks.*—The larger male examined (24.3 mm carapace + rostrum length), has more spines on the second and third abdominal tergites than the other two specimens (a male with 10 and 2 spines, and a female with 10 and 5 spines, respectively). The female differs also by having fewer lines on the carapace and by lacking post-cervical spines and a proximal hiatus on the chela. These characteristics make the female specimen practically identical to the syntype of *M. constricta* from Blake St. 221 (MNH Ga 534), which, however, has sub-parallel supra-ocular spines.

*Munida constricta* and *M. miles* are very similar, but, in spite of the uncertainty as to the validity of these two taxa expressed by A. Milne Edwards & Bouvier (1897:41), we are of the opinion that they are distinct. Comparison of the syntypes of both species corroborates the opinion of Chace (1942:37) that the most important differences are in the form of the carapace (arched in *M. miles*, and with parallel margins in *M. constricta*), and in the presence of spines on the fourth abdominal tergite of *M. constricta* (invariably absent in *M. miles*).

*Munida forceps* A. Milne Edwards, 1880  
Figs. 18–24

*Munida forceps* A. Milne Edwards, 1880: 49.—A. Milne Edwards & Bouvier, 1894a: 256; 1897:28, pl. 2, fig. 8.—Benedict, 1902:307.—Chace, 1942:39, text-fig. 15.—Pequegnat & Pequegnat, 1970:131, text-fig. 5-2.—Laird et al., 1976:462.—Wenner, 1982:361.—Takeda & Okutani, 1983:88, text-fig. (color).—Abele & Kim, 1986:35, fig. a:403.

*Munida miles.*—Henderson, 1888:126 (part.).—Moreira, 1901:21 and 83 (part.).

*Material examined.*—*Challenger* St. 122; 09°05'S, 34°50'W; off Alagoas; 10 Sep 1873; 630 m; 1 ovig. female; BMNH 1988:33. (Determined by Henderson as *M. miles*.)

*Description.*—Carapace margins slightly arched. Outer orbital spine on antero-lateral angle of carapace, followed by 5 smaller spines. Gastric area with epigastric row of strong spines. One para-hepatic spine. Anterior branchial regions each with 1 spine. One strong post-cervical spine on each side. Remainder of carapace unarmed. Transverse lines well spaced, distinct.

Rostrum ascendant. Supra-ocular spines subparallel, ascendant and short, not reaching cornea.

Eyes with cornea wider than peduncles.

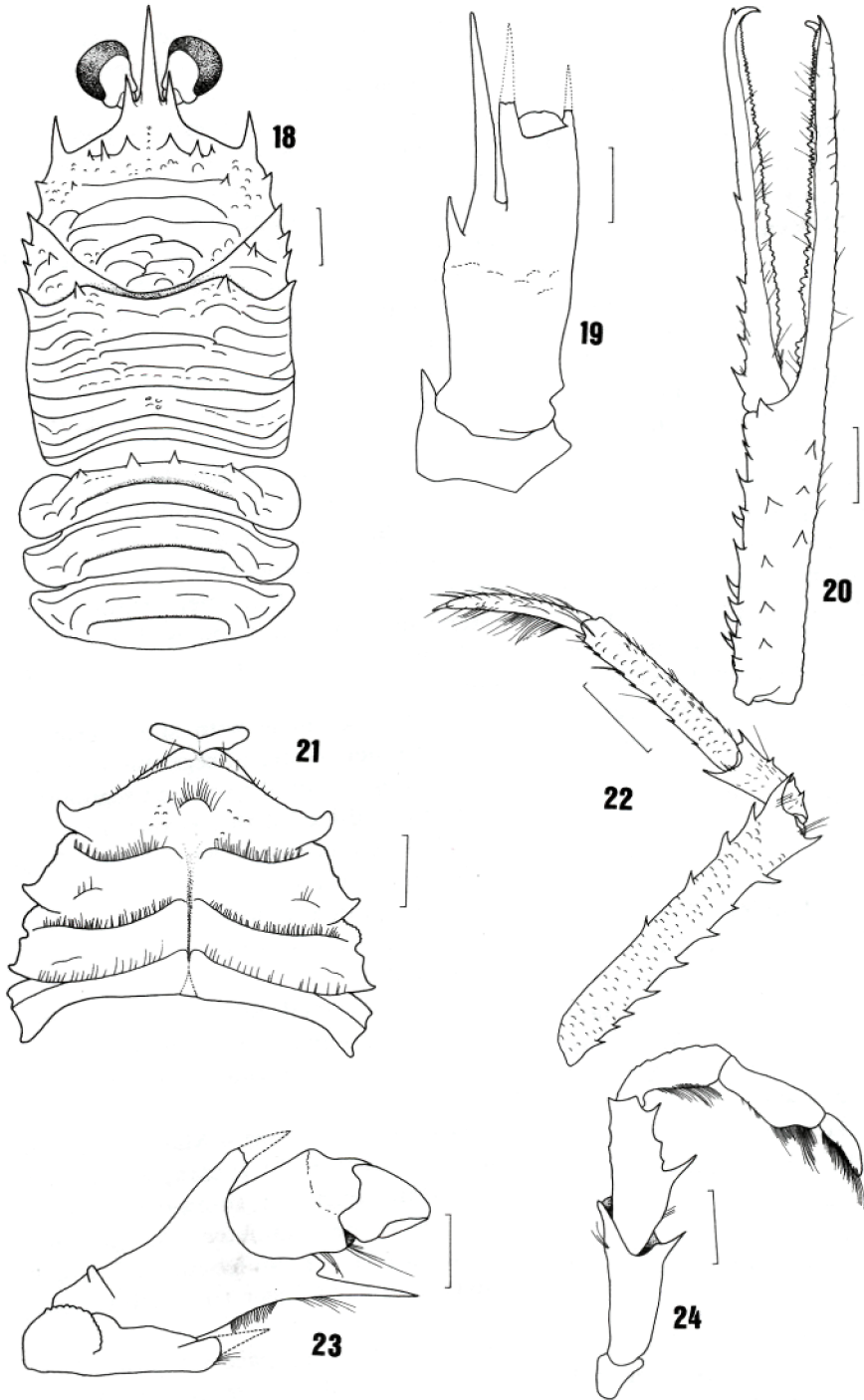
Second abdominal tergite armed with 4 spines (1-2-1); remaining tergites unarmed.

Antennular peduncle with outer terminal spine much longer than inner spine. Outer lateral margin with 1 medium-sized proximal spine and 1 very long distal spine.

Antennal peduncle with strong inner terminal spine on first segment (basis); second segment with 2 strong spines, inner spine slightly longer than outer spine; remaining segments unarmed.

Third maxilliped with 2 spines, in addition to several intercalary tubercles on ventral border of merus.

Right cheliped detached, ischium and



**Figs. 18–24.** *Munida forceps* A. Milne Edwards. Ovigerous female: 18, carapace and abdominal somites 2–4, dorsal view; 19, right antennular peduncle; 20, right chela, dorsal view; 21, sternum; 22, ambulatory leg; 23, right antennal peduncle; 24, right third maxilliped. Scales equal: 1.0 mm (19, 23), 2.0 mm (21, 24), 3.0 mm (18), 4.0 mm (20), 5.0 mm (22).

merus missing. Chela characteristically long and very stout.

Ambulatory legs 3 and 4 with coxae distinctly granulate.

Sternum smooth, unarmed. Sternal sulci deep medially, with dense ciliation.

*Measurements in mm.*—Length of carapace + rostrum 22.6; carapace breadth 14.0; rostrum length 5.1; supra-ocular spines length 1.9; cornea diameter 3.4; right cheliped: palm length 15.5, length of dactyl and fixed finger 20.2.

*Distribution.*—Western Atlantic: Virginia, Florida, Gulf of Mexico, Antilles, Guianas and Brazil. Depth: 80–325 m.

*Remarks.*—The *Challenger* specimen differs from a female reported by Chace (1942: 39, fig. 15b) in having two strong spines (instead of one) on the ventral margin of the merus of the third maxilliped. The form of the chelipeds, the somewhat small corneas, as well as the distinctly granulate coxae of the third and fourth ambulatory legs, are important characteristics of this species.

*Munida valida* Smith, 1883

Figs. 25–31

*Munida valida* Smith, 1883:42, pl. 1.—A.

Milne Edwards & Bouvier, 1894a:256.—

Benedict, 1902:252.—Chace, 1942:32.—

Pequegnat & Pequegnat, 1970:137.—

Wenner, 1982:365.—Takeda & Okutani,

1983:91, text-fig. (color).—Williams,

1984:237, text-fig. 172–173.—Abele &

Kim, 1986:36, fig. e:400.

*Munida miles.*—Henderson, 1888:126

(part.).—Moreira, 1902:21 and 83 (part.).

*Material examined.*—*Challenger* St. 122; 09°05'S, 34°50'W; off Alagoas; 10 Sep 1873; 2 males and 1 female; BMNH 1888:33. (Determined by Henderson as *M. miles*.)

*Description* (based on smaller male).—Carapace margins subparallel. Outer orbital spine anterior to antero-lateral angle, followed by 6 smaller spines. Gastric area with 2 pairs of spines aligned with supra-oculars: epigastric pair more developed than pro-

togastric pair. On each side of carapace, 1 barely visible spine forming hexagon with 2 preceding pairs, beside 1 para-hepatic spine aligned with protogastric pair. Anterior hepatic and branchial areas covered with tubercles and spines. One post-cervical spine on each side of carapace. Remainder of carapace unarmed. Transverse lines strongly crenulate, with numerous discontinuous lines, contrasting with some distinct continuous lines.

Rostrum descendant. Supra-ocular spines divergent, ascendant and very long, reaching past cornea.

Eyes with corneas wider than peduncles.

Second and third abdominal tergites armed with 9 and 4 spines respectively.

Antennular peduncle with outer terminal spine much longer than inner terminal spine. Lateral margin with 2 spines: 1 long proximal spine and another, even longer distal spine.

Antennal peduncle with short terminal spine on inner border of segment 1 (basis), and 2 strong terminal spines on segment 2.

Third maxilliped with 2 strong spines on ventral margin of merus, with few small tubercles between them.

Cheliped similar in form and size: strong, relatively short and spinous, with fingers lacking hiatus.

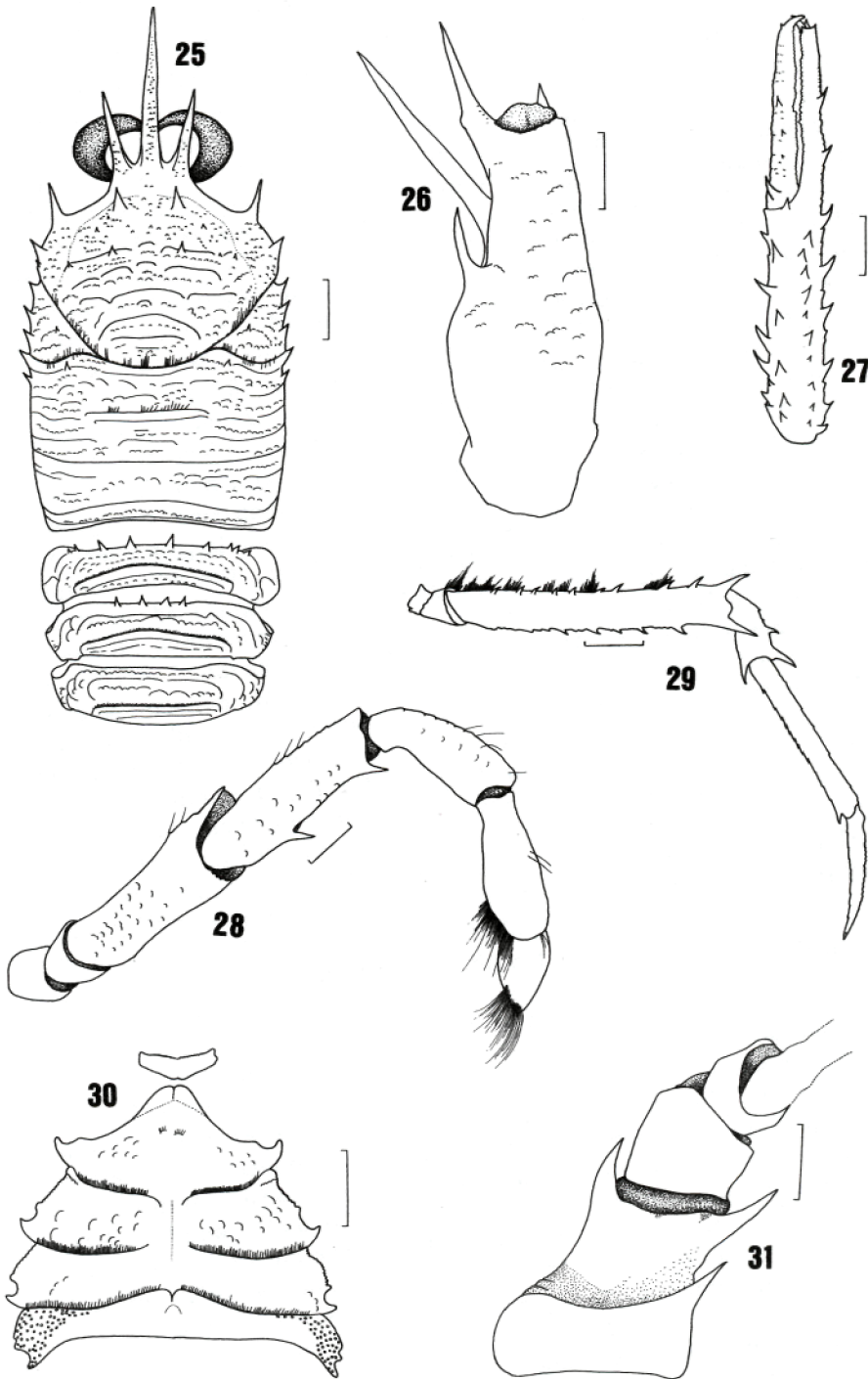
Sternum unarmed. Sternite of third ambulatory leg granulate, remaining sternites smooth. Sternal sulci wide, deep and densely ciliate.

*Measurements in mm.*—Male: Length of carapace + rostrum 25.1; carapace breadth 12.9; rostrum length 7.1; supra-ocular spines length 3.4; cornea diameter 3.9; right cheliped: length 51.4, palm length 12.7, length of dactyl and fixed finger 10.0, palm height 3.1.

Male: Length of carapace + rostrum 37.8; carapace breadth 19.5; rostrum length 10.5.

Female: Length of carapace + rostrum 21.2; carapace breadth 10.3; rostrum length 6.6.

*Distribution.*—Western Atlantic: north-



Figs. 25–31. *Munida valida* Smith. Smaller male: 25, carapace and abdominal somites 2–4, dorsal view; 26, right antennular peduncle; 27, right chela; 28, right third maxilliped; 29, ambulatory leg; 30, sternum; 31, right antennal peduncle. Scales equal: 1.0 mm (26, 28, 31), 2.0 mm (30), 3.0 mm (25, 27, 29).

eastern United States, Florida, Gulf of Mexico, Antilles, Guianas, northern South America and Brazil. Depth: 90–1823 m. According to Williams (1984), adult specimens have been collected at 0–9 m in the water column over water 384–402 m deep.

*Remarks.* — The larger male examined and the female differ very slightly from the specimen of *M. valida* described. These differences consist in the number of spines on the second and third abdominal tergites and in the length of supra-oculars, which do not extend past the cornea. Comparison of the *Challenger* specimens of *M. valida* with specimens of *M. miles* collected by the *Blake* (MNHN Ga 545 and 546) verified the practically unanimous opinion that these species are distinct (Benedict 1902, Chace 1942, Williams 1984). *Munida valida* is a much larger species, with longer and more divergent supra-oculars, lacking an epigastric spine row (always present in *M. miles*), and with post-cervical spines (absent in *M. miles*). In addition, the ornamentation of the carapace in *M. miles* differs in the more continuous, less distinct lines and in having a smoother surface.

Apparently *M. valida* is not morphologically very variable, an uncommon situation in the genus. All the specimens studied agree with the description of Smith (1883).

### Discussion

The taxonomic complexity of the genus *Munida* derives chiefly from the high degree of morphological variation shown by many of its species (Zariquiey Alvarez 1952). This characteristic renders the dividing lines between many similar species fragile. The tendency to gregariousness and syntopy (relatively large populations of several species frequently are found in the same locality), makes it difficult to identify specimens correctly. For this reason, availability of type material is often critical. Characters fixed for a particular group of species can vary in

other groups. Thus, the use of such characters in identification keys renders these keys unreliable. The older, original descriptions tend to be vague and generally based on extensive syntype series. It is therefore not surprising that Henderson mistakenly identified the numerous specimens from station 122. His opinion (Henderson 1888: 126) that *M. valida* was synonymous with *M. miles*, was certainly conditioned by the brevity of the initial description of the latter species (A. Milne Edwards 1880), which was described in detail only later by A. Milne Edwards & Bouvier (1897).

The study of the *Munida* material from the *Challenger*, *Blake*, *Albatross* and *Atlantis*, as well as abundant material collected recently off the Brazilian coast, strongly suggests the presence of four large species-complexes in the Atlantic: the *miles* complex (*Munida miles*, *M. benguela*, *M. constricta*, *M. forceps*, *M. microphthalma*, *M. sanctipauli* and *M. valida*); the *spinifrons* complex (*Munida spinifrons*, *M. angulata* and *M. pusilla*); the *stimpsoni* complex (*Munida stimpsoni*, *M. benedicti*, *M. flinti* and *M. striata*), and the *irrasa* complex (*Munida irrasa*, *M. iris*, *M. sculpta* and *M. simplex*). The latter complex is the only one not represented in the *Challenger* collections.

Reexamination of the species of *Munida* collected by the H.M.S. *Challenger* off the Brazilian coast leads us to conclude that of the four species collected in this region, two (*M. spinifrons* and *M. sanctipauli*) were described as new, and the other two were erroneously identified: *M. stimpsoni* (St. 122) was really *M. flinti*, and the material from the same station determined by Henderson as *M. miles*, in reality consists of three species: *M. constricta*, *M. forceps* and *M. valida*. Based on these observations we conclude that *M. stimpsoni* and *M. miles* are not known to occur off the Brazilian coast, whereas *M. flinti*, *M. forceps*, *M. constricta* and *M. valida* are cited for the first time from this area.

### Acknowledgments

The authors thank P. Clark, The Natural History Museum, for the loan of material from the *Challenger* Expedition, and Janet W. Reid, Smithsonian Institution, for assistance with the English text. Financial support was provided by the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) Proc. 830373/89-6 for GASMF, and Proc. 303224/87-8/ZO/FV for GASM.

### Literature Cited

- Abele, L. G., & W. Kim. 1986. An illustrated guide to the marine decapod crustaceans of Florida. State of Florida Department of Environmental Regulation, Technical Series, vol. 8, no 1, part 1. Florida State University, Tallahassee, 126 pp.
- Baba, K., & D. K. Camp. 1988. Two species of galatheid crustaceans (Decapoda: Anomura) new to Florida, *Munida spinifrons* Henderson, and *Munidopsis kucki*, new species. — Proceedings of the Biological Society of Washington 101:414–422.
- Barnard, K. H. 1950. Descriptive catalogue of South African decapod Crustacea (crabs and shrimps). — Annals of the South African Museum 38:1–837.
- Benedict, J. E. 1902. Description of a new genus and forty-six new species of crustaceans of the family Galatheidæ, with a list of the known marine species. — Proceedings of the United States National Museum 26:243–334.
- Bouvier, E. L. 1922. Observations complémentaires sur les Crustacés Décapodes (abstraction faite des Carides) provenant des campagnes de S. A. S. le Prince de Monaco. — Résultats des campagnes Scientifiques accomplies sur son Yacht par Albert I, Prince souverain de Monaco 62, 106 pp.
- Chace, F. A., Jr. 1942. Reports on the scientific results of the *Atlantis* expeditions to the West Indies, under the joint auspices of the University of Havana and Harvard University. The anomuran Crustacea. I. Galatheidæ. — Torreia 11: 1–106.
- Coelho, P. A., & M. A. Ramos. 1972. A constituição e a distribuição da fauna de decápodos do litoral leste da América do Sul, entre as latitudes de 5°N e 39°S. — Trabalhos Oceanográficos da Universidade Federal de Pernambuco, Recife 13:133–236.
- , ———, & G. A. S. Melo. 1989. Crustáceos decápodos do Estado de Alagoas. — Anais da Sociedade Nordestina de Zoologia 3(3):21–34.
- Ekman, E. 1953. Zoogeography of the sea. Sidgwick and Jackson Ltd., London, 417 pp.
- Faxon, W. 1895. Reports on an exploration off the west coasts of Mexico, Central and South America, and off Galapagos Islands, in charge of Alexander Agassiz, by the U.S. Fish Commission Steamer *Albatross*, during 1891, Lieut. Commander Z. L. Tanner, U. S. N., commanding. XV. The stalk-eyed Crustacea. — Memoirs of the Museum of Comparative Zoology at Harvard College 18:1–292.
- Henderson, J. R. 1885. Diagnoses of the new species of Galatheidæ collected during the *Challenger* expedition. — Annals and Magazine of Natural History 5(16):406–421.
- . 1888. Report on the Anomura collected by H. M. S. *Challenger* during the years 1873–76. — Report on the scientific results of the voyage of H. M. S. *Challenger* during the years 1873–76, Zoology, 27(69):1–221, 21 plates.
- Holthuis, L. B., A. J. Edwards, & H. R. Lubbock. 1980. The decapod and stomatopod Crustacea of St. Paul's Rocks. — Zoologische Mededelingen 56(3):27–51.
- Kensley, B. 1981. The South African Museum's Mairing Naude Cruises. Part 12. Crustacea Decapoda of the 1977, 1978, 1979 Cruises. — Annals of the South African Museum 83(4):49–78.
- Laird, C. E., E. G. Lewis, & P. A. Haefner, Jr. 1976. Occurrence of two galatheid crustaceans, *Munida forceps* and *Munidopsis bermudezi*, in the Chesapeake Bight of the western North Atlantic Ocean. — Fishery Bulletin 74(2):462–463.
- Marshall, N. B. 1954. Aspects of deep-sea biology. Hutchinson's Scientific and Technical Publications, London, 380 pp.
- Milne Edwards, A. 1880. Reports on the results of dredging, under the supervision of Alexander Agassiz, in the Gulf of Mexico, and in the Caribbean Sea, 1877, 78, 79, by U.S. Coast Survey steamer *Blake*, Lieut.-Commander C. D. Sigsbee U.S.N. and Commander J. R. Bartlett, U.S.N., commanding. VIII. Études préliminaires sur les Crustacés. Première Partie. — Bulletin of the Museum of Comparative Zoology at Harvard College 8:1–68, 2 pls.
- , & E. L. Bouvier. 1894a. Considérations générales sur la famille des Galathéidés. — Annales des Sciences Naturelles, Zoologie, series 7 et 16: 191–327.
- , & ———. 1894b. Crustacés Décapodes provenant des campagnes du Yacht l'*Hirondelle* (1886, 1887, 1888). Première partie. Brachyures

- et Anomoures.—Résultats des Campagnes Scientifiques du Prince Albert I 7:1-112, figs. A-D, pls. 1-11.
- , & ———. 1897. Reports on the results of dredgings under the supervision of Alexander Agassiz in the Gulf of Mexico (1877-78), in the Caribbean Sea (1878-79), and along the Atlantic coast of the United States (1880) by the U.S. Coast Survey steamer *Blake*, Lieut.-Commander C. D. Sigsbee, U.S.N., and Commander J. R. Bartlett, U. S. N., commanding. XXXV. Description des Crustacés de la famille des Galathéidés recueillis pendant l'expédition.—Memoirs of the Museum of Comparative Zoology at Harvard College 19(2):1-141, 12 pls.
- , & ———. 1899. Crustacés Décapodes provenant des campagnes de l'*Hirondelle* (Supplément) et de la *Princesse Alice* (1891-1897). Brachyures et Anomoures.—Résultats des campagnes scientifiques du Prince Albert I 13:1-106, pls. 1-4.
- , & ———. 1900. Crustacés Décapodes. Première partie. Brachyures et Anomoures in Masson et Cie, ed., Expeditions Scientifiques du *Travailleur* et du *Talisman* pendant les années 1880, 1881, 1882, 1883. Paris, 396 pp., 32 pls. (pls. 1-7 colored).
- Moreira, C. 1901. Contribuições para o conhecimento da fauna brasileira. Crustáceos do Brazil.—Archivos do Museu Nacional do Rio de Janeiro 11:1-51.
- Pequegnat, L. H., & W. E. Pequegnat. 1970. Deep-sea anomurans of superfamily Galatheoidea with descriptions of two new species. In W. E. Pequegnat & F. A. Chace, Jr., eds., Texas A&M University Oceanographic Studies 1(5). Contributions on the biology of the Gulf of Mexico, pp. 125-170.
- Saint Laurent, M. de, & E. Macpherson. 1988. *Munida benguela*, espèce nouvelle d'Afrique du Sud. Comparison avec *Munida sanctipauli* Henderson, 1885 (Crustacea: Decapoda: Galatheiidae).—Bulletin du Muséum national d'Histoire naturelle, Paris, Zoologie, series 4, 10(1):105-115.
- Smith, S. I. 1883. Preliminary report on the Brachyura and Anomura dredged in deep water off the south coast of New England by the United States Fish Commission in 1880, 1881 and 1882.—Proceedings of the United States National Museum 6:1-57, 6 pls.
- Stebbing, T. R. R. 1902. South African Crustacea. Part II. In W. A. Richard, ed., Marine investigation in South Africa, Cape Town, 12, 1901 (1902):1-92, pls. 5-16.
- . 1910. General catalogue of South African Crustacea (part V of South African Crustacea, for the Marine investigations in South Africa).—Annals of the South African Museum 6(4):281-593.
- Takeda, M., & T. Okutani. 1983. Crustaceans and Mollusks trawled off Suriname and French Guiana. Japan Marine Fishery Resource Research Center, Tokyo, 354 pp.
- Wenner, E. L. 1982. Notes on the distribution and biology of Galatheiidae and Chirostylidae (Decapoda: Anomura) from the middle Atlantic Bight.—Journal of Crustacean Biology 2:360-377.
- Williams, A. B. 1984. Shrimps, lobsters and crabs of the Atlantic coast of the eastern United States, Maine to Florida. Smithsonian Institution Press, Washington, D.C., 550 pp.
- Zariquiey Alvarez, R. 1952. Estudio de las especies europeas del gen. *Munida* Leach, 1818.—EOS, Revista Española de Entomología 28(2-3):143-231.

Museu de Zoologia, Universidade de São Paulo, Caixa Postal 7172, CEP. 01064, São Paulo, Brazil.