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New taxonomic and distributional information on hermit crabs (Crustacea: Anomura: Paguroidea) from the Gulf of Mexico, Caribbean Sea, and Atlantic coast of South America

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Abstract

A collection of Paguroidea recently obtained during deep-water expeditions along the coast of Brazil, forms the basis of this report. Of the 14 species reported from Brazil, 11 represent range extensions to the south, and one, *Michelopagurus atlanticus* (Bouvier, 1922), is a first record for the western Atlantic. The specimens were compared with types and western Atlantic materials deposited in various major museums. A diagnosis and illustrations are presented for each of seven spe-

cies found to be poorly or insufficiently known. New material and information is reported for two additional species that occur in Brazil but not found in the recent deep-water collections: *Clibanarius symmetricus* (Randall, 1840) and *Mixtopagurus paradoxus* A. Milne-Edwards, 1880. Remarkable and unique color photographs of live or fresh specimens of *Allodardanus bredini* Haig & Provenzano, 1965, *Bathynarius anomalus* (A. Milne-Edwards & Bouvier, 1893), *Pylopagurus discoidalis* (A. Milne-Edwards, 1880), *Paguristes spinipes* A. Milne-Edwards, 1880, *Parapagurus pilosimanus* Smith, 1876, and *P. alaminos* Lemaitre, 1986, are presented. A review of published records and museum collections of the terrestrial *Coenobita clypeatus* (Fabricius, 1787), has shown that the southern range limit of this species does not extend beyond the southern Caribbean and Trinidad and Tobago, and thus does not occur on the Brazilian coast as previously believed. A distribution map of *C. clypeatus* is provided based on specimens in the collections of the National Museum of Natural History, Smithsonian Institution. New distribution records in the Gulf of Mexico and southern Caribbean, and morphological information, are included for *Pagurus rotundimanus* Wass, 1963, a species originally described from the Florida Keys but rarely reported since. Relevant remarks on the taxonomy, morphology, and distribution of all these species are included. The revised list of Paguroidea known from Brazil is updated, and now includes a total of 62 species in the families Pylochelidae (1), Diogenidae (27), Paguridae (28), and Parapaguridae (6). A synopsis of primary taxonomic works on western Atlantic Paguroidea is also presented.

Key words: Crustacea, Paguroidea, hermit crabs, new records, taxonomy, distribution, Gulf of Mexico, Caribbean Sea, Brazil, Atlantic South America

Introduction

Despite the number of studies that have so far been published on western Atlantic paguroids, taxonomic and distributional knowledge of many species remains deficient, incomplete, or confusing even for some of the most commonly occurring species (*e.g.*, species of *Pagurus*, *Paguristes*, *Clibanarius*). This unsatisfactory state of paguroid knowledge can be attributed primarily to: 1) the inherent morphological variability exhibited by paguroids that has confounded carcinologists, and thus contributed to poor definition of many species and a complicated taxonomy; 2) lack of sampling in many areas, particularly in the Caribbean to Brazil; and 3) absence of monographs of this group from this vast region, even at the family level [except for Forest's (1987) worldwide treatment of the unusual, "symmetrical" Pylochelidae], that may have utilized the large, unstudied specimen base that exists in various museums from the Americas. Furthermore, the majority of paguroid studies have used specimens collected primarily along the northwestern Atlantic from the east coast of the United States to the Caribbean, whereas relatively fewer studies have used specimens from the immense, habitat rich coastline of eastern South America from Venezuela to Argentina. Few studies have compared in detail northwestern and southwestern Atlantic paguroid specimens. As result, numerous questions remain about the extent of the distributions, and often identity, of many western Atlantic species that have traditionally been considered to range broadly in the western Atlantic.

During recent deep-water expeditions along the coast of Brazil, a collection of 14 interesting paguroid species was obtained that adds significant knowledge to the western Atlantic paguroid fauna, and that collection forms the base of this report. The detailed study of this material, which included comparisons with western Atlantic specimens and types deposited in major museums, revealed that 11 of the 14 species found represent considerable range extensions to the south or first record for the western Atlantic, and that morphological definitions are poorly defined. Of these, one male was found of a rare species, *Nematopaguroides pusillus* Forest & de Saint Laurent, 1968, previously known from Brazil based only on the holotype and at the time of its description questionably placed in *Nematopaguroides*. No other specimens of *N. pusillus* have ever been reported of this species except for specimens attributed to *N. cf. pusillus* in a list included in an ecological study of *Oculina* reefs off the east coast of Florida (Reed *et al.* 1982). Reexamination of this unique Florida material of *N. pusillus*, which included males and females, reconfirmed McLaughlin & Wang's (2000) conclusion of the correct generic placement by Forest & de Saint Laurent (1968) of this species. Several specimens in the Brazilian collection represent *Michelopagurus atlanticus* (Bouvier, 1922), a species not previously known to occur in the western Atlantic. While comparing specimens of the Brazilian species of *Pagurus* with those in the National Museum of Natural History, Smithsonian Institution, Washington DC (USNM), a significant number of specimens were discovered of *P. rotundimanus* Wass, 1963 from localities in the southern Caribbean, much further south and collected in much deeper waters than previously known; thus, the opportunity is taken herein to document this new information for this species. A

diagnosis and illustrations are provided for seven species to supplement or clarify recognition characters, and remarkable color photographs of live specimens recently obtained are presented for four species, *Allodardanus bredini* Haig & Provenzano, 1965, *Bathynarius anomalus* (A. Milne-Edwards & Bouvier, 1893), *Pylopagurus discoidalis* (A. Milne-Edwards, 1880), and *Paguristes spinipes* A. Milne-Edwards, 1880. Finally, substantial new material of four species of Parapaguridae from the southwestern Atlantic is reported in order to document range extensions and update information on these species discussed by Lemaitre (1999, 2004, 2014) in his recent generic revisions of the genera *Parapagurus* Smith, 1879, *Sympagurus* Smith, 1883, and *Oncopagurus* Lemaitre, 1996. Photographs showing for the first time coloration in fresh specimens in two species of deep-water parapagurids, *P. pilosimanus* Smith, 1876, and *P. alaminos* Lemaitre, 1986, are also presented.

A list (Tab. 1) of all known species of paguroids from the Brazilian coast is included. There is one species discussed in this report, the terrestrial *Coenobita clypeatus* (Fabricius, 1787), that is noticeably absent from the list of Brazilian species, even though in the past it has been considered by some carcinologists (Rathbun 1919; Provenzano 1962; Chace & Hobbs 1969) to range to Brazil. Despite *C. clypeatus* being the most conspicuous and common hermit crab species known from the western Atlantic, its northern and southern limits of distribution have remained unclear. Herein, the range limits of this species are discussed, and shown that the presumed occurrence of *C. clypeatus* in Brazil is erroneous and based on a few dry specimens of uncertain origin and purchased from a private collector by The Natural History Museum, London (NHM) in the mid 19th century (White 1847).

TABLE 1. List of Paguroidea known from the Brazilian coast. [1, species present in Brazil collections reported herein; 2, previously reported as *Paguristes oxyphthalmus*, see Ayón-Parente *et al.* (2015); 3, previously confused in Brazil under *C. vittatus* (Bosc, 1802), see Negri *et al.* (2014); 4, mentioned in Coelho *et al.* (2007) as *Petrochirus insignis* under *Dardanus venosus*, 5, previously reported as *Paguristes calliopsis*, see Rahayu (2005)].

Family Pylochelidae

¹*Mixtopagurus paradoxus* A. Milne-Edwards, 1880

Family Diogenidae

Areopaguristes iris (Forest & de Saint Laurent, 1968)

²*Areopaguristes oxyphthalmus* (Holthuis, 1859)

Calcinus tibicen (Herbst, 1791)

Cancellus ornatus Benedict, 1901

Clibanarius antillensis Stimpson, 1859

Clibanarius foresti Holthuis, 1959

Clibanarius scolopetarius (Herbst, 1796)

Clibanarius tricolor (Gibbes, 1850)

³*Clibanarius symmetricus* (Randall, 1840)

Dardanus fucosus Biffar & Provenzano, 1972

⁴*Dardanus insignis* (de Saussure, 1858)

Dardanus venosus (H. Milne-Edwards, 1848)

Isocheles sawayai Forest & de Saint Laurent, 1968

Loxopagurus loxochelis (Moreira, 1901)

Paguristes angustithecica McLaughlin & Provenzano, 1974

Paguristes erythropros Holthuis, 1959

Paguristes meloi Nucci & Hebling, 2004

Paguristes pauciparus Forest & de Saint Laurent, 1968

Paguristes perplexus McLaughlin & Provenzano, 1974

Paguristes robustus Forest & de Saint Laurent, 1968

Paguristes rostralis Forest & de Saint Laurent, 1968

¹*Paguristes spectabilis* McLaughlin & Provenzano, 1975

¹*Paguristes spinipes* A. Milne-Edwards, 1880

Paguristes tortugae Schmitt, 1933

Paguristes triangulopsis Forest & de Saint Laurent, 1968

Petrochirus diogenes (Linnaeus, 1758)

⁵*Pseudopaguristes calliopsis* (Forest & de Saint Laurent, 1968)

Family Paguridae

Agaricochirus gibbosimanus (A. Milne-Edwards, 1880)

Anisopagurus bartletti (A. Milne-Edwards, 1880)
¹*Catapaguroides microps* A. Milne-Edwards & Bouvier, 1892
Catapagurus cunhai Nucci & Melo, 2012
¹*Catapagurus gracilis* (Smith, 1881)
Catapagurus sharreri A. Milne-Edwards, 1880
Goreopagurus lemaitrei Nucci & Melo, 2007
Iridopagurus dispar (Stimpson, 1859)
Iridopagurus iris (A. Milne-Edwards, 1880)
Iridopagurus reticulatus García-Gómez, 1983
Iridopagurus violaceus de Saint Laurent-Dechancé, 1966
¹*Michelopagurus atlanticus* (Bouvier, 1922)
Nematopaguroides fagei Forest & de Saint Laurent, 1968
¹*Nematopaguroides pusillus* Forest & de Saint Laurent, 1968
¹*Pagurus brevidactylus* (Stimpson, 1859)
Pagurus criniticornis (Dana, 1852)
Pagurus exilis (Benedict, 1892)
¹*Pagurus heblingi* Nucci & Melo, 2003
Pagurus leptonyx Forest & de Saint Laurent, 1968
Pagurus limatulus Fausto Filho, 1970
Pagurus longimanus Wass, 1963
Pagurus provenzanoi Forest & de Saint Laurent, 1968
Phimochirus holthuisi (Provenzano, 1961)
Phimochirus oclusus (Henderson, 1888)
Propagurus gaudichaudii (H. Milne Edwards, 1836)
¹*Pylopagurus discoidalis* (A. Milne-Edwards, 1880)
Rhodochirus rosaceus (A. Milne-Edwards & Bouvier, 1893)
Tomopagurus wassi McLaughlin, 1981

Family Parapaguridae

Oncopagurus bicristatus (A. Milne-Edwards, 1880)
¹*Oncopagurus gracilis* (Henderson, 1888)
¹*Parapagurus pilosimanus* Smith, 1879
¹*Parapagurus alaminos* Lemaitre, 1986
Sympagurus dimorphus (Studer, 1883)
¹*Sympagurus pictus* Smith, 1883

Synopsis of primary taxonomic works on western Atlantic Paguroidea

Taxonomic knowledge of hermit crabs (Paguroidea) from the western Atlantic is scattered in numerous publications dating back to the 18th century when earlier naturalists such as Fabricius (1787) and Herbst (1791) named a few species. More species were documented during the first six decades of the 19th century (*e.g.*, Say 1817; H. Milne Edwards, 1836, 1848; Gibbes 1850; Dana 1852; de Saussure 1858; Stimpson 1859, 1860; Heller 1865), but it was not until the late 1800s to early 1900s, mostly but not exclusively as result of broad deep sea explorations, that a rich hermit crab fauna was discovered in regions encompassing the coast of the eastern United States, Gulf of Mexico, Bermuda, Caribbean Sea, and Brazil. This hermit crab fauna was documented most notably during that period by Smith (1869, 1879, 1881a, 1881b, 1882, 1883a), A. Milne-Edwards (1880, 1883), Henderson (1888), Ives (1892), Benedict (1892, 1901a, 1901b), Rathbun (1897, 1900, 1907, 1919), A. Milne-Edwards & Bouvier (1893), Rankin (1898, 1900), Moreira (1901), Verrill (1908), Bouvier (1918), and Hay & Shore (1918). In the next four decades, several carcinologists studied hermit crabs from various regions of the temperate or tropical northwestern Atlantic, including the southeastern United States to Florida Keys, Bahamas, and some of the Antilles (*e.g.*, Schmitt 1933, 1935, 1936; Wass 1955, 1963; Provenzano 1959, 1961, 1965, 1968; Haig & Provenzano 1965; Williams 1965). Subsequently, numerous detailed in-depth taxonomic revisions or reports based on new and large collections from the western Atlantic were undertaken that focused on selected, problematic paguroid groups. These include revisions or reviews of *Paguristes* (*i.e.*, McLaughlin & Provenzano 1974, 1975; Campos & Sánchez 1995), *Pagurus* (*i.e.*, Lemaitre *et al.* 1982; Nucci & Melo 2007a), *Iridopagurus* (*i.e.*, de Saint Laurent-Dechancé 1966; García-Gómez 1983, 1988), *Catapaguroides* (*i.e.*, de Saint Laurent 1968a, 1968b), *Solenopagurus* (*i.e.*, de

Saint Laurent 1970), Parapaguridae (*i.e.*, Lemaitre 1986, 1989, 1999, 2004, 2013, 2014), and *Pylopagurus*-like genera (summarized in Lemaitre & McLaughlin 2003).

Various faunistic inventories have included summaries of western Atlantic paguroids, often adding new species from the Gulf of Mexico (Felder 1973; Hernández Aguilera *et al.* 1996; Raz-Guzmán *et al.* 1986, 2004; Felder *et al.* 2009), east and west coasts of Florida (Abele 1986; Strasser & Price 1999), Bermuda (Chace *et al.* 1986), Cuba (Gómez Hernández & Pérez 1984; Gómez Hernández & Martínez-Iglesias 1986; Hernández-Ávila *et al.* 2007), Caribbean coast of Colombia (Sánchez & Campos 1978; Campos *et al.* 2005; Martínez Campos *et al.* 2012) and Venezuela (Rodríguez 1980), Suriname (Holthuis 1959), Brazil (Forest & de Saint Laurent 1968; Fausto-Filho 1970a, 1975; Coelho & Ramos 1973; Coelho & Santos 1980; Coelho & Ramos-Porto 1986; Hebling & Rieger 1986; Coelho-Santos & Coelho 1995; Calado 1996; Rieger 1997, 1998, 1999; Melo 1999; Almeida *et al.* 2006, 2010; Coelho *et al.* 2007; Nucci & Melo 2011), Uruguay (Barattini & Ureta 1960; de Zolesi & Philippi 1995), and Argentina (Scelzo & Boschi 1973). A good number of studies have also been published in the last 65 years exclusively describing or providing updated taxonomic and distributional data for one or more new or previously poorly known species from the western Atlantic (Forest 1954, 1964, 1988; Fausto-Filho 1970b; Scelzo 1971; Biffar & Provenzano 1972; Narchi & Hebling 1972; McLaughlin 1975; García-Gómez 1982; Lemaitre 1982, 1995; McLaughlin 1982; Martínez-Iglesias & Gómez 1989; Campos & Lemaitre 1994; Coelho 1996; Sandberg 1996; Rieger & Giraldi 1997a, 1997b; Manjón-Cabeza *et al.* 2002; Nucci & Melo 2003, 2007b, 2012; Nucci & Hebling 2004; Lins & Cardoso 2010; Lemaitre & Felder 2011, 2012; Cardoso & Lemaitre 2012). In recent times, the use of modern molecular methods to investigate taxonomic questions has revealed previously unknown identity problems, and has helped clarify the taxonomic status or phylogenetic relationships of various western Atlantic species of Paguridae (*Pagurus*: Mantelatto *et al.* 2009; Matzen da Silva *et al.* 2011), and Diogenidae (*Loxopagurus* and *Isocheles*: Mantelatto *et al.* 2006; *Clibanarius*: Mantelatto *et al.* 2010; Negri *et al.* 2012, 2014).

Three major hermit crab catalogue efforts have included some or all western Atlantic species at the time they were published: Alcock (1905), even though that work focused on the paguroid fauna from the Indian coast, Gordan (1956), and McLaughlin *et al.* (2010). In addition, a list of all known hermit crab species worldwide, along with their general distribution, is now available and regularly updated online (WoRMS Editorial Board 2014).

Material and methods

Most of the material that forms the basis of this report was obtained during the deep-water expedition TAAF MD55 conducted off the southeastern coast of Brazil in 1987 in depths reaching 5155 m (Tavares 1999). Additional samples came from the REVIZEE Program (Recursos Vivos na Zona Econômica Exclusiva) carried out from 1996 to 2003 at depths of about 2100 m (MMA 2006), and from sporadic sampling off the northeastern Brazilian coast. Specimens remain deposited in the following museums or institutions: General Invertebrates Collection of the Academy of Natural Sciences, Drexel University, Philadelphia (ANSP); NHM (formerly British Museum); Harbor Branch Oceanographic Institution, Fort Pierce, Florida (HBOI, formerly Indian River Coastal Zone Museum); Museo de Historia Natural Marina de Colombia, Instituto de Investigaciones Marinas y Costeras “José Benito Vives De Andrés”, Santa Marta (INVEMAR); Museum of Comparative Zoology, Harvard University (MCZ); Museu de Zoologia, Universidade de São Paulo, Brazil (MZUSP); Research and Teaching Collection at Texas A&M University (formerly Texas Cooperative Wildlife Collection at Texas A&M University) (TCWC); Biodiversity, Research and Teaching Collection at Texas A&M University [formerly Texas Cooperative Wildlife Collection at Texas A&M University, College Station] (TCWC); University of Louisiana at Lafayette Zoological Collection, Lafayette (ULLZ); and National Museum of Natural History, Smithsonian Institution, Washington DC (USNM). Specimens obtained on board the manned submersible *Curasub* were collected off the downline of the Willemstad Seaquarium Substation (approximately 12°05.078'N, 68°53.788'W), as part of the Smithsonian Institution's Deep Reef Observation Program (DROP). For most *Curasub* specimens a field number used for molecular barcoding is included using the abbreviation CURI (Curaçao Invertebrates).

We follow McLaughlin *et al.* (2007) in excluding the Lithodidae and Hapalogastridae from the Paguroidea. General terminology is according to McLaughlin (2003) except that Schram & Koenemann (2004) is followed in the use of “pleon” instead of “abdomen”. Under the synonymy of each species, only the original description, primary synonyms, and most recent taxonomic references, are included. Specimens listed under “New material”

include those collected during various recent and earlier expeditions or sampling efforts, and not previously reported in the literature. The measurements or range of size indicated after each number of specimens in the material examined sections, refers to shield length, measured from the tip of the rostrum to the midpoint of the posterior margin of the cephalothoracic shield. Other abbreviations used are: B/I, buque de investigación [research vessel]; BLM, Bureau of Land Management, USA; CABP, Central Atlantic Benchmark Program; *Curasub*, manned submersible of Substation Curaçao; HMS, Her Majesty's Ship; JSL, Johnson Sea Link submersible; MMS-NGOMCS, United States Department of the Interior, Minerals Management Service, Northern Gulf of Mexico Continental Slope Study; ov, ovigerous; sta, station. Months are indicated by first three letters; USCSS, United States Coast & Geodetic Survey; USFC, United States Fish Commission; VIMS, Virginia Institute of Marine Science, The College of William & Mary.

Taxonomy

Family Coenobitidae

Coenobita clypeatus (Fabricius, 1787)

(Figs. 1A, 2, Tab. 2)

Pagurus clypeatus Fabricius, 1787 (type locality by neotype selection by McLaughlin, 2002: Batali River, N of Savane, Dominican Republic); ICZN, 2003: 235.

Coenobita clypeatus.—Chace & Hobbs, 1969: 123, figs 33, 34b, c.—McLaughlin, 2002: 17; ICZN, 2003: 235.

New material. 2 dry specimens in shells (not sexed or measured), Brazil, W. J. Broderip collection (NHM B2195, NHM B2196); 2 females 5.3–6.8 mm, Boca Grande, Florida Keys (ULLZ 10106), 4 females 3.4–3.9 mm, 1 male 4.3 mm, Loggerhead Key, Florida Keys, 25 Aug 1981, coll. Felder, Camp, *et al.* (ULLZ 15013). See also Table 2.

Diagnosis. See Chace & Hobbs (1969).

Distribution. Tropical western Atlantic: from Bermuda; central (Lakeland, Lake Kissimee) and southeastern Florida (Fort Lauderdale to Biscayne Bay), and Florida Keys; Gulf of Mexico, on the Florida Keys, and Yucatán to Tamaulipas, Mexico; Caribbean, from the Antilles, and coasts of Central and South America to Venezuela and Trinidad and Tobago (see Remarks). This is a terrestrial species that prefers dry, hard soil at some distance from the sea, although the larvae must develop in seawater. It has been reported in altitudes of 887 m above sea level (Wilde 1973).

Remarks. The complex taxonomic history of this West Indian land crab known for nearly a century under the name *Coenobita clypeatus*, was discussed by McLaughlin (2002), who fixed the name by selecting a neotype for *Pagurus clypeatus* Fabricius (1787). Although the nomenclature was stabilized by that action, the northern and southern limits of the natural distribution of this common semiterrestrial species widely used in the pet trade have remained obscure or at least the extreme localities unconfirmed. To the north (Fig. 2), this species has been reported in the eastern Gulf of Mexico only from the Florida Keys (Felder *et al.* 2009, pers. comm.), and on the western Gulf of Mexico it was first reported by Allen (1979) from Isla Lobos, Veracruz, Mexico, although it is now known from as far north on the Mexican coast as Matamoros, Tamaulipas State (Rodríguez-Almaraz & Zavala-Flores 2005). Most accounts of this species cite only “Florida” or “southern Florida” as the northern limit, without stating any precise locality or listing any specimens from the northern limits (*e.g.*, Chace & Hobbs 1969; Sánchez & Campos 1978; Rodríguez 1980; Abele & Kim 1986), although Provenzano (1959, 1962) did report specimens from Indian Key, Key Largo in the Florida Keys, and Biscayne Bay. Other than Provenzano’s records from Biscayne Bay, no other formal records of naturally occurring populations of *C. clypeatus* further north on the southeast Florida coast can be found in the scientific literature. Based on specimens found in the USNM collections (Table 2), this species is now herein reported further north in southeastern Florida from Fort Lauderdale (1 female 2.7 mm collected in 1924, USNM 59348), and in central Florida near Lake Kissimee, Osceola County (1 male 4.2 mm, collected in the late 1950s, USNM 102603), and Lakeland, Polk County (1 female 6.3 mm, lacking collecting date, USNM 265321).

The exact southern distributional limit of *Coenobita clypeatus* is not any clearer in the literature than the northern limit. Some studies have indicated the southern limit to be “Venezuela” (*e.g.*, Provenzano 1959; Sánchez & Campos 1978; Rodríguez 1980; Abele & Kim 1986), whereas others have vaguely indicated “Brazil” (*e.g.*,

Rathbun 1920; Chace & Hobbs 1969, with question; Allen 1979), or even “southern Brazil” (Provenzano 1962), without listing any specimens or exact locality. Indeed, given the tropical conditions along the coast from Venezuela to northern Brazil, it would seem possible that the terrestrial *C. clypeatus* could occur from Guyana, Suriname, and French Guiana, to several northern states of Brazil. However, there are no reports of specimens of *C. clypeatus* from the former three countries, and this species is not included in modern biodiversity summaries or inventories of decapods from Brazil that have been based on decades of collections (e.g., Melo 1999; Rieger 1998, 1999; Coelho *et al.* 2007).

It appears that the inclusion in some studies of Brazil in the distribution of *C. clypeatus* originated from earlier reports by Verrill (1908: 438, fig. 55, as *Cenobita Diogenes* [sic.]), who based his distribution on Smith (1869: 38, as *Cenobita Diogenes* [sic.]), and who in turn based his on White’s (1847: 61, as *Cenobita Diogenes* [sic.]) report of 19 specimens as: “f–x. In different kinds of shells. Brazil. From the collection of Mr. Broderip”. William John Broderip (1789–1859) was a lawyer and naturalist, and enthusiastic shell collector whose specimens in his unrivaled conchological cabinet were ultimately purchased by the British Museum (Boase 1886). Seven of White’s specimens of *C. clypeatus* were located (dry) in the Mollusca section of the NHM, two of which were inside shells of *Melongena melongena* (Fig. 1A), a gastropod known to have a southern limit of distribution in Suriname (Rosenberg 2009). There is no evidence that Broderip visited Brazil to collect (L.R. Simone, pers. comm.), although he did mention fossils from Brazil in his “Leaves from the note book of a naturalist” (Broderip 1852). He also studied cirripedes and mollusks based on collections obtained by the officers of the HMS *Adventure* and *Beagle* in South America (King & Broderip 1832), and it is possible that his specimens of *C. clypeatus* deposited in the NHM were obtained on those ships. However, the former ship explored only the Pacific, whereas the only ports visited by the latter in eastern South America were Fernando de Noronha Island, Salvador, and Rio de Janeiro (Papavero 1973). Based on the fact that despite intensive sampling such a common and conspicuous species as *C. clypeatus* has never been collected in modern times from the coast of Brazil, and that the southern limit of the species of gastropod (*M. melongena*) in which Broderip’s specimens were found is Suriname, we conclude that it is highly doubtful that *C. clypeatus* occurs in Brazil. Broderip’s specimens of *C. clypeatus* reported by White (1847) as from “Brazil”, may have been obtained or purchased, but not directly collected, by officers of the *Beagle*, and thus the collecting locality of Broderip’s specimens supposedly from “Brazil”, cannot be confirmed.

Family Pylochelidae

Mixtopagurus paradoxus A. Milne-Edwards, 1880

Mixtopagurus paradoxus A. Milne-Edwards, 1880: 39 (type locality: USCGS *Blake*, sta 291, Barbados).—A. Milne-Edwards & Bouvier, 1893: 24, pl. 2, figs 1–19.—Forest, 1987: 220, figs 4e, 6e, f, 7f, 74a–h, 75a–g, 76a–e, 77a–j, pls 2B, 3G, H, 8C, D [and synonymy therein].—Coelho, 1996: 165.—Melo, 1999: 160, figs 97, 98.—Coelho *et al.*, 2007: 10, tab. 1.—Felder *et al.*, 2009: 1072.

Mixtopagurus gilli Benedict, 1901 (type locality: USFC *Albatross*, sta 2061, off North Carolina, 34°39’N, 75°33’W).

Type material. Holotype male (not examined), USFC *Blake*, sta 291, Barbados, 365 m (MCZ 4076). Holotype of *Mixtopagurus gilli* Benedict, 1901, ov female 8.2 mm, off North Carolina, USFC *Albatross*, sta 2601, 34°39’N, 75°33’W, 196 m, 18 Oct 1885 (USNM 24805).

New material. *Western Atlantic. Bahamas:* New Providence Island, off Goulding’s Cay, JSL–II–2587, 25°02’30”N, 35°12’W, 518 m, 25 May 1995, coll. M. Harasewych & T. Askew: 1 male 14.3 mm (USNM 275962).

Brazil: Canopus Seamount, 120 miles off the coast of Ceará, fishing vessel, 02°14’25”S, 38°22’50”W, 240–260 m, 20–21 Aug 2005, coll. J. Coltro: 5 males 6.5–11.0 mm, 1 ov. female 9.0 mm, 15 females 4.0–11.0 mm, 1 juvenile 2.5 mm (MZUSP 16951); *idem:* 7 males 7.5–12.0 mm, 2 ov. females 8.0–11.2 mm, 2 females 9.0–10.5 mm (MZUSP 16954); Cabo Frio, Rio de Janeiro State, Apr 2001, fishing trawler, coll. Carlo Magenta, 350–400 m: 1 male 14.0 mm, 2 females 7.0–9.0 mm (MZUSP 13762); São Paulo, F/V *Nuevo Apenino*, 23°42.40’S, 42°18.30’W, 24 Nov 2001, 402 m: 1 male 17.0 mm (MZUSP 15699); *idem:* 23°42.49’S, 42°07.00’W, 2 Dec 2001, 423 m: 1 ov. female 10.5 mm (MZUSP 15694); *idem:* 23°69.33’S, 42°19.16’W, 30 Nov 2001, 398 m: 1 male 14.5 mm (MZUSP 15698); Santos, São Paulo State, Apr 2002, fishing trawler, coll. Carlo Magenta, 350–400 m: 18 males 7.5–13.0 mm, 11 females 7.5–8.5 mm (MZUSP 14594); *idem:* 30 males 8.5–14.0 mm, 9 females 7.0–8.5 mm (MZUSP 14595).

TABLE 2. List of specimens of *Coenobita clypeatus* (Fabricius, 1787) deposited in the USNM. Localities used for Fig. 2.

USNM No.	Specimen No.	Locality	Latitude and Longitude	Collection Date	Collector(s)
29068	1	Bermuda	32° 20' N, 64° 45' W	1876	G. Goode
1023011	1	Bermuda	32° 18' 08" N, 64° 45' 34" W		
25450	3	Bermuda, Hungry Bay	32° 17' 20" N, 64° 45' 38" W		
Central and southeastern Florida, USA					
265321	1	Polk County, Lakeland	28° 00' N, 82° 00' W		
102603	1	Osceola County, near Lake Kissimmee	27° 54' 50" N, 81° 16' 12" W		A. Reese
59348	1	Fort Lauderdale, palmetto forest within 200 ft. of mangrove swamp	26° 07' 20" N, 80° 08' 36" W	28 Dec 1924	R. Holt
267551	1	Dade County, near bridge	25° 44' N, 80° 11' W	25 Aug 1968	F. Bayer
99753	1	Key Biscayne	25° 41' 28" N, 80° 09' 56" W	Sep 1954	F. Bayer
14007	1	Cape Florida	25° 39' 56" N, 80° 09' 28" W	1884	
Bahamas					
11502	25	Little Bahama Bank, Great Abaco Island	26° 28' 0" N, 77° 05' 0" W	1886	USFC
11503	10	Abaco Island	26° 28' 0" N, 77° 05' 0" W	1886	
88645	6	Bimini Islands	25° 42' N, 79° 15' W	20 Oct 1948	
68960	2	Spanish Wells	25° 36' N, 76° 44' W	1893	
68967	15	Egg Island	25° 30' N, 76° 54' W	13 May 1893	
42479	1	New Providence Island	25° 05' 0" N, 77° 21' 0" W	17 Jun 1903	B. Bean
29073	2	New Providence Island	25° 05' 0" N, 77° 21' 0" W	25 Dec 1898	
45621	1	Smith's Place, Pot Hole, S of South Bight, E end of Andros Island	25° 04' N, 77° 20' W	3 May 1912	P. Bartsch
31463	2	Andros Island	24° 26' 0" N, 77° 57' 0" W		
68971	2	Water Cay	24° 0' N, 76° W	1893	
68968	15	Water Cay	24° 0' N, 76° W	1893	
68965	1	Water Cay	24° 0' N, 76° W	1893	
1163146	2	Long Cay	22° 36' N, 74° 21' W	13 Jul 1930	P. Bartsch
102641	239	Long Cay	22° 36' N, 74° 21' W	13 Jul 1930	P. Bartsch
102609	8	Acklens Island, Smugs Corner	22° 22' N, 74° 03' W	10 Jul 1930	P. Bartsch

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TABLE 2. (Continued)

USNM No.	Specimen No.	Locality	Latitude and Longitude	Collection Date	Collector(s)
Gulf of Mexico					
81961	2	USA: Florida, north Matecumbe Key	24° 54' 51" N, 80° 38' 17" W	Dec 1934	
81960	10	USA, Florida, Long Key	24° 49' 11" N, 80° 49' 18" W	29 Jan 1903	
14086	8	USA, Florida Keys	24° 44' N, 81° 03' W		
69731	1	USA, Florida Keys, Dry Tortugas	24° 39' 55" N, 82° 51' 19" W	1934	H. Darby
102638	12	USA: Florida Keys, Dry Tortugas	24° 39' 55" N, 82° 51' 19" W	25 Nov 1919	
65026	1	USA, Florida Keys, Dry Tortugas	24° 39' 55" N, 82° 51' 19" W	12 Aug 1930	H. Gee
81958	100	USA, Florida Keys, Dry Tortugas	24° 39' 55" N, 82° 51' 19" W		
20185	4	USA, Florida Keys, Dry Tortugas, Garden Key	24° 38' N, 82° 52' W	8 Apr 1889	
102642	12	USA, Florida Keys, Dry Tortugas, Garden Key	24° 37' 43" N, 82° 52' 23" W	24 Dec 1912	
102637	1	USA, Florida Keys, Dry Tortugas, Garden Key	24° 37' 43" N, 82° 52' 23" W	25 Nov 1919	
102640	1	USA, Florida Keys, Dry Tortugas, Fort Jefferson Moat	24° 37' 41" N, 82° 52' 22" W	24 Jul 1924	
62178	4	USA, Florida Keys, Dry Tortugas	24° 37' 41" N, 82° 52' 22" W	15 Jul 1928	A. Pearce
68972	4	USA, Florida, Monroe County, Sand Key, near Key West	24° 35' 32" N, 81° 38' 08" W	1893	
81957	3	USA, Florida, Monroe County, Sand Key, near Key West	24° 35' 32" N, 81° 38' 08" W		
81959	1	USA, Florida Keys	24° 34' N, 81° 47' W		
102602	1	USA, Florida Keys, Key West	24° 33' 21" N, 81° 46' 57" W		Allen
29065	25	USA, Florida Keys, Key West	24° 33' 21" N, 81° 46' 57" W		
14038	50	USA, Florida Keys, Key West	24° 33' 21" N, 81° 46' 57" W		
13524	1	USA, Florida Keys, Key West	24° 33' 21" N, 81° 46' 57" W		
1106056	7	USA, Florida Keys, Key West	24° 33' 21" N, 81° 46' 57" W		
119439	3	Mexico, West Triangles Island	20° 58' 0" N, 92° 19' 0" W	May 1965	G. Rowe
24882	8	Mexico, Yucatan	20° 58' 0" N, 92° 19' 0" W		Nelson & Goldman
18728	4	Mexico	20° 30' 30" N, 86° 56' 45" W	24 Jan 1885	
78392	1	Mexico, Ascension Bay	19° 40' N, 87° 30' W	30 Mar 1939	R. Elliott
Greater and Lesser Antilles					
99963	3	Cuba, Hicacos Peninsula, E of Xanadu	23° 10' 0" N, 81° 12' 0" W	27 Jan 1957	W. Schmitt

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TABLE 2. (Continued)

USNM No.	Specimen No.	Locality	Latitude and Longitude	Collection Date	Collector(s)
29063	4	Cuba, Mariel	22° 59' 15" N, 82° 45' 13" W	10 May 1900	Palmer & Riley
102727	1	Cuba, Mariel	22° 59' 15" N, 82° 45' 13" W	10 Jun 1900	Palmer & Riley
48716	1	Cuba, Bahia Honda	22° 56' 38" N, 83° 10' 0" W	7 Jun 1914	Henderson & Bartsch
102633	1	Cuba, Bahia Honda Anchorage, submarine light	22° 56' 38" N, 83° 10' 0" W	2 Apr 1931	P. Bartsch
48657	18	Cuba, Levisa Italiano Reef, opposite Cayo Levisa	22° 53' N, 83° 31' W	2 Jun 1914	Henderson & P. Bartsch
48644	1	Cuba, reef flat between Cayo Hutia and Little Cayo, NE of light	22° 43' N, 84° 01' W		Henderson & P. Bartsch
48645	87	Cuba, reef flat between Cayo Hutia and Little Cayo, NE of light	22° 43' N, 84° 01' W		Henderson & P. Bartsch
29075	1	Cuba, Baracoa	22° 32' 0" N, 79° 36' 0" W	1 Feb 1902	
48650	4	Cuba, Ensenada De Cajon, off Cape San Antonio	21° 54' 49" N, 84° 53' 48" W	22 May 1914	Henderson & P. Bartsch
29070	2	Cuba	21° 30' 0" N, 80° 0' 0" W		
65875	2	Cuba, Gibara	21° 06' 35" N, 76° 07' 54" W	22 Feb 1926	
65869	16	Cuba, Cayo Grande de Moa	20° 41' 34" N, 74° 54' 37" W	4 Mar 1930	S. Parish
29067	1	Cuba, Cabanas	20° 08' 0" N, 75° 28' 0" W	31 May 1900	Palmer & Riley
48641	5	Cuba, Cabanas	20° 08' 0" N, 75° 28' 0" W	8 Jun 1914 to 9 Jun 1914	Henderson & P. Bartsch
48755	1	Cuba, Cabanas	20° 08' 0" N, 75° 28' 0" W	8 Jun 1914 to 9 Jun 1914	Henderson & P. Bartsch
48646	3	Cuba, San Antonio	20° 04' 0" N, 76° 4' 0" W		Henderson & P. Bartsch
29069	1	Cuba, either Guama or Santiago	19° 57' 0" N, 76° 30' 0" W		
136869	1	Cayman Islands, Grand Cayman Island	19° 20' 0" N, 81° 15' 0" W	3 Nov 1970	V. Scheffer
136868	1	Cayman Islands, Grand Cayman Island	19° 20' 0" N, 81° 15' 0" W	3 Jan 1971	V. Scheffer
136867	1	Cayman Islands, Grand Cayman Island, Bodden Town, swampy road	19° 17' N, 81° 15' W	8 Oct 1970	V. Scheffer
9096	23	Jamaica	18° 15' 0" N, 77° 30' 0" W	1884	USFC
61645	1	Jamaica	18° 15' 0" N, 77° 30' 0" W	1 Jul 1926	Prince & Harley
45595	1	Jamaica	18° 15' 0" N, 77° 30' 0" W		
81962	1	Jamaica, Lime Cay	17° 54' N, 76° 50' W		
7684	19	Jamaica, S of Kingston Harbor	17° 52' 0" N, 76° 45' 30" W	11 Mar 1884	USFC
29064	4	Jamaica, Kingston Harbor	17° 48' N, 76° 46' W	1893	
63159	1	Haiti, Jean Rabel	19° 49' N, 73° 08' W	1929	E. Leonard & G. Leonard

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TABLE 2. (Continued)

USNM No.	Specimen No.	Locality	Latitude and Longitude	Collection Date	Collector(s)
50530	17	Haiti, near San Marc	19° 07' N, 72° 42' W		
58678	1	Haiti	19° 0' N, 72° 25' W	14 Nov 1924	H. Kenyon
65876	1	Haiti, Île de la Gonave	18° 51' N, 73° 03' W	22 Mar 1930	
22558	2	Haiti, Jacmel	18° 49' N, 72° 30' W		
65877	1	Haiti, Petite Gonave Island	18° 42' N, 72° 48' W	19 Mar 1930	
65874	1	Haiti, Baraderes Bay	18° 31' N, 73° 37' W	11 Apr 1930	
102635	5	Haiti, Caille Island	18° 24' N, 74° 21' W		P. Bartsch
277933	4	Haiti, Navassa Island, near lighthouse	18° 23' 48" N, 75° 0' 42" W	25 Jul 1998	W. Steiner
277934	2	Haiti, Navassa Island, ruins near Lulu Bay	18° 23' 43" N, 75° 01' 42" W	25 Jul 1998	W. Steiner
50534	2	Haiti, Rosseau	18° 21' N, 73° 37' W		Henderson & P. Bartsch
102639	1	Haiti, Île a Vache	18° 04' N, 73° 38' W		
265338	2	Haiti, Jacmel	18° 19' N, 72° 30' W		
4169	50	Dominican Republic, Santo Domingo	19° 0' N, 70° 0' W		
102632	8	Dominican Republic, Santo Domingo	19° 0' N, 70° 0' W		
4114	1	Dominican Republic, Puerto Plata	18° 45' N, 70° 42' W		
29066	1	Dominican Republic, Bajos del Cabello	18° 05' 51" N, 68° 39' 29" W	1898 to 1899	
29062	8	Dominican Republic, Bajos del Cabello	18° 05' 51" N, 68° 39' 29" W		
29074	8	Puerto Rico, San Juan	18° 57' 0" N, 71° 28' 0" W	Jan 1899	
42551	3	Puerto Rico, Culebra Island, Ensenada Honda	18° 49' N, 65° 17' W	11 Feb 1899	
29071	1	Puerto Rico, Boqueron Bay	18° 28' N, 66° 05' W	27 Jan 1899	
80501	1	Puerto Rico, Mona Island	18° 05' N, 67° 53' W	11 Aug 1944 to 3 Sep 1944	H. Beatty
29072	1	Puerto Rico, Ponce	18° 01' N, 66° 37' W	30 Jan 1899	
104202	1	Puerto Rico, La Parguera, Mayaguez Island	17° 58' N, 67° 02' W	23 Aug 1959	A. Humes & R. Gooding
240232	1	British Virgin Islands, Tortola Island, Guana Island	18° 29' N, 64° 34' W	2 Jul 1985	J. Lazell
240233	1	British Virgin Islands, Tortola Island, Guana Island	18° 29' N, 64° 34' W	3 Jul 1985	J. Lazell
240230	1	British Virgin Islands, Nameless Cay	18° 19' 55" N, 64° 44' 59" W	13 Jul 1985	D. Ford
240236	1	Virgin Islands (USA), Great Camanoe Island	18° 29' N, 64° 32' W	25 Jul 1985	J. Damron

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TABLE 2. (Continued)

USNM No.	Specimen No.	Locality	Latitude and Longitude	Collection Date	Collector(s)
240234	1	Virgin Islands (USA), South Cockroach Island	18° 24' 14" N, 65° 3' 38" W	22 Jul 1985	Mayer & Jenkins
93560	1	Virgin Islands (USA), Saint Thomas	18° 21' 19" N, 64° 56' 13" W	8 Jul 1952	
93559	1	Virgin Islands (USA), Saint Thomas, from Saint John intercepted at Charlotte Amalie	18° 20' N, 64° 56' W	14 Aug 1952	J. Conroy
265550	13	Virgin Islands (USA), Peter Island	18° 20' 32" N, 64° 55' 58" W	29 Mar 1958	Clarke
240235	1	Virgin Islands (USA), Carrot Rock	18° 19' N, 64° 34' W	2 Jul 1985	Laze II & Mayer
240231	1	Virgin Islands (USA), Carrot Rock	18° 19' N, 64° 34' W	13 Jul 1985	D. Ford
7654	6	Virgin Islands (USA), S of Saint Thomas	18° 09' 0" N, 64° 58' 50" W	17 Jan 1884	USFC
71841	1	Virgin Islands (USA), Saint Croix Island, Green Cay Islet	17° 46' N, 64° 40' W	16 Mar 1936	H. Beatty
71843	1	Virgin Islands (USA), Saint Croix Island	17° 44' 30" N, 64° 44' 21" W		H. Beatty
71844	3	Virgin Islands (USA), Saint Croix Island, Tagus Pond	17° 44' 30" N, 64° 44' 21" W		H. Beatty
71842	1	Virgin Islands (USA), Saint Croix Island	17° 44' 30" N, 64° 44' 21" W		H. Beatty
71845	10	Virgin Islands (USA), Saint Croix Island	17° 44' 30" N, 64° 44' 21" W		H. Beatty
100815	1	Saba Island, Netherlands	17° 38' 0" N, 63° 13' 0" W	12 Apr 1937	
100866	14	Saba Island, Netherlands	17° 38' 0" N, 63° 13' 0" W	11 Apr 1937 to 12 Apr 1937	
1023016	1	Barbuda	17° 36' N, 61° 51' W	6 Apr 1956	F. Chace & Clarke
1107575	6	Barbuda, lagoon	17° 36' N, 61° 51' W	25 Apr 1958	
265352	9	Antigua, Darby Cave	17° 04' N, 61° 49' W	26 Apr 1958	
68975	1	Antigua, English Harbor	17° 0' N, 61° 46' W	Jul 1918	C. Nutting
1023012	1	St. Kitts and Nevis, Nevis, Charlestown	17° 08' 0" N, 62° 37' 0" W	17 Apr 1958	
126776	1	Dominica, Portsmouth Sandbox	15° 35' N, 61° 28' W	3 Mar 1964	H. Hobbs
119585	2	Dominica, Belfast River Estuary, old north river channel	15° 35' N, 61° 28' W	17 Nov 1965	J. Morrison
1023019	1	Dominica	15° 30' N, 61° 20' W		J. Morrison
1007224	1	Dominica, Batali River, N of Grande Savane, N of Salisbury	15° 27' N, 61° 27' W	2 Feb 1964	R. Zusi
126770	1	Dominica, coconut-banana grove adjoining beach immediately S of Layou River mouth	15° 23' 0" N, 61° 26' 0" W	27 Jan 1964	H. Hobbs
126768	1	Dominica, tributary of Layou River on N side, 0.5 miles E of Clarke Hall	15° 23' 0" N, 61° 26' 0" W	6 Feb 1964	H. Hobbs
126772	8	Dominica, north slope of Tarou Cliff, just S of mouth of Layou River	15° 23' 0" N, 61° 26' 0" W	12 Feb 1964	H. Hobbs

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TABLE 2. (Continued)

USNM No.	Specimen No.	Locality	Latitude and Longitude	Collection Date	Collector(s)
126771	6	Dominica, coconut-banana grove adjoining beach immediately S of Layou River mouth	15° 23' 0" N, 61° 26' 0" W	12 Feb 1964	H. Hobbs
126779	1	Dominica, mouth of Layou River	15° 23' 0" N, 61° 26' 0" W	8 Mar 1964	H. Hobbs
126777	1	Dominica, in wood near Laronde River, S of Laplains	15° 23' 0" N, 61° 26' 0" W	15 Mar 1966	H. Hobbs
126782	5	Dominica, Rodney's Rock	15° 22' N, 61° 25' W	8 Feb 1964	H. Hobbs
126781	2	Dominica, Rodney's Rock	15° 22' N, 61° 25' W	10 Mar 1964	H. Hobbs
126775	2	Dominica, Rodney's Rock between Layou and Mahaut	15° 22' N, 61° 24' W	5 Feb 1964	H. Hobbs
126769	6	Dominica, headwater stream tributary of Clarke Hall River	15° 22' 0" N, 61° 17' 0" W	1 Feb 1964	H. Hobbs & Patrick
126778	2	Dominica, Clarke Hall	15° 22' 0" N, 61° 17' 0" W	5 Jun 1966	G. Steyskal
126774	12	Dominica, shore near mouth of Rosalie River	15° 22' 0" N, 61° 15' 0" W	14 Feb 1962	H. Hobbs
126783	3	Dominica, near police station at La Plaine	15° 20' N, 61° 15' W	15 Feb 1964	H. Hobbs
126780	1	Dominica, Laronde River, between road and mouth on bluff above	15° 19' N, 61° 15' W	15 Feb 1964	H. Hobbs
1023013	1	St. Lucia, Pigeon Island	14° 05' N, 60° 58' W	22 Mar 1956	
1023020	1	St. Lucia, Marigot Lagoon	13° 58' N, 61° 02' W	21 Mar 1956	W. Schmitt
68964	17	Barbados, 1.5 miles SW of Pelican Island	13° 10' N, 59° 32' W	14 May 1918	C. Nutting
68956	16	Barbados, 0.5 miles NW of Pelican Island	13° 10' N, 59° 32' W	27 May 1918	J. Henderson
57957	3	Barbados, 0.5 miles NW of Pelican Island	13° 10' N, 59° 32' W	27 May 1918	J. Henderson
57955	4	Barbados, Pelican Island	13° 10' N, 59° 32' W	Jun 1918	C. Nutting
113400	2	Trinidad near Grande River	11° 0' 0" N, 61° 0' 0" W	Aug 1964	P. Rusk
42952	1	Bonaire	12° 10' N, 68° 18' W	12 Jul 1905	J. Bohlke
7598	1	Curaçao	12° 0' N, 69° 0' W	10 Feb 1884	USFC
Western and southern Caribbean					
265398	1	Belize, Cay Caulker, 25 m from beach, E side of cay at settlement	17° 46' N, 88° 02' W		
102634	1	Belize	17° 29' 0" N, 88° 11' 0" W		H. Hurve
3287	1	Belize	17° 29' 0" N, 88° 11' 0" W		
102636	1	Belize	17° 11' N, 88° 30' W		P. Shufeldt
21381	1	Belize	17° 11' N, 88° 30' W		W. Stanton

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TABLE 2. (Continued)

USNM No.	Specimen No.	Locality	Latitude and Longitude	Collection Date	Collector(s)
1023014	1	Belize, Carrie Bow Cay	16° 47' 0" N, 88° 04' 0" W	25 May 1976	G. Bretschko
1007785	1	Belize, Carrie Bow Cay	16° 47' 0" N, 88° 04' 0" W	May 1991	R. Gullede
14562	12	Honduras, Swan Islands, Swan Island	17° 25' 0" N, 83° 55' 0" W	Feb 1887	G. Townsend
46075	1	Honduras, Swan Islands, Swan Island	17° 25' 0" N, 83° 55' 0" W	Feb 1887	G. Townsend
267618	1	Panama, Canal Zone, Galeta Island	09° 24' 03" N, 79° 52' 11" W	14 Jul 1969	L. Abele
267552	30	Panama, Canal Zone, Galeta Island, mangrove swamp	09° 24' 03" N, 79° 52' 11" W	22 Jan 1971	L. Abele
267616	2	Panama, Canal Zone, Limon Bay, Fort Randolph at base of jetty	09° 23' 04" N, 79° 53' 16" W	4 Jan 1969	L. Abele & J. Graham
1023015	1	Panama, Canal Zone, Limon Bay, Fort Sherman, Toro Point	09° 22' N, 79° 57' W	24 Jan 1912	Meek & Hildebrand
1023018	1	Panama, Chagres River, about 2 miles N of mouth of Chagres River	09° 13' 45" N, 79° 32' 10" W		P. Weems
57723	1	Panama, Colon	09° 10' 0" N, 80° 0' 0" W	1923	
2511	12	Panama, Colon	09° 10' 0" N, 80° 0' 0" W		
7554	13	Colombia, Providencia Island	13° 01' 30" N, 81° 25' 0" W	4 Apr 1884	USFC
22557	3	Colombia, Santa Marta	11° 14' N, 74° 12' W		
95709	3	Venezuela, Isla Los Roques	11° 46' N, 66° 37' W	Sep 1950	F. Weibezahn
154544	29	Venezuela, Aves Island	10° 36' N, 71° 33' W	Nov 1971	W. Ramey
154545	3	Venezuela, Aves Island	10° 36' N, 71° 33' W	Jul 1972	W. Ramey
18822	1	Venezuela, La Guaira	10° 36' N, 66° 56' W	26 Jul 1895	
1023017	1	Venezuela, Puerto La Cruz	10° 13' 0" N, 64° 37' 0" W	Jul 1928 to Dec 1928	E. Holt

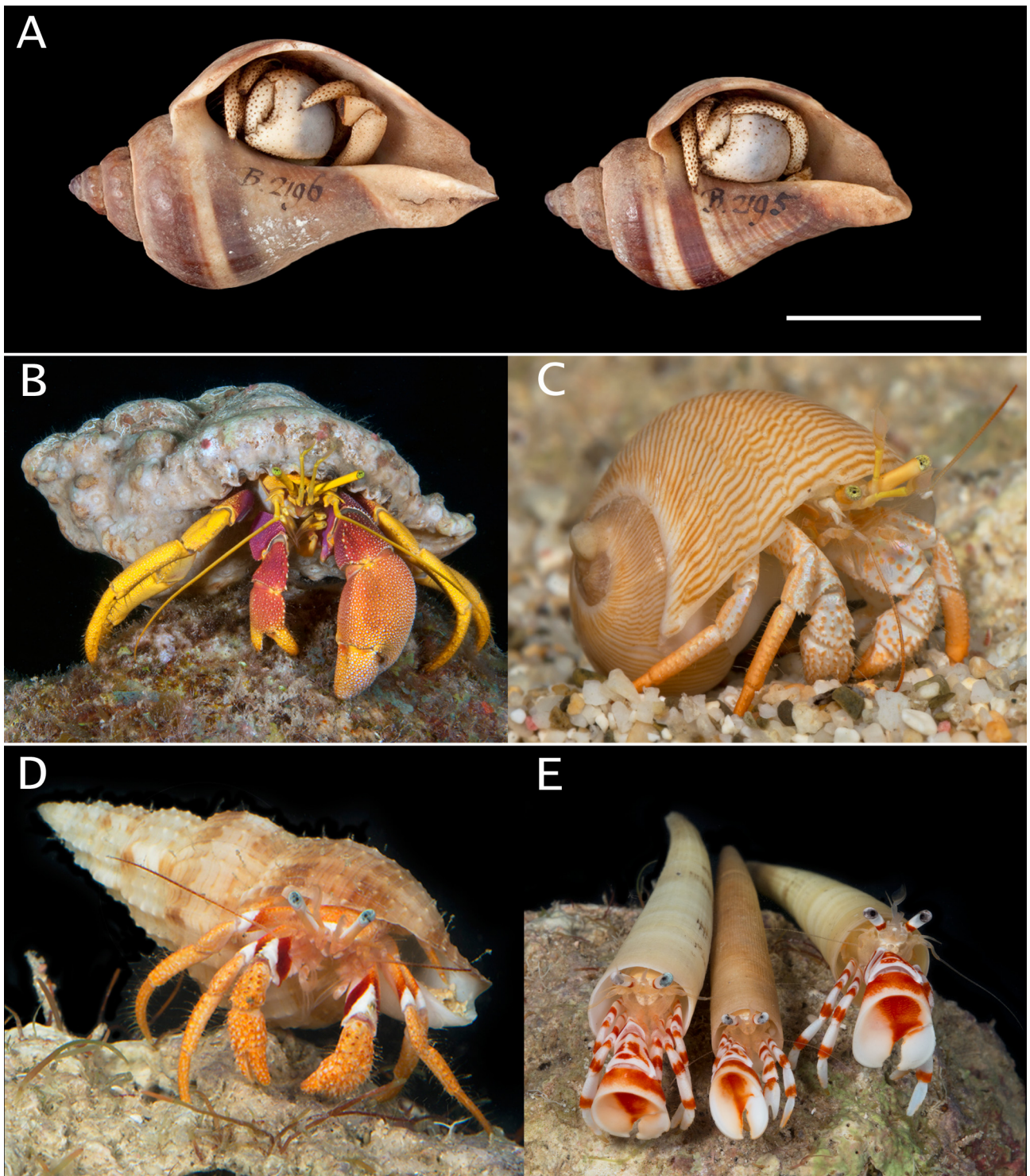


FIGURE 1. A, *Coenobita clypeatus* (Fabricius, 1787), in gastropod *Melongena melongena*: dry specimens [not sexed or measured], W. J. Broderip collection (NHM B2195, NHM B2196); B, *Allodardanus bredini* Haig & Provenzano, 1965, female 10.1 mm, in gastropod shell, Curaçao, *Curasub* 13–21 (USNM 1253325); C, *Bathynarius anomalus* (A. Milne-Edwards & Bouvier, 1893), in gastropod shell, male, 4.0 mm, Curaçao 12–11, CURI 12088 (USNM 1253278); D, *Paguristes spinipes* A. Milne-Edwards, 1880, in gastropod shell: male 4.8 mm, Curaçao, *Curasub* 12–03, CURI 12040 (USNM 1253258); E, *Pylopagurus discoidalis* (A. Milne-Edwards, 1880), in scaphopod shells: male 6.3 mm (right), 1 female 5.1 mm (center), 1 ov female 5.8 mm (left), Curaçao, *Curasub* 12–09 (right and center specimens: CURI 12030, CURI 12031, USNM 1253259; left specimen USNM 1253260). (Photos: A, H. Taylor, NHM; B–E, B.B. Brown, Curaçao Seaquarium). Scale: 20 mm (A).

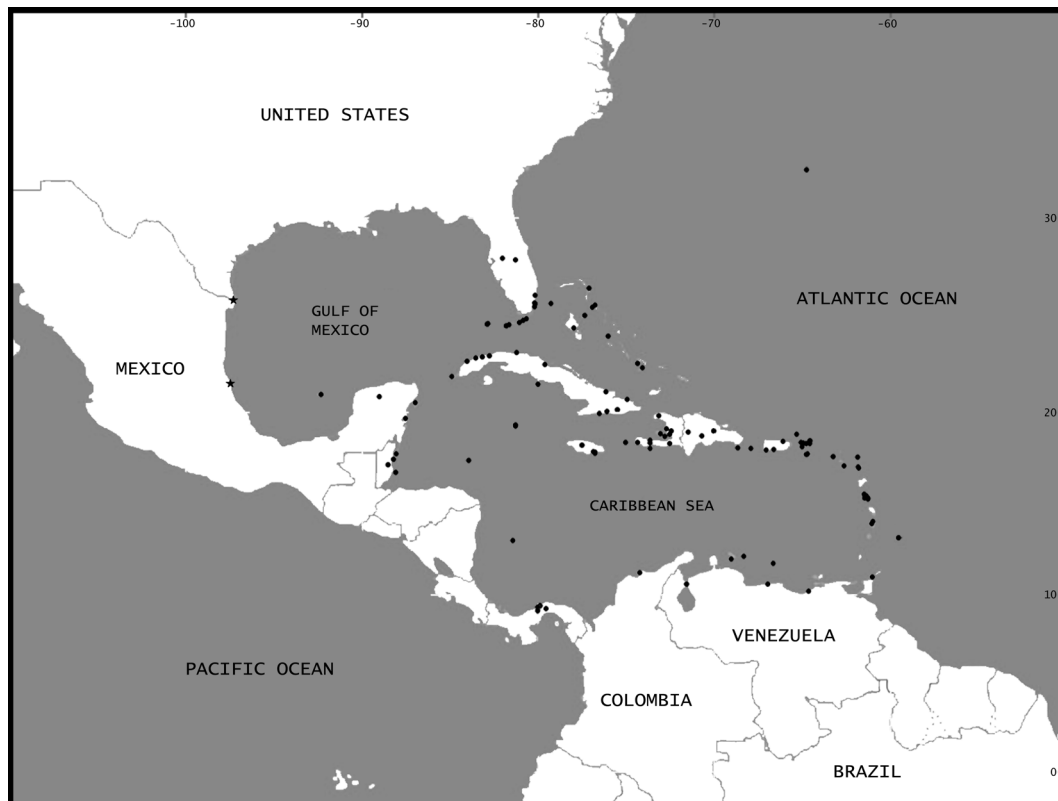


FIGURE 2. Distribution of *Coenobita clypeatus* (Fabricius, 1787), based on specimens deposited in USNM (black circles), and records by Rodríguez-Almaraz & Zavala-Flores (2005) from Matamoros and Tampico, Mexico (stars). For localities indicated in black circles, see Table 2.

Diagnosis. See Forest (1987).

Distribution. Western Atlantic: from off North Carolina, Gulf of Mexico, Bahamas, and Caribbean Sea to Brazil on the coasts of Amapá, Pará, Ceará, Rio de Janeiro and São Paulo (see Remarks). Depth: 194 to 567 m.

Remarks. The first record of this species from the Brazilian coast is based on material collected on board the R/V *Oregon* at station 2066, off the coast of Maranhão (2°40'N, 47°55'W) and reported in a list of species by Bullis & Thompson (1965), although the deposition of their material is unknown and thus it has not been possible to examine the specimens. A second report of *M. paradoxus* was documented by Coelho (1996) from further north, off the coast of the State of Amapá (5°09'00"N, 50°42'00"W). Thus, in his manual of decapods from Brazil, Melo (1999) indicated a range in Brazil for this species from Amapá to Maranhão, based on the previous records from Bullis & Thompson (1965) and Coelho (1996). Coelho *et al.* (2007) was mistaken in giving Amapá and Pará (instead of Maranhão) as the distribution range of this species. The abundant material reported herein is from much further south, as far as Santos, about 24°S, off the coast of São Paulo.

Family Diogenidae

Allodardanus bredini Haig & Provenzano, 1965

(Fig. 1B)

Allodardanus bredini Haig & Provenzano, 1965: 203, figs 2, 5 (type locality: R/V *Freelance*, sta 71–58, St. Kitts and Nevis, WSW of Charlestown, Caribbean Sea).—McLaughlin & Gore, 1985: 40.—Chace *et al.*, 1986: 335, fig. 10.7.—McLaughlin *et al.*, 2010: 18.

Type material. Holotype female 11.4 mm, Caribbean Sea, St. Kitts and Nevis, WSW of Charlestown, R/V *Freelance*, sta 71–58, Smithsonian-Bredin Caribbean Expedition, “Finlay” trap, 230 m, 16 Apr 1958 (USNM)

111172); paratype male 11.1 mm, Straits of Florida, off N side of Cay Sal Bank, Bahamas, R/V *Silver Bay*, sta 2445, 24°08'N, 80°08'W, 252 m, 3 Nov 1960 (USNM 111173).

New material. *Bermuda*. 1.5 miles off Castle Roads, 32°19'N, 64°18'W, trap, 450 m, 16 Oct 1974, coll. A. Guest: 1 female 12.2 mm (USNM 151534); 32°20'N, 64°45'W, [no date or depth]: 1 female 12.4 mm (USNM 243420).

Curaçao. *Curasub* 12–04, 265 m, 23 May 2012: 1 male 10.3 mm, CURI 12146 (USNM 1253275); *Curasub* 13–21, 171.6–248.1 m, 17 Aug 2013: 1 female 10.1 mm (USNM 1253325).

Diagnosis. See Haig & Provenzano (1965).

Distribution. Northwestern Atlantic: from Bermuda, Straits of Florida, and Bahamas, to Curaçao in the southern Caribbean Sea. Depth: 100 to 450 m.

Color (Fig. 1B). Second and third maxillipeds, shield and cephalic appendages, and calcified portions of posterior carapace and branchiostegites, bright yellow or yellow-orange; corneae yellowish-green with some black pigmentation centrally. Cheliped with outer surfaces of meri, carpi and palm with lightly yellow-colored granules over purple to yellow-orange background, purple background strong on meri, fading distally thereafter and becoming pink to yellow-orange on palm and fingers; meri and carpi bright purple on inner surfaces. Ambulatory legs (second and third pereopods) with meri bright purple except for yellow distal portion; carpi, propodi and dactyl bright yellow, dactyl yellow-orange distally. Fourth and fifth pereopods yellow or yellow-orange.

Remarks. Previous to this report, *Allodardanus bredini* was known only from Bermuda, Straits of Florida, Bahamas, and St. Kitts and Nevis in the Lesser Antilles (Haig & Provenzano 1965; Chace *et al.* 1986). Thus, the finding of this species in Curaçao considerably extends its range to the south virtually across the entire Caribbean.

The coloration of this species was documented in the original description by Haig & Provenzano (1965), although based on preserved specimens. Subsequently, a brief description of color, along with a photograph, was reported by Chace *et al.* (1986: pl. 10, fig 7) based on specimens from Bermuda. The detailed coloration and photograph presented herein of *A. bredini* is based on live specimens captured in Curaçao (Fig. 1B), and is the most detailed known so far.

***Bathynarius anomalus* (A. Milne-Edwards & Bouvier, 1893)**

(Fig. 1C)

Clibanarius anomalus A. Milne-Edwards & Bouvier, 1893: 157, pl. 11, figs 13–23 (type locality: Barbados).

Bathynarius anomalus.—Forest, 1989: 763, figs. 1, 4b, 5b, d, g, j, k, 7b, 8b.—McLaughlin *et al.*, 2010: 18.

Type material. Holotype ov female (not examined) 8 mm, *Hassler*, Barbados, 183 m, MCZ.

New material. *Bermuda*. S shore, about 2 miles off Tuckers Town, trap, 200–220 m, 16 Aug 1975, coll. J. Markham: 2 males 3.1, 6.7 mm (USNM 154617).

Bahamas. North Bimini, sta 8, 25°43'58"N, 79°19'25"W, 300 m, 13 May 2005: 1 male 3.7 mm, 2 females 2.8, 3.6 mm, 1 ov female 3.6 mm (USNM 1106027); New Providence Island, off Goulding's Cay, JSL-II-2587, 25°02'30 N, 35°12'W, coll. M. Harasewych & T. Askew, submersible, 518 m, 25 May 1995: 2 females 2.7, 4.5 mm (USNM 275959).

Caribbean Sea. Mexico, Quintana Roo, Yucatan Channel, Arrowsmith Bank, R/V *Gerda*, sta cruise 7028, sta 1270, 21°05'N, 86°31'W, 207–430 m, 20 Aug 1970: 6 males 3.0–5.8 mm, 3 females 3.0–4.0 mm (USNM 276093); Colombia, SE of Serrana Bank, R/V *Oregon*, sta 4834, 14°14'12"N, 80°28'30"W, 274–293 m, 12 May 1964: 1 male 5.2 mm (USNM 122456).

Curaçao. *Curasub* 12–08, [no depth recorded], 28 May 2012: 1 female 3.0 mm (USNM 1253288); *Curasub* 12–09, [no depth recorded], 29 May 2012: 1 male 3.7 mm, CURI 12038 (USNM 1253287); *Curasub* 12–11, 220 m, 6 Aug 2012: 1 male 4.5 mm, CURI 12079 (USNM 1253286), 1 male 5.5 CURI 12080 (USNM 1253279), 1 female 4.0 mm, CURI 12081 (USNM 1253276), 1 female 4.9 mm, CURI 12084 (USNM 1253277), 1 male 2.8 mm, CURI 12086 (USNM 1253280), 1 male 4.0 mm, CURI 12088 (USNM 1253278); *Curasub* 12–12, 290 m, 7 Aug 2012: 1 male 3.6 mm, CURI 12126 (USNM 1253282), 1 male 4.1 mm, CURI 12128, (USNM 1253283), 1 ov. female 4.0 mm, CURI 12129 (USNM 1253281); *Curasub* 12–04, 265 m, 23 May 2012: 1 male 3.3 mm, CURI 12098 (USNM 1253284); *Curasub* 12–14, 123.1–256 m, 9 Aug 2012: 1 female 4.8 mm (USNM 1253285).

Diagnosis. See Forest (1989).

Distribution. Northwestern Atlantic: from Straits of Florida, Bahamas, and Caribbean Sea. Depth: 150 to 472 m.

Color (Fig. 1C). General background coloration of thorax and thoracic appendages white. Shield white with light orange portions medially on anterior third and on each side posteriorly. Posterior carapace white except for light orange portions on posteromedian and posterolateral plates. Ocular peduncles light orange or yellowish; cornea bright yellow with black spots. Antennules with basal and penultimate segments light yellow, ultimate segment bright yellow. Antennae with peduncles white, flagella light orange. Chelipeds white and covered with numerous small orange spots; fingers becoming orangish distally. Ambulatory legs (second and third pereopods) similarly colored as chelipeds on ischia, meri and carpi; propodus white-light orange; dactyls orange. Fourth and fifth pereopods white.

Remarks. Forest (1989) redescribed this species in detail when he placed *Clibanarius anomalus* in his new genus *Bathynarius* Forest, 1989. He used preserved specimens for his documentation of color in *B. anomalus*, although in a footnote added color notes obtained from P.A. McLaughlin that were presumably based on live specimens. However, the notes included by Forest differ from our observations of live specimens collected in Curaçao on board the *Curasub*. Forest (1989: 766, 784) describes a general coloration consisting of a light salmon-pink, and pink ocular peduncles, antennules and antennae, whereas our live specimens are distinctly white with numerous orange spots, with an orange color on distal portions of cheliped fingers, and meri and dactyls of ambulatory legs (Fig. 1C). It would appear that McLaughlin's notes were also based on preserved specimens albeit perhaps not as old as Forest's, and thus the coloration of *B. anomalus* presented herein is the first actually based on live specimens.

***Clibanarius symmetricus* (Randall, 1840)**

Pagurus symmetricus Randall, 1840: 133 [type locality: Suriname, restricted by lectotype selection by Negri *et al.*, 2014].

Clibanarius vittatus.—Moreira, 1901: 28.—Holthuis, 1959: 141, figs 26a, b, 27.—Forest & de Saint Laurent, 1968: 104.—

Sánchez & Campos, 1978: 32, fig. 9.—Coelho & Ramos- Porto, 1986: 52.—Rieger, 1998: 422.—Melo, 1999: 56, fig. 14.—Nucci & Melo, 2015: 334, figs 2D, 6B. (See Remarks).

Clibanarius symmetricus.—Negri *et al.* 2014: 851, figs 1A–C, 2B, C, 3–5 [and synonymy therein].

Type material. Lectotype (dry) 11.2 mm selected by Negri *et al.* (2014), sex undetermined due to damaged ventral thorax and missing pleon, Suriname, [no other data], coll. Dr. Herring (ANSP 3229); paralectotype, 1 dry specimen, sex undetermined, 9.5 mm, "East Indies", [no other data], coll. J. Longstreth (ANSP 3229).

Diagnosis. See Negri *et al.* (2014)

Distribution. Western Atlantic: from Caribbean Sea to Santa Catarina, Brazil. Depth: intertidal or shallow waters less than 1 m, rarely to 22 m (Negri *et al.* 2014).

Remarks. Using an analysis of the barcode region of the COI gene, Negri *et al.* (2014) recently resurrected the name *Clibanarius symmetricus* for this species which had been confounded for over 170 years under the name *Clibanarius vittatus* (Bosc, 1802). The latter name had been applied to a common littoral species presumed to range broadly in the western Atlantic from the southeastern United States and Gulf of Mexico to Brazil. However, Negri *et al.* (2014) demonstrated based on molecular and morphological (color) data that *C. vittatus* *sensu lato* actually contained two species, and that the name *C. vittatus* applies only to a species distributed in the southeastern coast of the United States and Gulf of Mexico, whereas the name *C. symmetricus* should be applied to this species that occurs in the western and southern Caribbean to Brazil. Thus, any previous records reported as "*Clibanarius vittatus*" from the western Caribbean to Brazil, actually refer to *C. symmetricus*. Nucci & Melo's (2015) report of *C. vittatus* from Brazil was in press when the study by Negri *et al.* (2014) was published, and the former authors could not replace in time the name *C. vittatus* by *C. symmetricus*.

As discussed in detail by Negri *et al.* (2014), the difference in coloration of the carpi of the ambulatory legs is the only reliable morphological character to separate *Clibanarius symmetricus* from *C. vittatus* *sensu stricto*. The carpi in *C. symmetricus* each have three straight, whitish longitudinal stripes, two on the lateral face and one on the dorsal or dorsolateral margin, whereas the carpi in *C. vittatus* *sensu stricto* each have four stripes on the lateral face: one straight lateroventral, two submedian and approximate (with the lower stripe slightly curving proximally and

together with the upper stripe forming the top of a blunt, posteriorly skewed triangle), and one straight dorsolateral.

***Paguristes spectabilis* McLaughlin & Provenzano, 1975**

(Figs. 3–5)

Paguristes spectabilis McLaughlin & Provenzano, 1975: 886, figs 1–3 (type locality: off Trinidad, 11°14.5'N, 61°46.2'W).—
McLaughlin *et al.*, 2010: 23.

Type material. *Caribbean Sea, Lesser Antilles.* Holotype female 4.9 mm, off Trinidad, R/V *Pillsbury*, sta P-849, 11°14.5'N, 61°46.2'W, 137–143 m, 2 Jul 1969 (USNM 143639).

New material. *Brazil.* São Paulo, TAAF MD55, sta 63 CB 104, 23°42'S, 42°07'W, 430 m, 1 Jun 1987: 1 female 4.6 mm, 1 ov female 4.5 mm (MZUSP 16814).

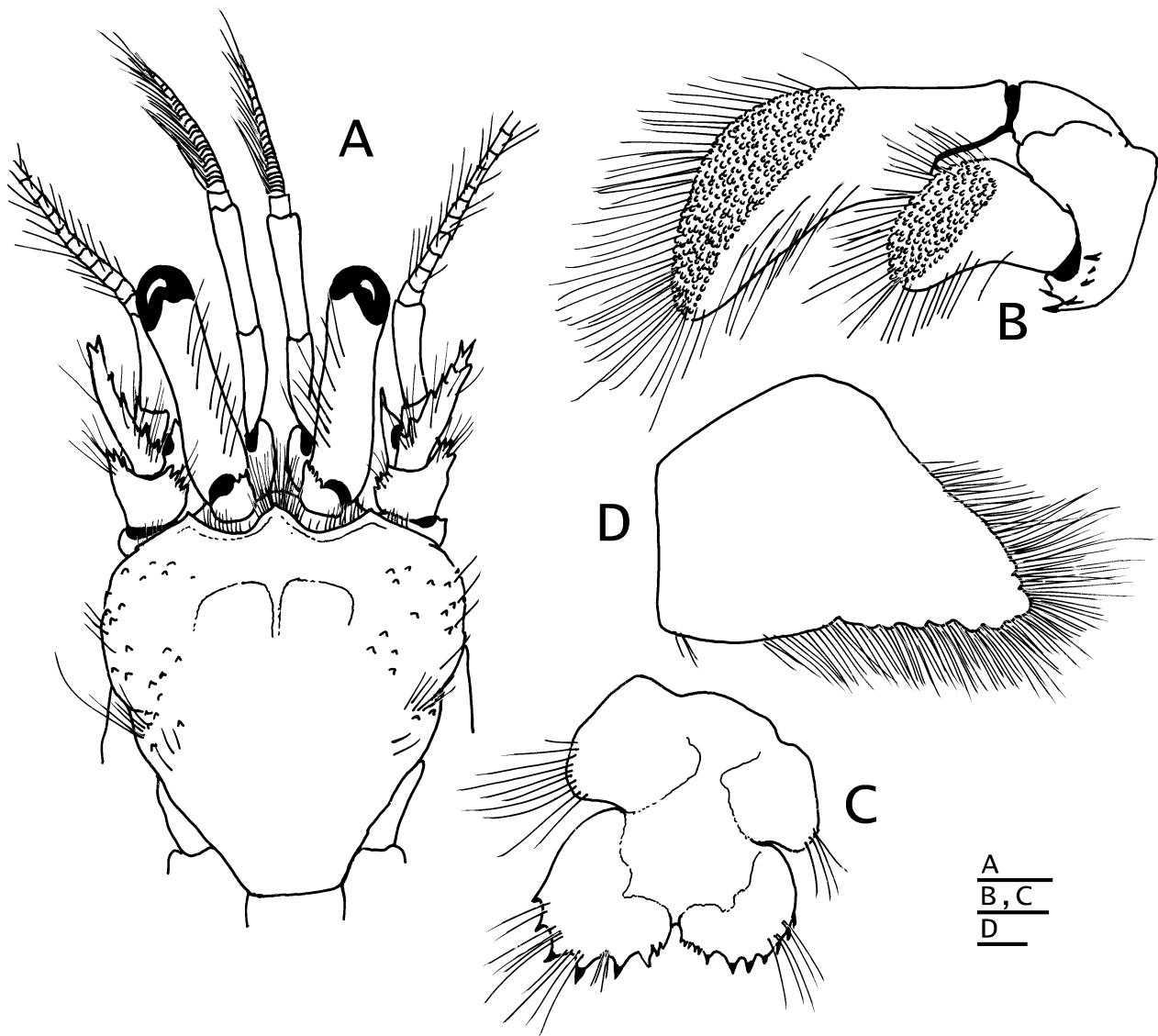


FIGURE 3. *Paguristes spectabilis* McLaughlin & Provenzano, 1975: female 4.6 mm, Brazil, TAAF MD55, sta 63 CB 104 (MZUSP 16814). A, shield and cephalic appendages, dorsal; B, left uropod, dorsal; C, telson, dorsal; D, female brood pouch on fourth pleopod. Scales 1 mm (A, D), 0.5 mm B, C).

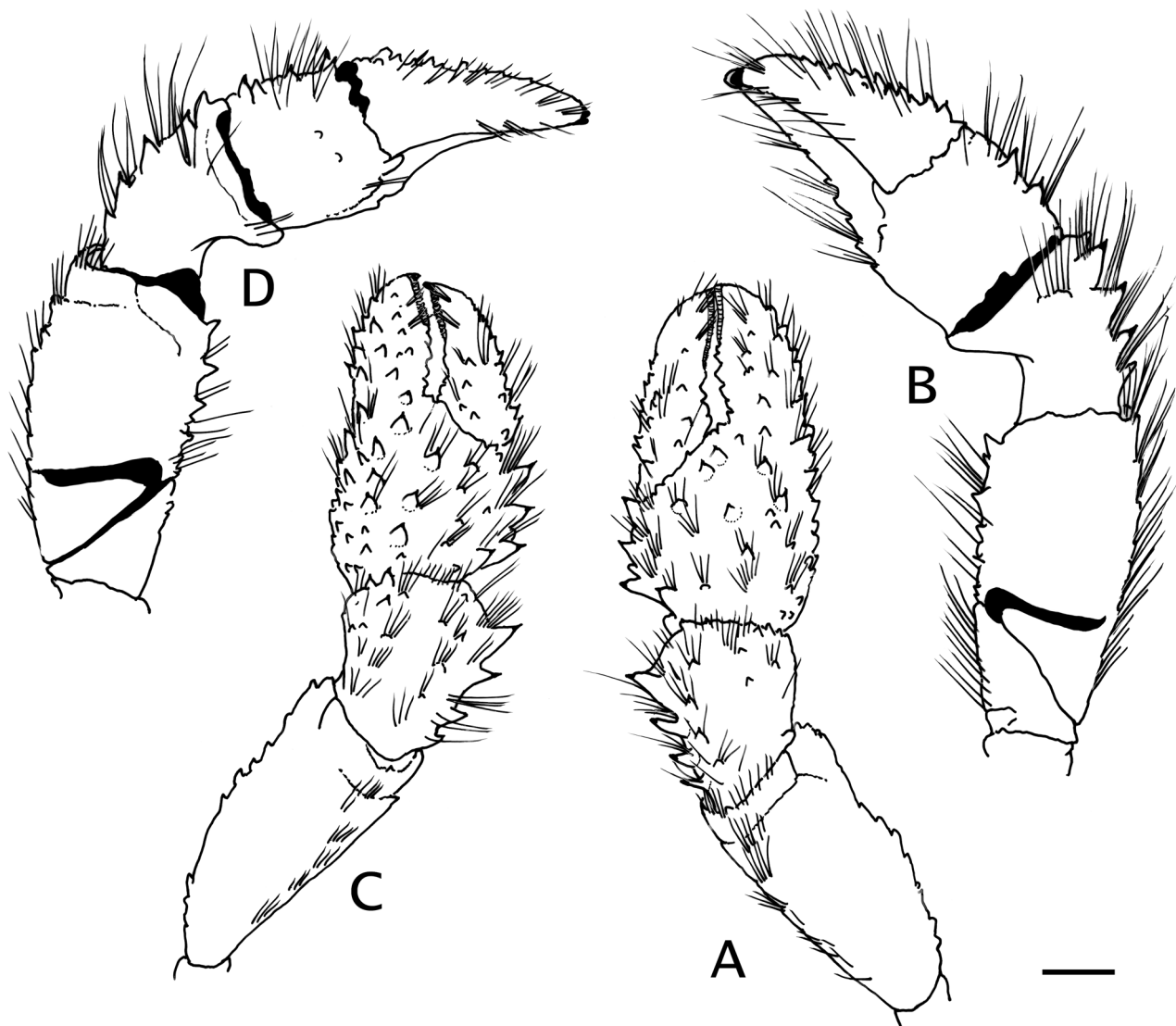


FIGURE 4. *Paguristes spectabilis* McLaughlin & Provenzano, 1875: female 4.6 mm, Brazil, TAAF MD55, sta 63 CB 104 (MZUSP 16814). A, right cheliped, dorsal; B, same mesial; C, left cheliped, dorsal; D, same, mesial. Scale: 1 mm.

Diagnosis. Thirteen pairs of biserial gills. Shield (Fig. 1A) slightly longer than broad, (about 1.1 as long as broad); dorsal surface with tufts of setae and irregular rows of small spines or tubercles on dorsolateral surfaces; anteromedian region subdivided into 2 low, rounded ridges. Rostrum subtriangular, reaching to about same level of lateral projections and ending in minute spine, margins with fringe of long setae. Lateral projections broadly subtriangular, terminating in small spine. Ocular peduncles about 0.6 times as long as shield, with dorsal row of long setae; corneas weakly dilated; ocular acicles subtriangular, each terminating in simple spine with 1–3 accessory spines laterally. Antennular peduncles slender, exceeding distal margins of corneas by about 0.2 length of ultimate segment. Antennal peduncles short, reaching to about midlevel of corneas; second segment with distolateral angle strongly produced, terminating in strong, multifid spine, mesial margin with row of 3 or 4 small spines; acicle reaching to about proximal margin of cornea, terminating in strongly bifid spine, with 3 or 4 distinct spines mesially and unarmed or with up to 4 small spines laterally; fourth segment with distinct lateral dorsodistal spine; flagellum short, reaching to about distal tip of chelipeds, with numerous setae 1–3 flagellar articles in length. Third maxilliped merus armed with 3–6 small, blunt ventral spines; ischium with crista dentata consisting of row of 18–20 small, subequal corneous teeth; basis unarmed except for row of long setae mesially. Chelipeds (Fig. 4A–D) subequal in strength and size, moderately setose, similarly armed on meri, carpi and chelae with spines (most corneous tipped); fixed finger and palm with distinct, well spaced and mostly corneous-tipped spines on dorsolateral surfaces; carpi and palm each with row of strong spines on dorsomesial margin; meri mostly smooth

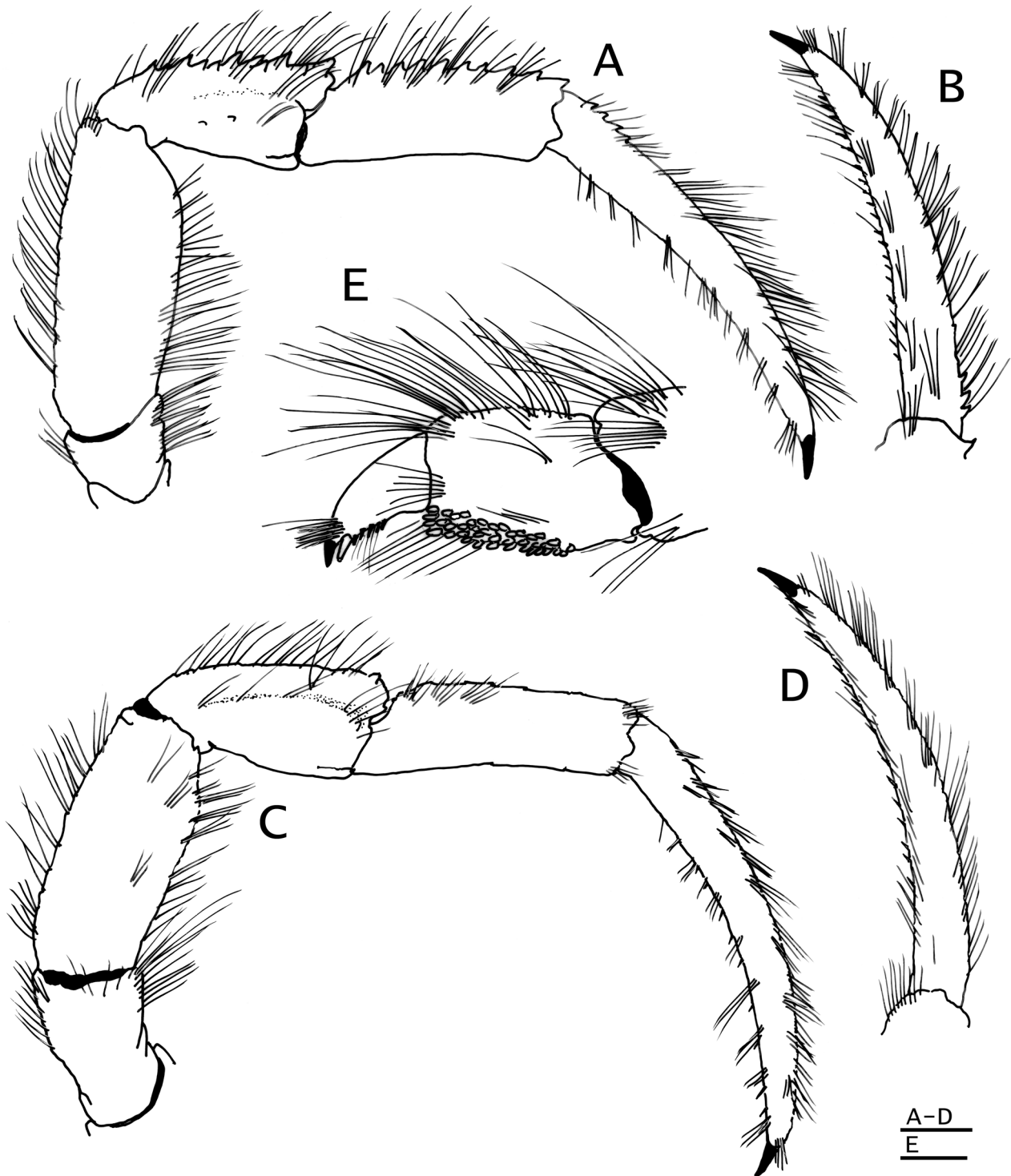


FIGURE 5. *Paguristes spectabilis* McLaughlin & Provenzano, 1875: female 4.6 mm, Brazil, TAAF MD55, sta 63 CB 104 (MZUSP 16814). A, right second pereopod, lateral; B, dactyl of same, mesial; C, right third pereopod, lateral; D, dactyl of same, mesial; E, propodus and dactyl of left fourth pereopod, lateral. Scales: 1 mm (A–D), 0.5 mm (E).

except for ventromesial row of small spines, and ventrolateral row of long setae. Ambulatory legs (Fig. 5A–D) with moderately dense setae or tufts of setae, denser on dactyls; carpi with weak dorsolateral longitudinal groove; carpus and propodus of first ambulatory leg with dorsal row of strong spines; carpus of second ambulatory leg with small dorsodistal spine, propodus unarmed except for tufts of setae on dorsal and ventral margins; dactyls 2.0–2.1 times as long as propodus, with numerous tufts of setae, and ventromesial row of 20–25 minute corneous spines. Fourth pereopod (Fig. 5E) semichelate; dactyl with prominent preungual process at base of claw, and ventrolateral row of corneous spinules; propodal rasp consisting of 2–4 rows of ovate, corneous scales (number of rows increasing

distally). Protopod of uropods (Fig. 3B) with irregular row of sharp, corneous-tipped spines on ventral angle. Telson (Fig. 3C) with lobes slightly asymmetrical; posterior lobes separated by narrow, median cleft, terminal margins rounded, setose, and armed with strong spines of which distalmost are strongest and corneous-tipped. Female with paired first gonopods and left pleopods 2–5; first gonopod with plumose setae, distal lobe slender; brood pouch (Fig. 3D) well developed over pleopod 4, subquadrate or subtrapezoidal, margins setose (setae denser in ovigerous females). Male unknown.

Distribution. Western Atlantic: from Trinidad, in the Caribbean Sea, and off São Paulo, Brazil, in southwestern Atlantic. Depth: 137 to 430 m.

Color. See McLaughlin & Provenzano (1975).

Remarks. *Paguristes spectabilis* was previously known only from the holotype collected in the extreme southeastern Caribbean, off Trinidad (McLaughlin & Provenzano 1975). Thus, the range of this species is expanded considerably by nearly 34° of latitude to the southwestern Atlantic, reaching to off Rio de Janeiro, Brazil. The two females reported herein differ slightly from the holotype of *P. spectabilis* in having two or three accessory spines on the lateral margins, instead of one as in the holotype; and lacking spines on the lateral margins of the anterior lobes of the telson, whereas the lobes in the holotype have one (left lobe) or three (right lobe) small spines. Both differences can be attributed to intraspecific variations.

McLaughlin & Provenzano (1975) did not indicate in *Paguristes spectabilis* the presence of a preungual process, which herein is documented to occur in this species as conical and elongate in shape, and weakly calcified (Fig. 5E). Although this diagnostic structure had been discovered several years earlier by de Saint Laurent (1969b) in *Solenopagurus*, at the time of the description of *P. spectabilis*, it was not yet customary to observe for the presence of this process.

Males of this species remain unknown.

***Paguristes spinipes* A. Milne-Edwards, 1880**

(Figs. 1D, 6–11)

Paguristes spinipes A. Milne-Edwards, 1880: 44 (type locality: Grenada, USSS *Blake*, sta 253, 11°25'N, 62°04'15"W).—A. Milne-Edwards & Bouvier, 1893: 33, pl. 3, figs 1–13.—Lemaitre & Felder, 2012: 69, tab. 1.—Forest & de Saint Laurent, 1968: 68.—Williams, 1965: 118, fig. 95.—Williams, 1984: 204, fig. 143.—Coelho & Ramos, 1973: 167.—Provenzano, 1978: 512, figs 1–8 (larvae).—Coelho & Santos, 1980: 142.—Abele & Kim, 1986: 346, 347, figs. [unnumbered] f, g.—Coelho & Ramos-Porto, 1987: 48.—Rieger, 1998: 419.—Melo, 1999: 86, figs. 39, 40.—Manjón-Cabeza *et al.*, 2002: 137.—Nizinski, 2003: 118.—Rodríguez-Almaraz & Zavala-Flores, 2005: 293, fig. 20.—Felder *et al.*, 2009: 1069.—McLaughlin *et al.*, 2010: 23.

Paguristes visor Henderson, 1888: 78, pl. 8, fig. 3.—Forest & de Saint Laurent, 1968: 68.

Paguristes armatus Hay, 1917: 73.—Hay & Shore, 1918: 409, fig. 15, pl. 30, fig. 7.

Type material. Holotype female 6.6 mm, USSS *Blake*, sta 253, Caribbean Sea, Grenada, 11°25'N, 62°04'15"W, 176 m, 27 Feb 1879, coll. A. Agassiz (MCZ 3985).

Lectotype, herein selected, of *Paguristes visor* Henderson, 1888: male 10.0 mm, H.M.S. *Challenger*, sta 122, off Alagoas, 9°5'S, 34°50'W, 640 m, 10 Sep 1873 (BM 88.33); paralectotype: 1 male 5.0 mm, same sta as lectotype (BM 88.33).

Holotype of *Paguristes armatus* Hay, 1917: female 5.1 mm, [off coast of North Carolina], 30 miles due S of Cape Lookout lightship, [no depth], [day, month not recorded] 1915 (USNM 49699).

New material. *Southeastern coast of United States.* Off Cape Canaveral, Florida: R/V *Combat*, sta 235, 27°27'N, 78°58'W, 329 m, 2 Feb 1957: 1 female 8.3 mm (USNM 101363); R/V *Combat*, sta 237, 27°28'N, 78°44'W, 393 m, 3 Feb 1957: 1 male 11.6 mm (USNM 101665).

Bahamas. New Providence Island, off Goulding's Cay, JSL-II-2587, 25°02'30"N, 35°12'W, 518 m, 25 May 1995, coll. M. Harasewych & T. Askew: 1 male 6.6 mm (USNM 275960).

Caribbean Sea. Cuba, [NE of Havana], USFC *Albatross*, sta 2327, 23°11'45"N, 82°17'54"W, 333 m, 17 Jan 1885: 1 male 4.3 mm (USNM 267540); Quintana Roo (Mexico), Cozumel Island, Yucatan Channel, USFC *Albatross*, sta 2354, 20°59'30"N, 86°23'45"W, 238 m, 22 Jan 1885: 1 female 8.6 mm (USNM 9550); St. Lucia [Lesser Antilles], R/V *Oregon*, sta 5956, 13°40'N, 60°54'W, 229 m, 10 Mar 1966: 4 males 8.6–9.6 mm, 1 female 8.8 mm (USNM 265305).

Gulf of Mexico. Off Sarasota, Florida, sta B-166, 179 m, 8 May 1952, coll. R. Stewart: 1 male 10.9 mm, 1 female 9.2 mm (USNM 103441); off western coast of Florida: sta MMS-SOFLA/2/II-32-TDS, 26°16'40"N, 84°04'05"W, 137 m, 25 Jul 1981: 3 males 3.6–5.1 mm, 1 female 3.0 mm, 1 ov female 6.6 mm (USNM 1017882); same sta data, 6 Feb 1982: 2 females 3.7, 6.4 mm (USNM 1021172); same sta data: 2 males 3.0, 3.3 mm, 1 female 9.8 mm (USNM 1073011); sta MMS-SOFLA/2/III-35-TDS, 25°44'50"N, 84°21'02"W, 159 m, 7 Feb 1982: 1 male 3.0 mm (USNM 1017913); same sta data: 2 males 3.0, 7.5 mm, 1 female 2.7 mm (USNM 1017915); sta MMS-SOFLA/2/III-36-TDS, 25°16'50"N, 83°57'21"W, 127 m, 9 Feb 1982: 1 female 7.8 mm (USNM 1072742); sta MMS-SOFLA/2/III-38-TDS, 25°16'30"N, 84°14'46"W, 159 m, 10 Feb 1982: 1 female 5.7 mm (USNM 1021170); sta MMS-SOFLA/2/III-39-RDS, 24°47'10 N, 83°55'22"W, 151.5 m, 10 Feb 1982: 1 male 9.5 mm (USNM 1021171).

Curacao. *Curasub* 12–03: 28 May 2012, 145–183 m: male 4.8 mm, CURI 12040 (USNM 1253258); *Curasub* 12: 1 male 3.3 mm, CURI 12029, no other data recorded (USNM 1253266); *Curasub* 12–11: 220 m, 6 Aug 2012: 1 female 6.7 mm, CURI 12077 (USNM 1253265), 1 female, 7.1 mm, CURI 12078 (USNM 1253267), 1 male 6.4 mm, CURI 12083 (USNM 1253268); *Curasub* 12–12, 290 m, 7 Aug 2012: 1 ov female 8.5 mm, CURI 12124 (USNM 1253269), 1 male 7.5 mm, CURI 12125 (USNM 1253270), 1 male 6.0 mm, CURI 12131 (USNM 1253271), 1 ov female 6.7 mm, CURI 12132 (USNM 1253272); *Curasub* 12–13, 286 m, 8 Aug 2012: 1 male 6.6 mm, CURI 12142 (USNM 1253273); *Curasub* 12–02, 201 m, 22 May 2012: 1 female 9.6 mm, CURI 12152 (USNM 1253274).

Brazil. Bahia, REVIZEE—Comissão Central 2, PS/V *Astro Garoupa*, sta 6C, 15°54'23"S, 38°02'53"W, 340 m, 25 Oct 1997: 1 female 7.8 mm (MZUSP 16121).

Diagnosis. Thirteen pairs of quadriserial gills. Shield (Figs. 6A, 10A) distinctly longer than broad, ranging 1.1–1.3 as long as broad (narrowness increasing with specimen size); dorsal surface with scattered irregular rows of tufts of setae more numerous dorsolaterally, and irregular rows of small spines or tubercles on dorsolateral surface; anteromedian region subdivided into 2 low, rounded ridges. Rostrum (Figs. 6A, 9A, B, 10A) distinctly exceeding lateral projections, acutely triangular, often slender, and pointing slightly ventrally. Lateral projections broadly subtriangular, terminating in small spine. Ocular peduncles long, about 0.8 to as long as shield length, with dorsal row of tufts of short setae; corneas weakly dilated; ocular acicles subtriangular, each terminating in simple or rarely bifid spine (on one or both sides). Antennular peduncles slender, not exceeding distal margins of corneas. Antennal peduncles short, slender, at most reaching to about distal two-thirds of ocular peduncles; second segment with distolateral angle strongly produced, terminating in strong, bifid spine; acicle reaching to about distal three-fourths of fifth antennal segment, terminating in bifid spine and with 1–4 distinct spines mesially and laterally; fourth segment with weak lateral dorsodistal spine; flagellum exceeding tip of extended chelipeds, with series of long and short setae every 3 or 4 flagellar articles (long setae 3 or 4 articles in length, short setae \leq articles in length). Third maxilliped merus armed with 2–5 ventral spines; ischium with crista dentata consisting of row of 18–20 subequal, corneous teeth; basis with mesial row of small calcareous spines. Chelipeds (Figs. 1D, 6B–E, 10B–E) slightly unequal in strength, moderately setose, similarly armed on dorsal surfaces of carpi and chelae with dense spines (most corneous tipped and often curved forwardly); carpi, palm and dactyl each with row of strong spines on dorsomesial margin; meri mostly smooth except for scattered small tubercles, and row of small spines on dorsodistal and ventromesial margins. Ambulatory legs (Figs. 7, 11A–H) with moderately dense setae or tufts of setae, denser on propodi and dactyls; carpi with dorsolateral longitudinal groove; carpus and propodus of first ambulatory leg with dorsal row of strong spines; carpus of second ambulatory leg with weak row of small spines, propodus unarmed except for tufts of setae on dorsal and ventral margins; dactyls with numerous tufts of setae, and ventromesial row of 16–33 small corneous spines (spine number increasing with specimen size). Fourth pereopod (Fig. 8A) semichelate; dactyl with prominent preungual process at base of claw, and ventrolateral row of corneous spinules; propodal rasp consisting of 1–4 rows of ovate, corneous scales (number of rows increasing distally). Protopod of uropods (Fig. 6G) with several rows of small, sharp calcareous or corneous spines on ventral angle. Telson (Fig. 6F) with posterior lobes slightly to distinctly asymmetrical, roundly subtriangular, setose, and separated by shallow, median cleft. Male with paired first and second gonopods (Figs. 9C–E, 11I, J); first gonopod well developed, inferior lamella with distal margin armed with row of small, hooked corneous spines, external lobe naked, internal lobe with long setae on mesial margin; second gonopod with distal segment slightly twisted, setose distally. Female with paired first gonopods (Fig. 8B, C) and left pleopods 2–5; first gonopod with distal lobe slender, with plumose setae; with well developed, subcircular brood pouch (Fig. 6H) over left pleopod 4.

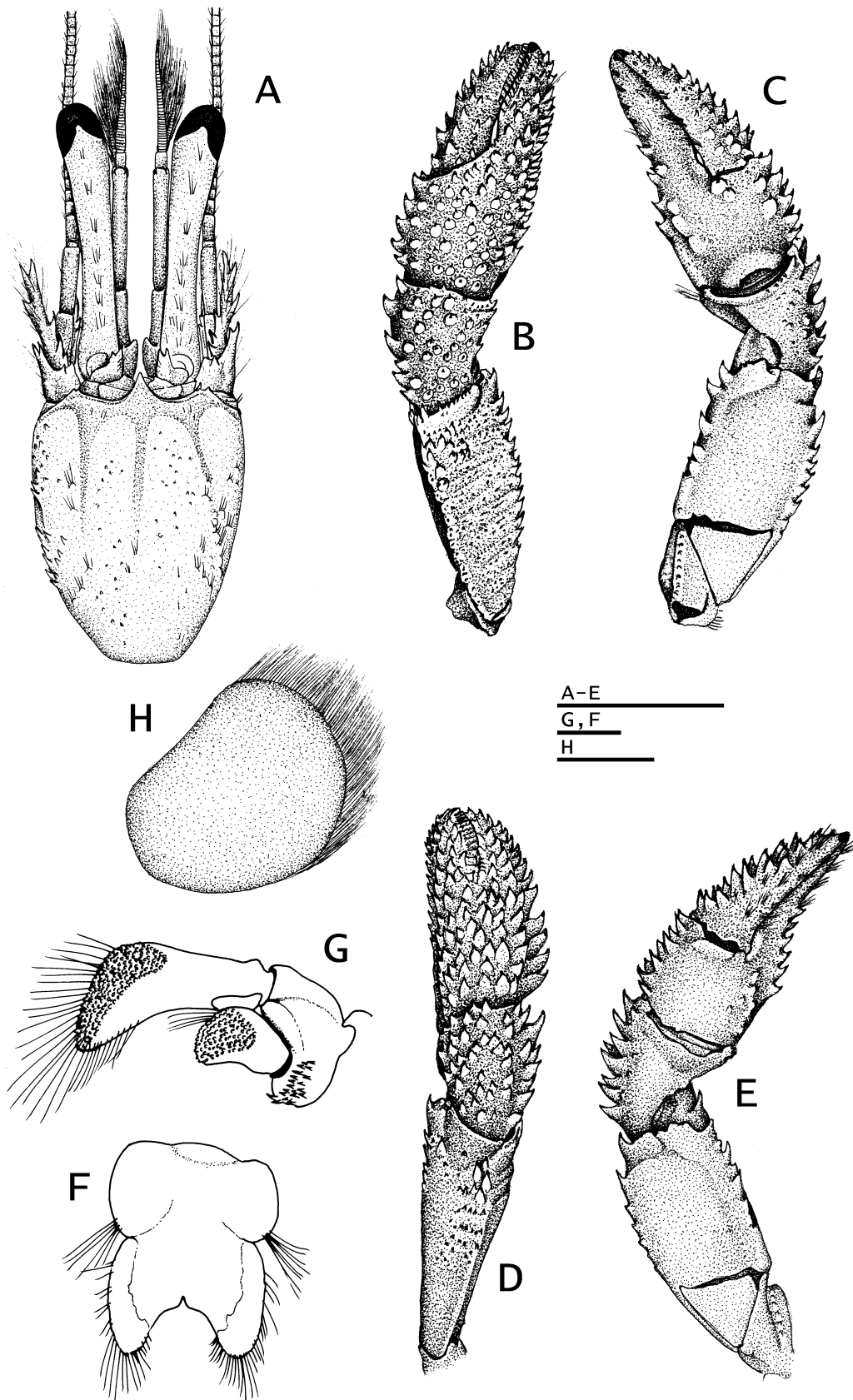


FIGURE 6. *Paguristes spinipes* A. Milne-Edwards, 1880: female 7.8 mm, Brazil, REVIZEE—Comissão Central 2, sta 6C (MZUSP 16121). A, shield and cephalic appendages, dorsal; B, right cheliped, dorsal; C, same, mesial; D, left cheliped, dorsal; E, same, mesial; F, telson, dorsal; G, left uropod, dorsal; H, female brood pouch on fourth pleopod. Scales: 5 mm (A–E, H), 1 mm (F, G).

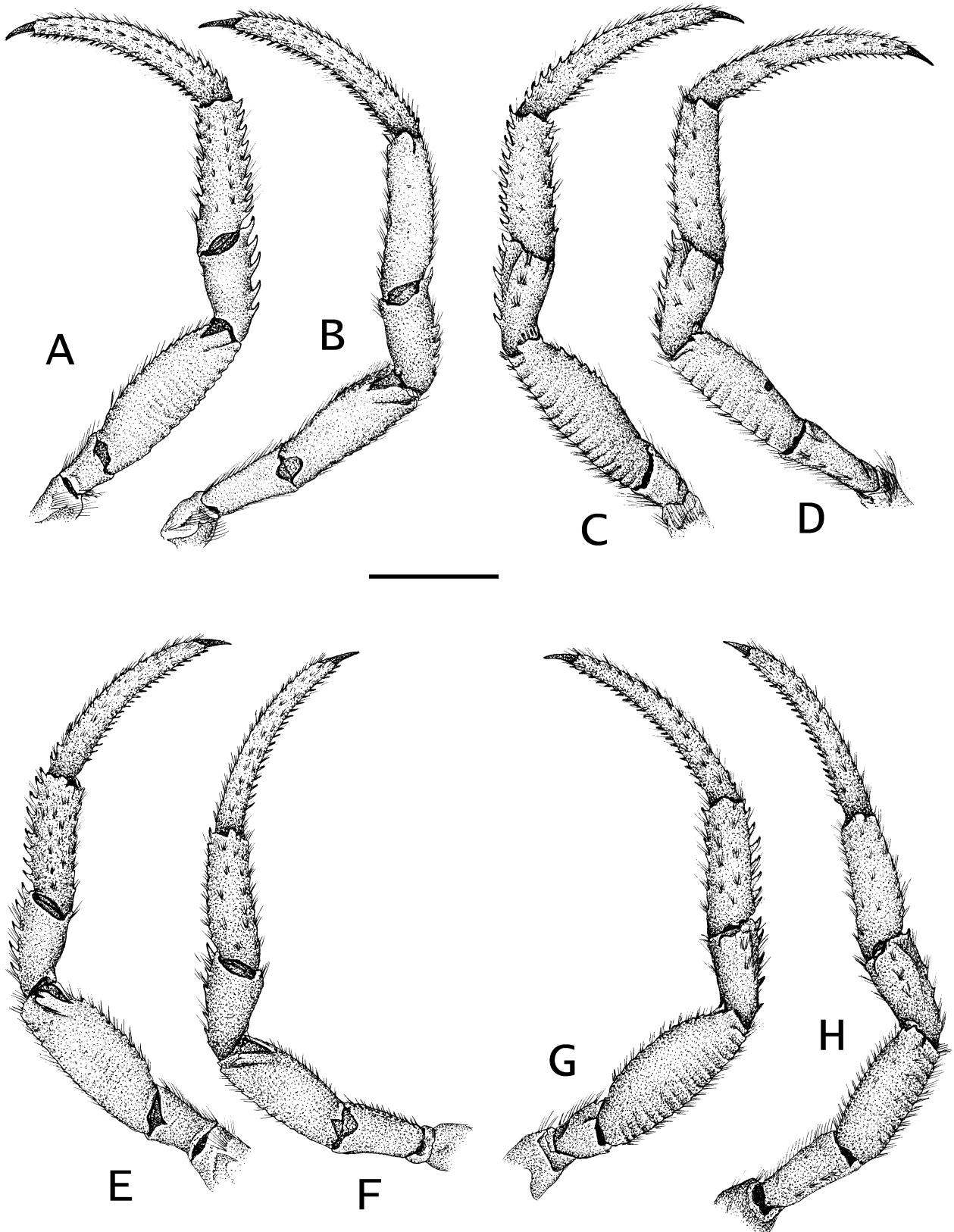


FIGURE 7. *Paguristes spinipes* A. Milne-Edwards, 1880: female 7.8 mm, Brazil, REVIZEE—Comissão Central 2, sta 6C (MZUSP 16121). A, C, right second pereopod in mesial (A) and lateral (C) view; B, D, right third pereopod in mesial (B) and lateral (D) view; E, G, left second pereopod in mesial (E) and lateral (G) view; F, H, left third pereopod in mesial (F) and lateral (H) view. Scale: 5 mm.

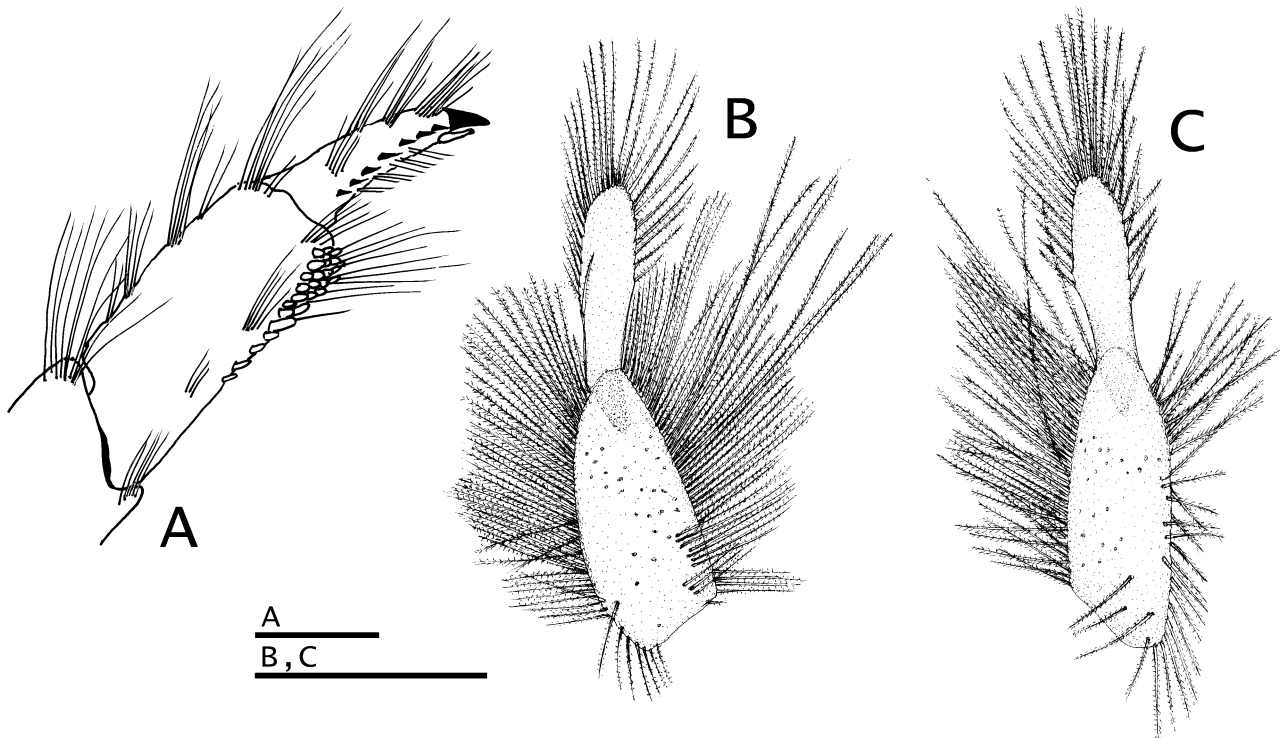


FIGURE 8. *Paguristes spinipes* A. Milne-Edwards, 1880: female 7.8 mm, Brazil, REVIZEE—Comissão Central 2, sta 6C (MZUSP 16121). A, propodus and dactyl of right fourth pereopod, lateral; B, C, right first gonopod, anterior (B) and posterior (C). Scales: 1 mm.

Color (Fig. 1D). General background color light to dark orange mottled with whitish spots and spines, chelipeds with whitish or dark orange-tipped spines. Shield with darker orange or reddish color anteriorly except for distinct white anterior margin and rostrum. Ocular peduncles white throughout dorsal surfaces, light orange ventrally; corneas light gray to light blue. Meri of chelipeds and ambulatory legs each distinctly white band distally and extending posteriorly on about one-third of dorsal margin, followed by dark orange-red band fading to light orange posteriorly, latter band darker on meri of chelipeds and gradually diminishing in darkness posteriorly on meri of ambulatory legs.

Distribution. Western Atlantic: from off the North Carolina to Florida, Bahamas, Gulf of Mexico, Caribbean Sea, and Brazil (off Alagoas and Bahia). Depth: 70 to 640 m.

Remarks. The single female specimen reported herein from Bahia, Brazil (MZUSP 16121) agrees with the description and types of *Paguristes spinipes*, originally obtained from further north (Alagoas, Brazil), except for the terminally bifid condition of its ocular acicles, and the slightly less asymmetrical condition of the terminal lobes of its telson. In some *Paguristes* species, however, the terminal spine of the ocular acicle is known to occasionally vary from simple to bifid (McLaughlin 2004b), and the subtle difference in telson asymmetry can be attributed to the expected intraspecific variation normally observed in many *Paguristes* species.

Paguristes visor Henderson, 1888, a species described using specimens from off Alagoas, Brazil, has been considered a junior synonym of *P. spinipes* for more than a century (A. Milne-Edwards & Bouvier 1893; Forest & de Saint Laurent 1968; Williams 1984; McLaughlin *et al.* 2010), although modern reports of new material or discussions about the morphology and color pattern of *P. spinipes* are sketchy and scattered in the literature. Forest & de Saint Laurent (1968), without any comments, considered *Paguristes armatus* Hay, 1917, a junior synonym of *P. spinipes*. Hay's original description was brief, lacking illustrations, and was based on a single female specimen collected off North Carolina on the eastern coast of the United States, although subsequently Hay & Shore (1918) did publish an illustration of the cephalothorax and chelipeds, and a photograph, of the same female. We have studied the types of all these three taxa, and compared them to our Brazilian female specimen as well as other unreported materials of *P. spinipes* deposited in the USNM, and can confirm based on morphological grounds that they are all conspecific. Nevertheless, given that Henderson (1888) did not select a holotype among the three

syntypes of his *P. visor*, and the morphological complexities as yet incompletely understood of western Atlantic species of *Paguristes*, we consider wise to select a lectotype in order to fix the name of that taxon, and in case future evidence may show that name to represent a different, valid species.

The diagnosis presented herein of *Paguristes spinipes* includes observed variations in the listed material examined. The characteristic coloration of the meri of chelipeds and ambulatory legs of this species (*i.e.*, with an orange-red or orange-yellow band) was only briefly mentioned by A. Milne-Edwards & Bouvier (1893), Hay & Shore (1918, as *P. armatus*), and Forest & de Saint Laurent (1968). The detailed description presented herein of the coloration of this species is based on live specimens captured in waters off Curaçao, using the manned submersible *Curasub*, and brought to a laboratory aquarium for photographing (Fig. 1D).

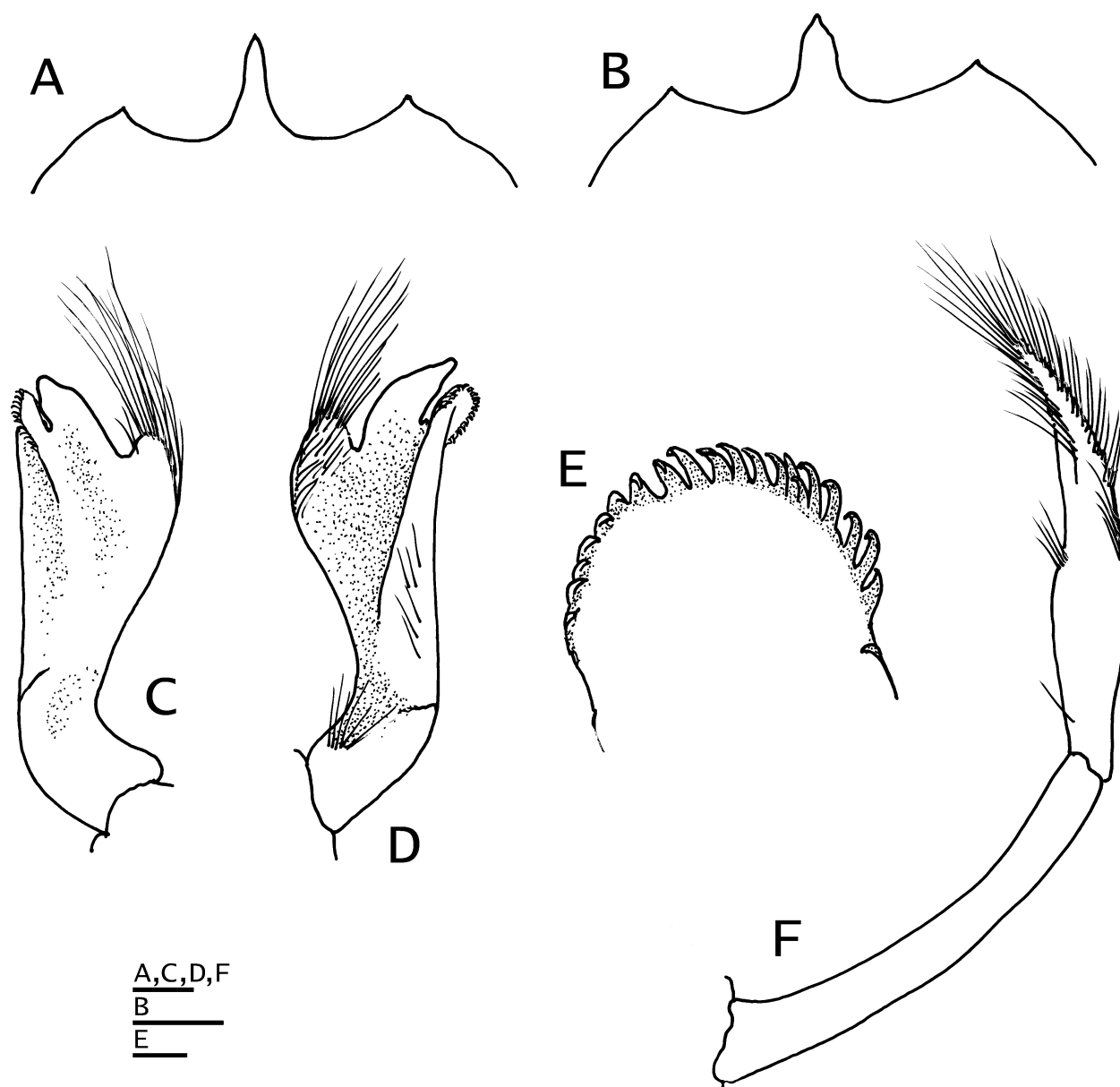


FIGURE 9. *Paguristes spinipes* A. Milne-Edwards, 1880: A, male 10.9 mm, Gulf of Mexico, off Sarasota, Florida (USNM 103441); B, female 7.8 mm (USNM 1072742); C–F, male 4.8 mm, Curaçao, *Curasub* 12–03, CURI 12040 (USNM 1253258). A, B, anterior portion of shield with rostrum and lateral projections; C, left first male gonopod, lateral; D, same, mesial; E, distal margin of inferior lamella, posterior; F, left second male gonopod, lateral. Scales: 1 mm (A, B), 0.25 mm (C, D, F), 0.1 mm (E).

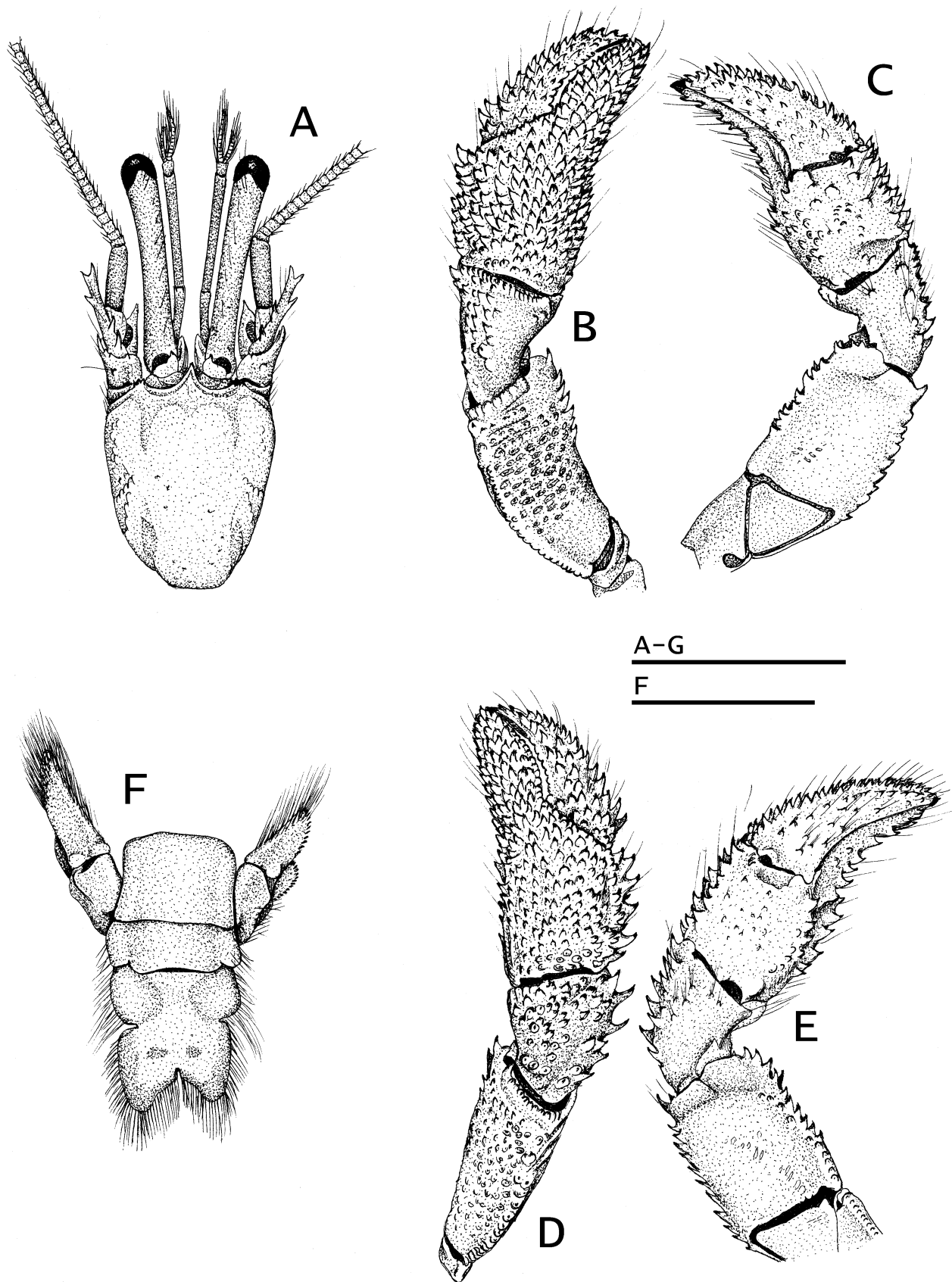


FIGURE 10. *Paguristes spinipes* A. Milne-Edwards, 1880. Lectotype of *Paguristes visor* Henderson, 1888: male 10.0 mm, Brazil, off Alagoas, H.M.S. *Challenger*, sta 122 (BM 88.33). A, shield and cephalic appendages, dorsal; B, right cheliped, dorsal; C, same, mesial; D, left cheliped, dorsal; E, same, mesial; F, sixth pleonal somite, telson, and uropods, dorsal. Scales: 10 mm (A–G), 5 mm (F).

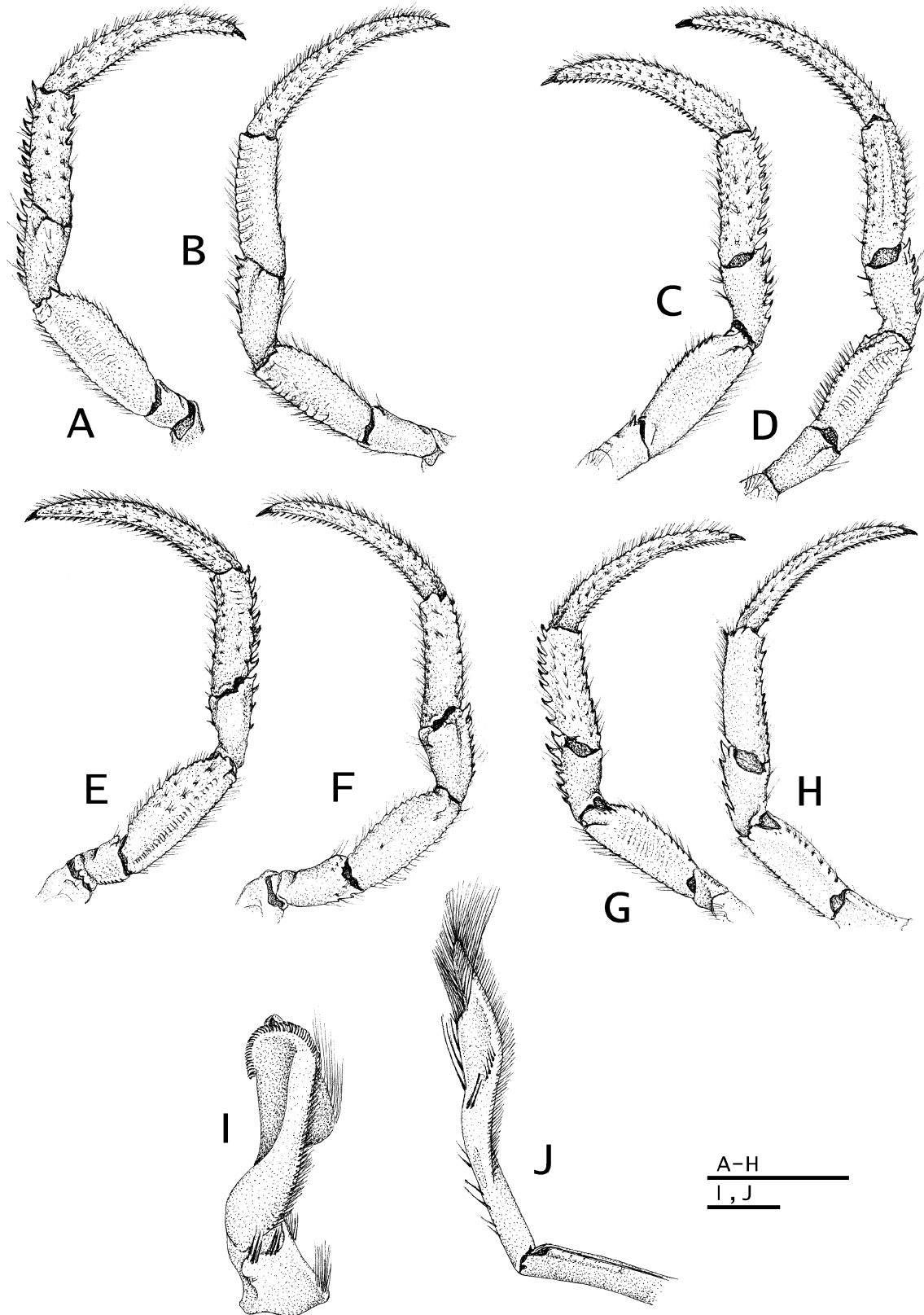


FIGURE 11. *Paguristes spinipes* A. Milne-Edwards, 1880. Lectotype of *Paguristes visor* Henderson, 1888: male 10.0 mm, Brazil, off Alagoas, H.M.S. *Challenger*, sta 122 (BM 88.33). A, C, left second pereopod in lateral (A) and mesial (C) view; B, D, right third pereopod in lateral (B) and mesial (D) view; E, G, left second pereopod in lateral (E) and mesial (G) view; F, H, left third pereopod in lateral (F) and mesial (H) view; I, male left first gonopod, posterior; J, male left second gonopod, mesial. Scales: 10 mm (A–H), 1 mm (I, J).

Currently, *Paguristes spinipes* is considered to have a wide western Atlantic distribution ranging from the southeastern coast of the United States to off Bahia, Brazil. Previous to this study there had been no reports of this species in the Caribbean outside of the Antilles (Cuba and Barbados). Herein we report for the first time this species in the Bahamas, the Caribbean Sea other than the Antilles (off Quintana Roo in the Yucatan Channel, and Curaçao), and provide only the second report for the Lesser Antilles (St. Lucia). There are still no published records of *P. spinipes* along the vast stretch of South American coastline from Venezuela to Pernambuco in northern Brazil.

Henderson (1888: 88) described *Paguristes visor* based on one male and one female specimens from “off Pernambuco”, 09°05’S, 34°50’W. However, these geographic coordinates actually place the locality further south, off the State of Alagoas, which therefore is considered herein the correct type locality for this species.

Family Paguridae

Catapaguroides microps A. Milne-Edwards & Bouvier, 1892

(Figs. 12, 13)

Catapaguroides microps A. Milne-Edwards & Bouvier, 1892: 211 (type locality: Mazagan cape [off Morocco, eastern Atlantic], *Travailleur*, sta 1, 33°09’N, 11°38’W).—A. Milne-Edwards & Bouvier, 1900: 207, pl. 24, figs. 17–20.—de Saint Laurent, 1968 (in part? see Remarks): 935, figs 1, 3–7, 9, 11–14, 16, ?not figs 17, 21–24.—Ingle, 1993: 108, 77–80.—Lins & Cardoso, 2010: 70, figs 1, 2.—Komai *et al.*, 2010: 40.—McLaughlin *et al.*, 2010: 28.—Komai & Rahayu, 2013: 144, tab 1.

Type material. Holotype male [not examined, unknown deposition, see de Saint Laurent (1968: 935)], *Travailleur*, sta 1, Gulf of Gascogne, 2818 m, 13 Jun 1881; paratypes: 1 female 1.9, 1 imm. female 1.2 mm, same station as holotype (USNM 22919).

New material. *Northwestern Atlantic, United States.* North American Basin, off North Carolina, 2500 m, coll. R. Menzies: 2 ov females 1.9, 2.2 mm (USNM 171543).

Gulf of Mexico. R/V *Alaminos*: sta 68A7-15, 29°10.3’N, 87°31.5’W, 1097.3 m, 9 Aug 1968: 1 ov female 2.4 mm (USNM 1245085, exTCWC 2-0729); sta 67A5-8B, 28°55’N, 87°24’W, 1494.1 m, 18 Jul 1967: 1 female 1.9 mm (TCWC 2-0728); sta 66A9-15, 28°13.5’N, 87°04’W, 1000.3 m, 11 Jul 1966: 2 males 1.3, 1.8 mm (USNM 1245086, exTCWC 2-0727); sta 69A11-2, 27°24.3’N, 94°32’W, 969.3 m, 6 Aug 1969: 1 ov female 1.8 mm (TA 2-3514); sta 69A11-13, 27°01.6’N, 94°42’W, 1463 m, 10 Aug 1969: 1 male 2.1 mm (TCWC 2-3516); sta 69A11-7, 27°01.5’N, 94°43.5’W, 1399 m, 7 Aug 1969: 2 females 1.0, 1.5 mm, 1 ov female 1.6 mm (TCWC 2-3515); sta 69A11-86, 21°41.1’N, 96°51.0’W, 969.3 m, 25 Aug 1969: 8 males 1.5–2.4 mm, 3 females 1.6–1.7 mm, 1 ov female 2.2 mm (TCWC 2-3519); sta 69A11-83, 21°35’N, 96°45’W, 1325.9 m, 24 Aug 1969: 1 male 1.9 mm (TCWC 2-3518); sta 69A11-69, 20°07.5’N, 96°10.5’W, 1371.6 m, 21 Aug 1969: 1 male 2.5 mm (TCWC 2-0730); sta 69A11-39, 19°01’N, 94°54’W, 1298.5 m, 15 Aug 1969: 1 male 2.5 mm (TCWC 2-3517). USFC *Albatross*: sta 2385, 28°51’00”N, 88°18’00”W, 1335 m, [no day, month] 1885: 1 male 2.1 mm (USNM 265205). R/V *Citation*, cruise IV, coll. LGL Ecological Research Associates: off Florida, sta E3C, MMS-NGOMCS/4514, 28°16’00”N, 86°36’16”W, 838–847 m, 20 May 1985: 1 male 1.8 mm (USNM 265257); off Louisiana, sta WC-3, MMS-NGOMCS/5503, 27°35’13”N, 92°22’40”W, 768–781 m, 9 Jun 1985: 2 males 2.1, 2.2 mm, 1 female 1.5 mm (USNM 265256); off Louisiana, sta WC-9, MMS-NGOMCS/4517, 27°42’47”N, 91°15’17”W, 695–807 m, 23 May 1985: 4 males 1.6–2.2 mm, 1 ov female 1.9 mm (USNM 265258).

Caribbean Sea. Barbados, E of Barbados, USFC *Albatross*, sta 2754, 11°40’00”N, 58°33’00”W, 1610 m, 5 Dec 1887: 1 ov female 2.5 mm (USNM 267531); Venezuela, N of Orchila Island, R/V *Pillsbury*, cruise 6806, sta 741, 11°47’48”N, 66°06’48”W, [no depth], 23 Jul 1968: 1 male 1.8 mm (USNM 310803); Venezuela, Los Roques Islands, R/V *Pillsbury*, sta P-747, 11°46’N, 67°05’48”W, 1175–1098 m, 24 Jul 1968: 1 male 2.4 mm (USNM 1012671).

Southwestern Atlantic. *Guiana:* Guiana Basin, N of Surinam, R/V *Knorr*, sta 25-293, 8°58’00”N, 54°04’18”W, 1456–1518 m, 27 Feb 1972: 2 males 1.2, 1.3 mm, 2 females 0.6, 1.1 mm (USNM 1111032). *Brazil:* Espírito Santo, TAAF MD55, sta 45 CB 79, 19°01’S, 37°47’W, 1500–1575 m, 28 May 1987: 1 male 1.8 mm, 1 female 1.7 mm, in gastropod shells (MZUSP 16813); Rio de Janeiro, TAAF MD55, sta 59 CB 99, 21°36’S, 39°58’W, 1190–1205 m, 31 May 1987: 1 female 2.1 mm (MZUSP 16826); continental slope of Campos Basin, Rio de Janeiro, Ocean prof II

BC Norte, PS/V *Astro Garoupa*, sta 59 (16-1), about 21°53'S, 39°51'W, 1059 m, 22 Aug 2003: 2 males 2.4, 2.5 mm, 2 ov females 2.2, 2.3 mm (MNRJ 20458); Campos Basin, off Rio de Janeiro, Ocean Prof II BC Norte, sta MNRJ 20458, 22°14'51"S, 39°52'59"W, 1059–1110 m, 22 Aug 2003, coll. C. Serejo: 2 males 2.4, 2.5 mm, 2 ov females 2.2, 2.3 mm (USNM 1009469); São Paulo: TAAF MD55, sta 65 CB 106, 23°54'S, 42°10'W, 830 m, 2 Jun 1987: 1 male 1.7 mm, in gastropod shell (MZUSP 16827); TAAF MD55, sta 65 CB 107, 24°00'S, 42°14'W, 1020 m, 2 Jun 1987: 2 males 1.8, 2.1 mm, 4 females 1.3–1.8 mm, 7 ov females 1.7–2.4 mm (MZUSP 16815).

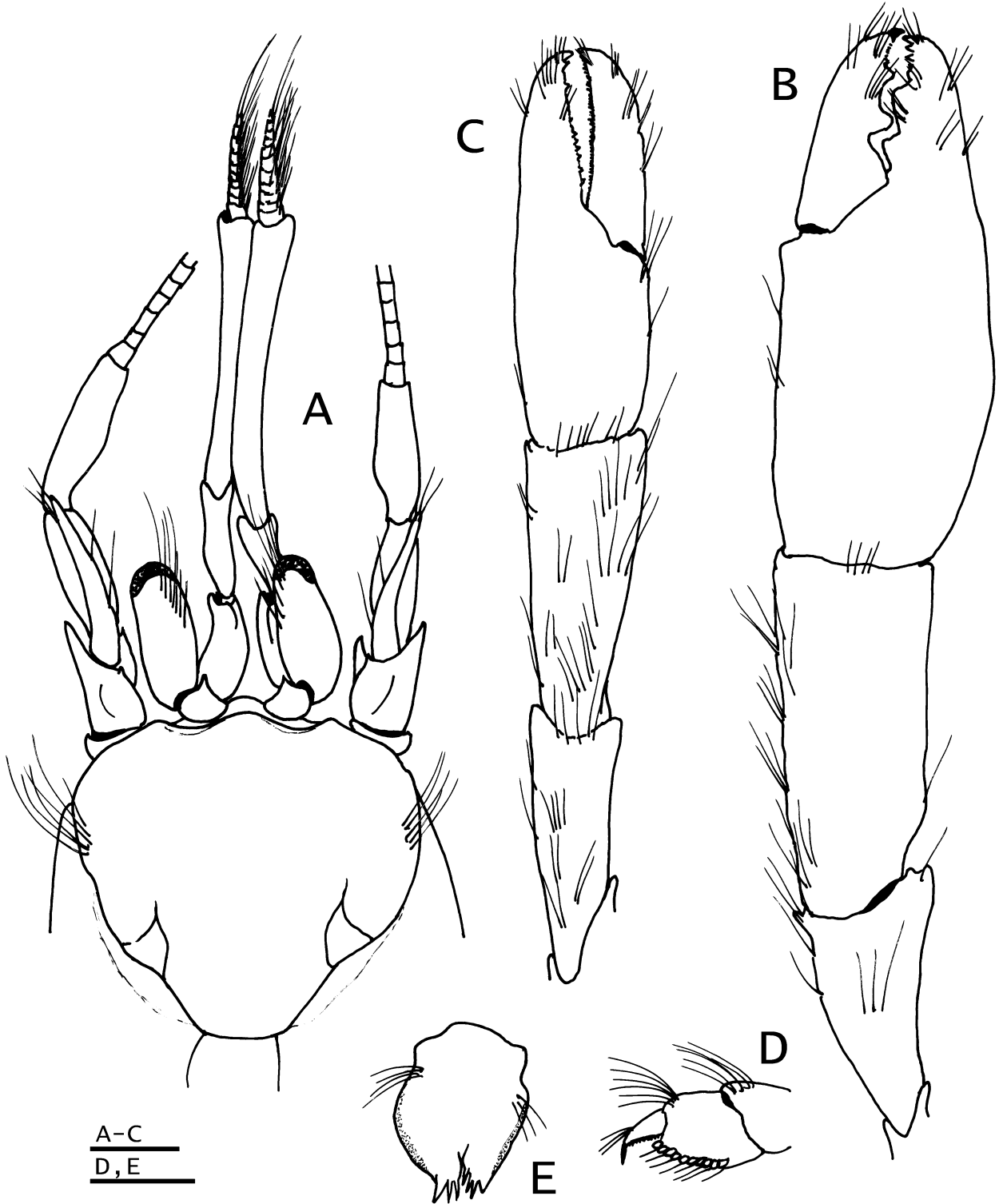


FIGURE 12. *Catapaguroides microps* A. Milne-Edwards & Bouvier, 1892: male 1.8 mm, Gulf of Mexico, R/V *Alaminos*, sta 66A9–15 (USNM 1245086): A, shield and cephalic appendages, dorsal; B, right cheliped, dorsal; C, left cheliped, dorsal; D, propodus and dactyl of left fourth pereopod, lateral; E, telson, dorsal. Scales: 0.5 mm.

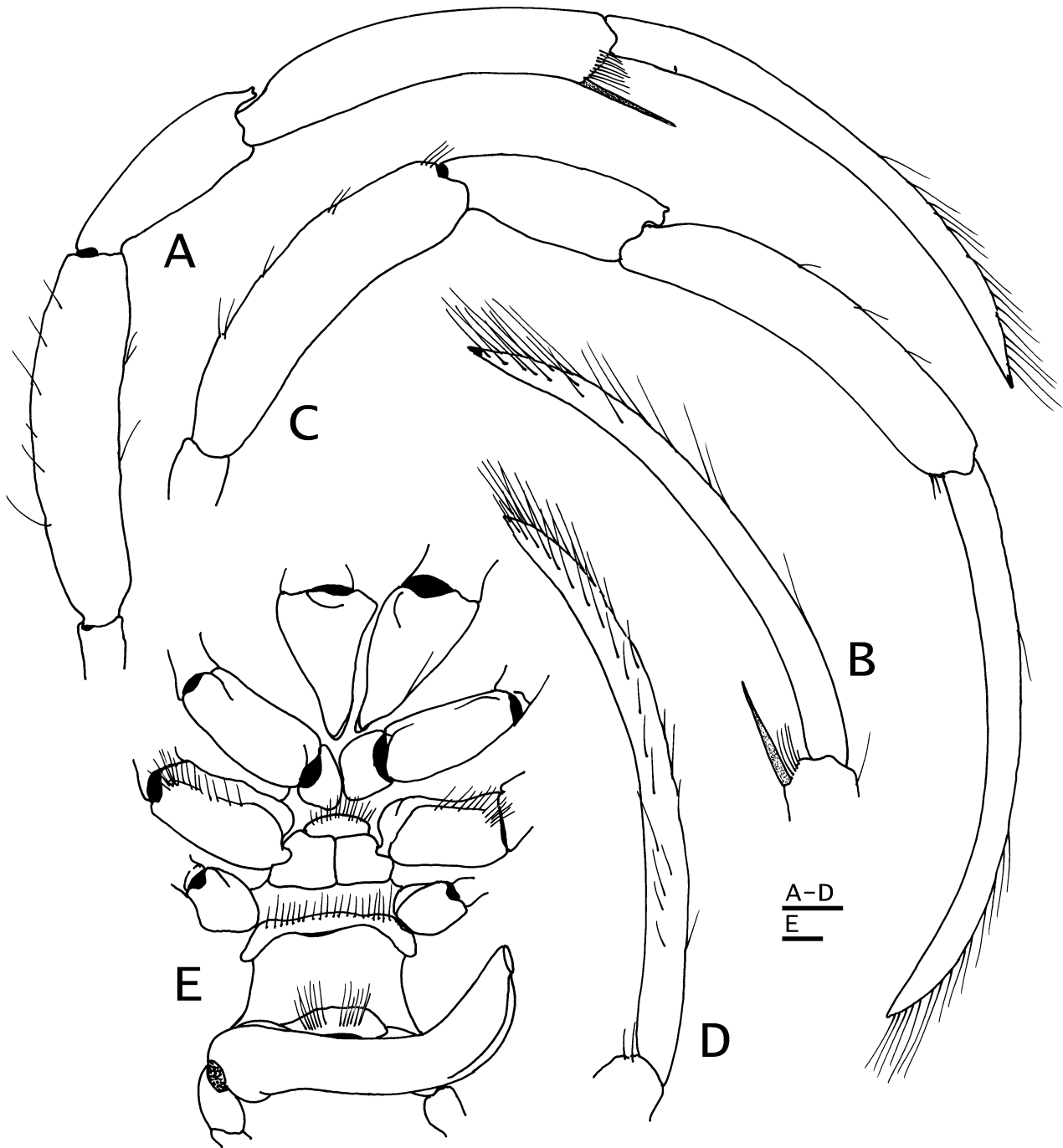


FIGURE 13. *Catapaguroides microps* A. Milne-Edwards & Bouvier, 1892: male 1.8 mm, Gulf of Mexico, R/V *Alaminos*, sta 66A9–15 (USNM 1245086): A, right second pereopod, lateral; B, dactyl of same, mesial; C, right third pereopod, lateral; D, dactyl of same, mesial; E, sternum, coxae of pereopods, and sexual tube, ventral. Scales: 0.5 mm.

Diagnosis. See de Saint Laurent (1968), Ingle (1993), and Lins & Cardoso (2010).

Distribution. Amphi-Atlantic: in the western Atlantic, from off North Carolina, Gulf of Mexico and Caribbean to off the northern coast of São Paulo, Brazil; in the eastern Atlantic from Finistère coast in France, Spain and Portugal, to Morocco, including the Azores. Presumably from western Pacific: Indonesia. Depth: 718 to 2818 m.

Remarks. Several detailed reports with diagnosis and illustrations of this species have been published since A. Milne-Edwards & Bouvier (1892) original description, although these studies used specimens from the northeastern Atlantic (de Saint Laurent 1968; Ingle 1993). Reports of this species from the western Atlantic are few

and scattered, somewhat cryptic. Based on correspondence with A.J. Provenzano, Jr., de Saint Laurent (1968: 937) reported this species from the Caribbean in a footnote. Felder *et al.* (2009) reported this species in their list of decapods from the Gulf of Mexico, based on ecological reports (Pequegnat *et al.* 1983; Wicksten & Packard 2005) and a few museum specimens they examined. Lins & Cardoso (2010) reported and illustrated specimens of this species from southeastern Brazil, as far south as 22°45'S, and provided the only available illustrations and summary of diagnostic characters based on specimens from the western Atlantic. Herein, we report specimens from the northwest, northeast, and southwest Gulf of Mexico, Caribbean, and additional material from the southwestern Atlantic. The latter specimens slightly extend the southern distribution of *C. microps* on the coast of Brazil along the Campos Basin, from approximately 22°S to 24°S. Specimens from the Gulf of Mexico are illustrated to document additional morphological details and variations across the western Atlantic range of *C. microps* (Figs. 12, 13).

Morphological variations related to sex are exhibited on the right cheliped, with the chela in males frequently attaining a more elongated shape (2.8 as long as broad, including fingers), and larger size than in females (2.2 as long as broad, including fingers). One ovigerous female (TCWC 2-3519) has paired gonopores, whereas the genus and species diagnosis indicate that this species has unpaired, left gonopore.

This species has been considered to have a cosmopolitan distribution based on de Saint Laurent's (1968: figs 17, 21–24) report of two females from the “*Siboga*” Expedition to Indonesia, the only record outside of the Atlantic and which has been taken as the source of the overall distribution of this species by various carcinologists (Ingle 1993; Felder *et al.* 2009; Lins & Cardoso 2010; Komai & Rahayu 2013). However, based on unpublished studies of recent collections, McLaughlin *et al.* (2010: 37) questioned the conspecificity of the Indonesian and eastern Atlantic material used by de Saint Laurent. Although P.A. McLaughlin passed away (Lemaitre 2012) and her study was never published, we agree that the “*Siboga*” material should be reexamined to confirm or not whether it can be considered conspecific with the Atlantic material, and for the time being consider de Saint Laurent's Indonesian record questionable.

***Catapagurus gracilis* (Smith, 1881)**

(Figs. 14, 15)

Hemipagurus gracilis Smith, 1881: 426 [type locality by lectotype selection by Asakura (2001): NW Atlantic, off Martha's Vineyard, USFC *Fish Hawk*, sta 874, 40°00'N, 70°57'W].—Asakura, 2001: 832, figs 1H, 4A–S.—Nizinski, 2003: 119.

Catapagurus gracilis.—Smith, 1882: 19, 1883b: 19, 1886: 38.—A. Milne-Edwards & Bouvier, 1893: 132, pls 25–30.—Gordan, 1956: 306.—Williams & Wigley, 1977: 9.—McLaughlin, 2004a: 13.—McLaughlin *et al.*, 2010: 28.—Nucci & Melo, 2012: 81 (key).

Catapagurus gracilis var. *intermedius* A Milne-Edwards & Bouvier, 1893: 137, pl. 9, figs. 31–34 (type locality: off Barbados, USCSS *Blake*, sta 299, 13°05'N, 59°39.66'W).

Type material. Lectotype male 2.5 mm, selected by Asakura (2001) of *Hemipagurus gracilis* Smith, 1881, off Martha's Vineyard, NE United States, USFC *Fish Hawk*, sta 874, 40°00'N, 70°57'W, 156 m, 13 Sep 1880 (USNM 5081); paralectotypes, same station data as lectotype: 4 males 1.6–1.9 mm, 1 female 1.8 mm (USNM 1000218).

Lectotype male 1.6 mm (dismembered), herein selected of *Catapagurus gracilis* var. *intermedius* A Milne-Edwards & Bouvier, 1893, Dominica, USCSS *Blake*, sta 192, 15°17'33"N, 61°24.3'W, 253 m, 30 Jan 1879 (MCZ 4028); paralectotype male 1.8 mm (dismembered), off Barbados, USCSS *Blake* sta 299, 13°05'N, 59°39.66'W, 256 m, 10 Mar 1879 (MCZ 4027).

New material. *Eastern United States. Massachusetts:* off Martha's Vineyard, USFC *Fish Hawk*, sta 920, 40°13'00"N, 70°41'54"W, 115 m, 16 Jul 1881: 2 males 1.9, 2.1 mm, 2 ov females 1.7, 1.8 mm (USNM 35300); off Martha's Vineyard, USFC *Fish Hawk*, sta 865, 40°05'N, 70°23'W, 119 m, 4 Sep 1880: 1 male [not measured] (USNM 5076); off Martha's Vineyard, USFC *Fish Hawk*, sta 949, 40°03'00"N, 70°31'00"W, 183 m, 23 Aug 1881: 2 males 1.6, 1.8 mm, 7 females 1.3–2.2 mm, 4 ov females 1.6–2.2 mm (USNM 12559); off Martha's Vineyard, USFC *Fish Hawk*, sta 870, 40°02'36"N, 70°22'58"W, 283 m, 4 Sep 1880: 3 males 1.6–2.2 mm, 1 ov female 2.0 mm (USNM 5079); off Martha's Vineyard, USFC *Fish Hawk*, sta 871, 40°02'54"N, 70°23'40"W, 210 m, 4 Sep 1880: 2 males 2.6, 2.7 mm, 1 ov female 2.2 mm (USNM 35400); S of Nantucket Shoals, USFC *Albatross*, sta 2245, 40°01'15"N, 70°22'00"W, 179 m, 26 Sep 1884: 1 male 2.4 mm, 1 ov female 2.0 mm (USNM 7170); S of Martha's Vineyard, USFC *Fish Hawk*, sta 1038, 39°58'N, 70°06'W, 267 m, 21 Sep 1881: 1 male 1.8 mm (USNM 5078); off

Martha's Vineyard, USFC *Fish Hawk*, sta 877, 39°56'00"N, 70°54'18"W, 230 m, 13 Sep 1880: 1 male 2.3 mm, 2 ov females 1.8, 2.3 mm (USNM 5077); off Martha's Vineyard, USFC *Fish Hawk*, sta 940, 39°54'00"N, 69°51'30"W, 245 m, 4 Aug 1881: 1 male 2.1 mm, 1 ov female 2.3 mm (USNM 34047); Vineyard Sound, USFC [no ship data], sta 5005, 110 m, 1886: 3 male 1.9–2.0 mm, 2 ov females 1.5, 1.8 mm (USNM 1010632); off Martha's Vineyard, USFC *Fish Hawk*, sta 879, 39°49'30"N, 70°54'00"W, 411 m, 13 Sep 1880: 3 males 1.7–2.2 mm, 1 ov female 2.3 mm (USNM 21406); S of Martha's Vineyard, USFC *Fish Hawk*, sta 1040, 170.1 m, 21 Sep 1881: 2 males 1.6, 1.9 mm, 1 female 2.1 mm, 1 ov female 1.9 mm (USNM 5083). *New Jersey*: USFC Grampus, sta 5005, 40°01'00"N, 71°05'00"W, 190 m, 19 Aug 1886: 3 males 1.9–2.2 mm, 2 ov females 1.6, 1.7 mm (USNM 11876); CABP, sta G6, 39°40'30"N, 72°00'24"W, 178 m, 14 Aug 1977, coll. VIMS: 1 sex indet., damaged (USNM 179410); CABP, sta A1, 39°14'42"N, 72°47'18"W, 91 m, 3 Nov 1975, coll. VIMS: 1 male 1.7 mm (USNM 185572); CABP, sta A1, 39°14'42"N, 72°47'24"W, 90 m, 4 Mar 1976, coll. VIMS: 3 males 1.2–2.3 mm, 1 ov female 2.0 mm (USNM 185573); CABP, sta A1, 39°14'42"N, 72°47'24"W, 90 m, 4 Mar 1976, coll. VIMS: 4 males 1.7–2.0 mm, 4 ov females 1.9–2.1 mm (USNM 185574), 12 males 1.2–2.4 mm, 18 ov females 1.6–2.1 mm (USNM 185582); CABP, sta A1, 39°14'00"N, 72°47'00"W, 91 m, 12 Sep 1977, coll. VIMS: 1 male 1.8 mm (USNM 185579), 8 males 1.3–2.7 mm, 4 females 1.6–1.9 mm, 5 ov females 1.6–1.9 mm (USNM 185580), 13 males 1.3–2.7 mm, 4 females 1.6–1.9 mm, 9 ov females 1.3–2.4 mm (USNM 185581); CABP, sta J1, 38°50'00"N, 72°55'00"W, 400 m, 12 Sep 1977, coll. VIMS: 4 males 1.8–2.2 mm, 2 females 1.5, 1.6 mm, 6 ov females 1.3–1.9 mm (USNM 185578); CABP, sta J1, 38°45'00"N, 73°01'00"W, 400 m, 25 Aug 1976, coll. VIMS: 1 male 1.9 mm (USNM 185577); CABP, sta F1, 38°44'00"N, 73°14'42"W, 85 m, 31 Oct 1975, coll. VIMS: 1 male 1.7 mm (USNM 185575); CABP, sta F1, 38°43'00"N, 73°14'00"W, 85 m, 24 Aug 1976, coll. VIMS: 1 ov female 2.1 mm (USNM 185576). *Delaware*: CABP, sta K5, 38°01'30"N, 73°53'48"W, 152 m, 16 Feb 1977, coll. VIMS: 1 male 2.1 mm (USNM 179204). *Virginia*: off mouth of Chesapeake Bay, USFC *Fish Hawk*, sta 896, 37°26'00"N, 74°19'00"W, 102 m, 16 Nov 1880, 1 male 1.6 mm (USNM 4997), 1 male 1.7 mm (USNM 77452); off mouth of Chesapeake Bay, USFC *Fish Hawk*, sta 899, 37°24'00"N, 74°29'00"W, 105.2 m, 16 Nov 1880, 1 male 2.2 mm (USNM 4996); USFC *Albatross*, sta 2265, 37°07'40"N, 74°35'40"W, 128 m, 18 Oct 1884: 7 males 1.6–1.9 mm, 1 female 1.5 mm (USNM 38131); USFC *Albatross*, sta 2265, 37°07'40"N, 74°35'40"W, 128 m, 18 Oct 1884: 2 male 1.6, 1.7 mm (USNM 7213), 2 male 1.7, 1.9 mm (USNM 77449). *North Carolina*: North American Slope, off North Carolina, R/V *Gilliss*, sta GI-76-01-68, 37°01'30"N, 74°39'W, 150 m, 31 Jan 1976: 1 male 2.5 mm (USNM 1111065).

Gulf of Mexico. R/V *Tommy Munro*, MAMES, cruise B1, sta D4, sample MMS-MAMES/B1:D4-5, 29°40'30"N, 89°16'00"W, 200 m, 30 Sep 1987, coll. D. Harper: 1 male 0.7 mm (USNM 1108043); Florida Keys, off Key West, USFC *Fish Hawk*, sta 7282, 24°21'15"N, 81°52'15"W, 199 m, 19 Feb 1902: 1 ov female 1.7 mm (USNM 102590); Florida Keys, sta 71, 347–512 m, 5 Aug 1932, coll. W.L. Schmitt: 1 ov female 1.3 mm (USNM 102714); Florida Keys, Sambo Key, 246.9 m, 1916, coll. J. Henderson: 1 male 1.8 mm (USNM 102715).

Bahamas. Straits of Florida, Cay Sal Bank, N of Muerto Cay, R/V *Gerda*, cruise 6804, sta 986, 24°05'00"N, 80°19'00"W, 137–239 m, 5 Mar 1968: 1 male 1.1 mm (USNM 1010543).

Brazil. Espírito Santo, TAAF MD55, sta 54 CB 93, 19°36'S, 38°53'W, 707–733 m, 30 May 1987: 1 male 1.7 mm, in gastropod shell (MZUSP 16829); São Paulo, TAAF MD55, sta 64 CB 105, 23°46'S, 42°09'W, 592–610 m, 2 May 1987 (2 lots): 1 ov female 1.7 mm (MZUSP 16811), 1 male 1.9 mm, (MZUSP 16824).

Diagnosis. See Asakura (2001, as *Hemipagurus gracilis*).

Distribution. Western Atlantic: eastern coast of the United States, from Massachusetts to Florida Keys, Bahamas, Gulf of Mexico, Barbados, to off northern coast of São Paulo, Brazil. Depth: 85 to 733 m.

Remarks. *Catapagurus gracilis* has seldom been reported since it was described from the northeastern coast of the United States by Smith (1881 as *Hemipagurus gracilis*). A. Milne-Edwards & Bouvier (1893) subsequently expanded the distribution of *C. gracilis* to Barbados, although this Caribbean island in the Lesser Antilles has often not been included in published accounts of this species (e.g., Asakura 2001, as *Hemipagurus gracilis*; Felder *et al.* 2009). Since then, however, numerous specimens have been deposited in the USNM, unreported except for Felder *et al.*'s (2009) report of a few specimens from the Gulf of Mexico and Florida Keys. Thus, the discovery of this species off the Brazilian coast represents a remarkable southward range extension from Barbados to the southern hemisphere, covering nearly 37° of latitude. We herein add this species to the hermit crab fauna of Brazil, and illustrate specimens (Figs. 14, 15) collected during the TAAF expedition. Additional records are herein provided for this often abundant species, from the eastern coast of the United States, Bahamas, and Gulf of Mexico.

A. Milne-Edwards & Bouvier separated *Catapagurus gracilis* var. *intermedius* from the “typical” form primarily based on differences in the width of the shield (wider in the “variety”), cheliped proportions (shorter in the “variety”), and dilation of cornea (more dilated in the “variety”). However, when sufficient specimens are studied, it is evident that such differences clearly represent intraspecific variations of *C. gracilis* that are growth related or result of sexual dimorphism. Thus, *Catapagurus* var. *intermedius* A Milne-Edwards & Bouvier, 1893, is herein formally placed in synonymy with the nominal subspecies as per the recommendation by McLaughlin *et al.* (2010: 28, and note therein: 37), and based on our comparisons of type materials with numerous specimens of the nominal *C. gracilis* in the general collections of the USNM.

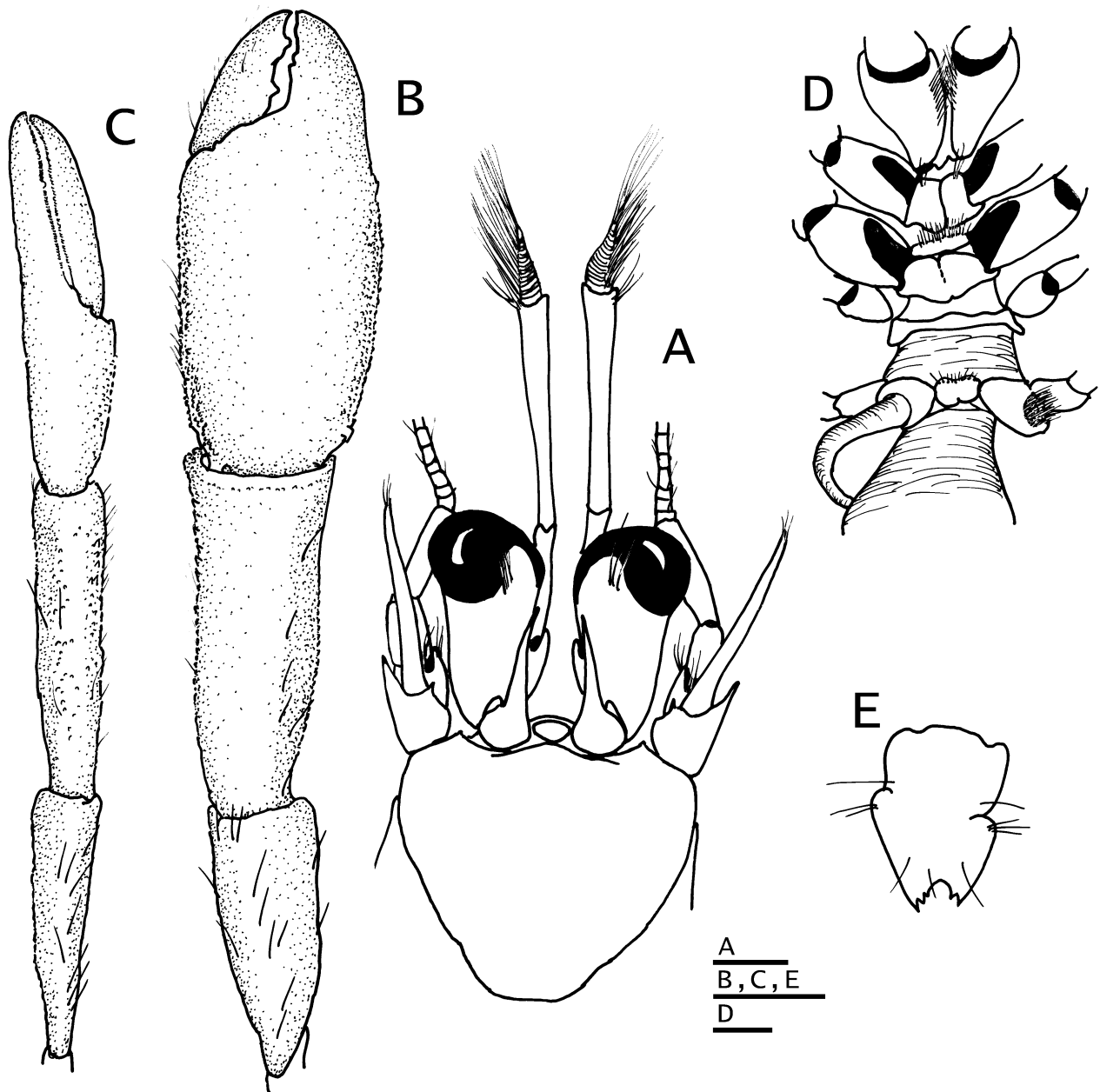


FIGURE 14. *Catapagurus gracilis* (Smith, 1881): male 1.9 mm, Brazil, TAAF MD55, sta 64 CB 105 (MZUSP 16824): A, shield and cephalic appendages, dorsal; B, right cheliped, dorsal; C, left cheliped, dorsal; D, sternum, coxae of pereopods, and sexual tube, ventral; E, telson, dorsal. Scales: 0.5 mm (A, E, D), 1.0 mm (B, C).

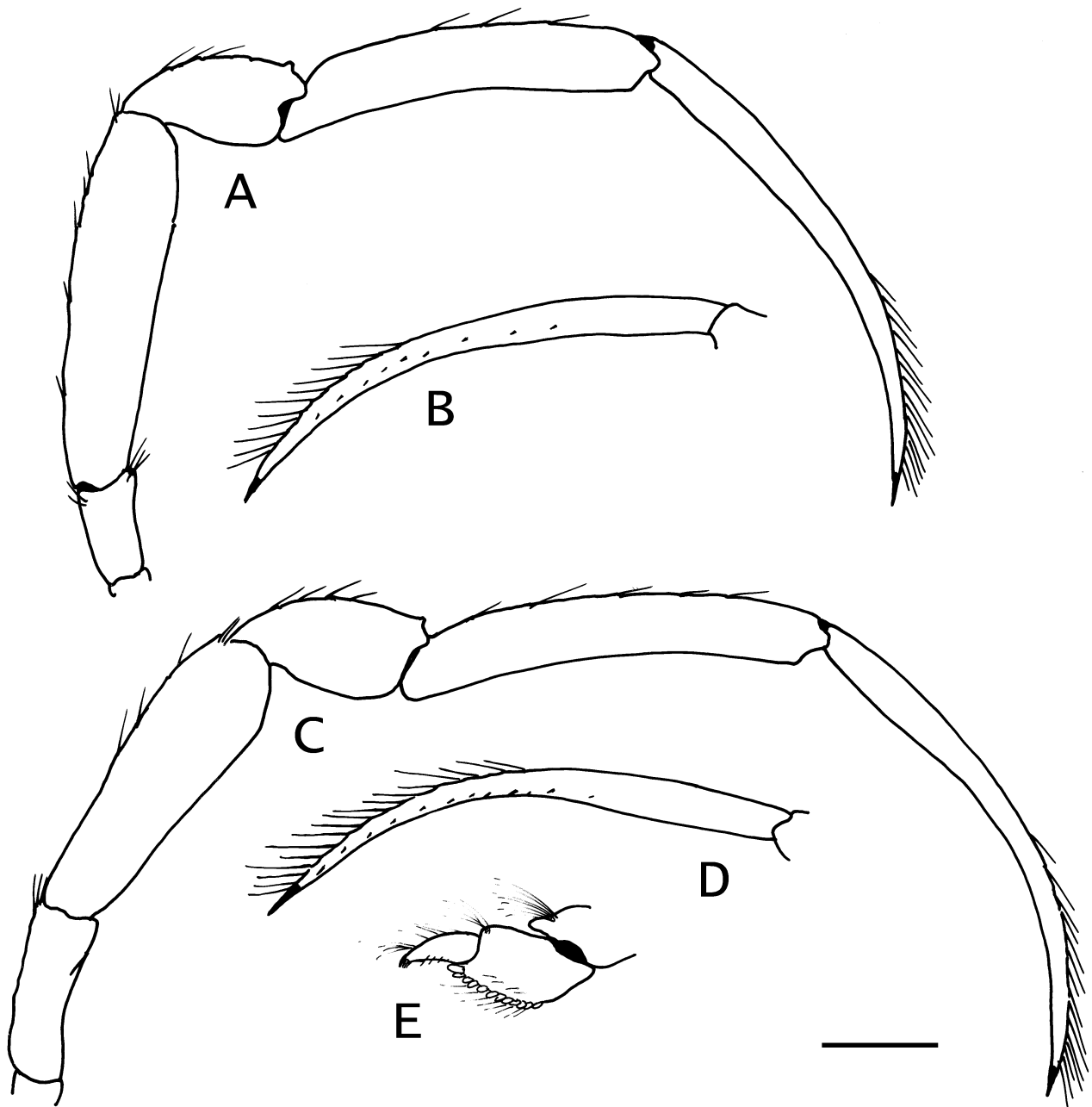


FIGURE 15. *Catapagurus gracilis* (Smith, 1881): male 1.9 mm, Brazil, TAAF MD55, sta 64 CB 105 (MZUSP 16824): A, right second pereopod, lateral; B, dactyl of same, mesial; C, right third pereopod, lateral; D, dactyl of same, mesial; E, propodus and dactyl of left fourth pereopod, lateral. Scale: 1.0 mm (A–D), 0.5 mm (E).

***Michelopagurus atlanticus* (Bouvier, 1922)**

(Figs. 16–18)

Pagurodes atlanticus Bouvier, 1922: 24, pl. 3, fig. 5, pl. 4, fig. 4 (type locality: Azores, between Pico and S. Jorge, Campagnes de S.A.S. le Prince de Monaco of 1902, sta 1349).—Ingle, 1993: 102, figs 69–72.—McLaughlin, 1997: 482.

Michelopagurus atlanticus.—McLaughlin, 1997: 482 (by implication).—Udekem d’Acoz, 1999: 179.—McLaughlin *et al.*, 2010: 30.

New material. *Brazil.* Espírito Santo, TAAF MD55, sta 45 CB 79, 19°01’S, 37°47’W, 1500–1575 m, 28 May 1987: 1 male 2.9 mm (missing right cheliped) (MZUSP 16813); TAAF MD55, sta 43 CB 77, 19°05’S, 37°47’W, 900–790 m, 27 May 1987: 1 female 2.1 mm (MZUSP 16834).

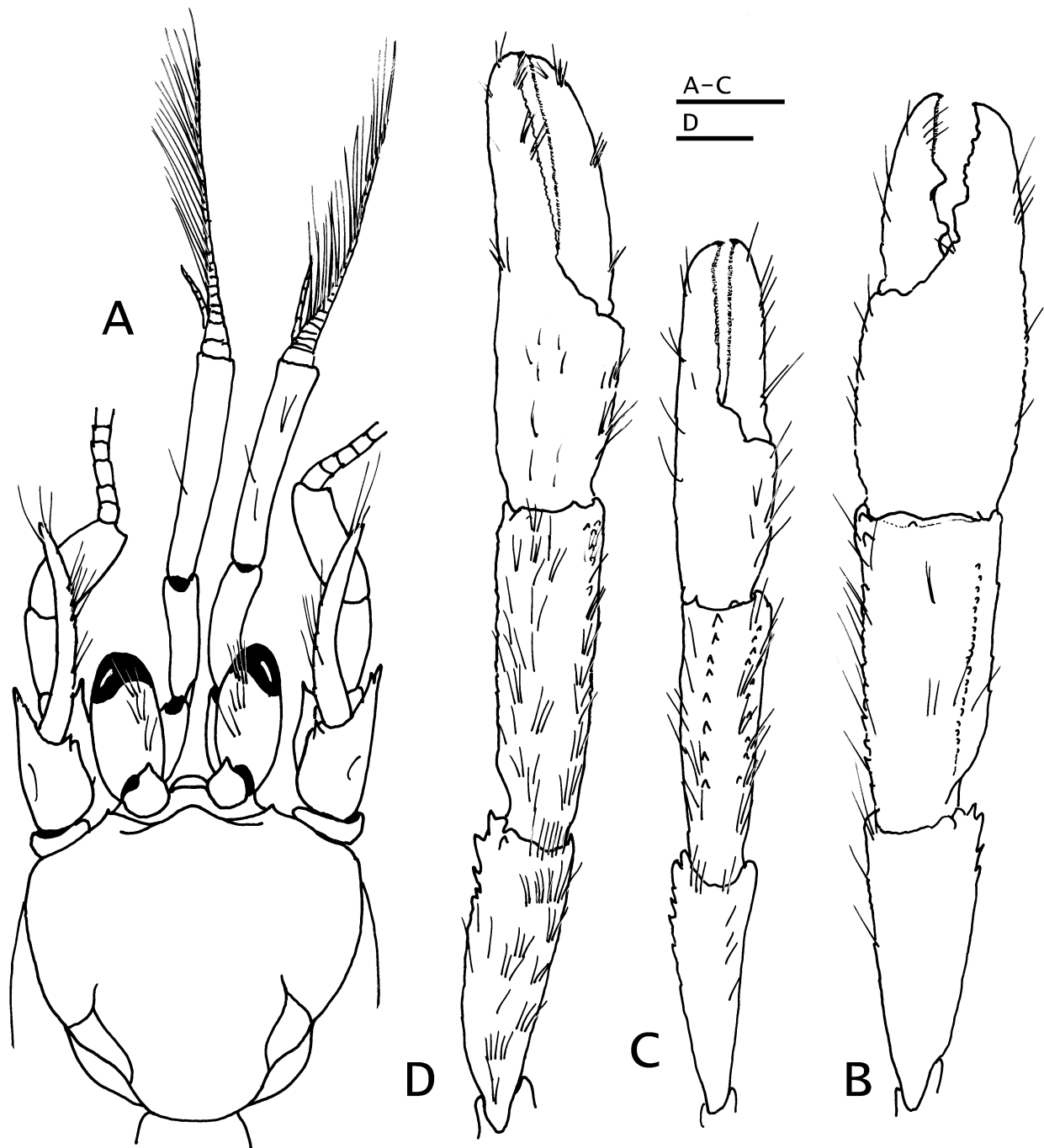


FIGURE 16. *Michelopagurus atlanticus* (Bouvier, 1922), Brazil. A, D: male 2.9 mm, TAAF MD55, sta 45 CB 79 (MZUSP 16813); B, C: female 2.1 mm, TAAF MD55, sta 43 CB 77 (MZUSP 16834). A, shield and cephalic appendages, dorsal; B, right cheliped, dorsal; C, D, left cheliped, dorsal. Scales: 1 mm.

Diagnosis. Shield (Fig. 16A) slightly longer than broad, naked or at most with scattered short setae. Rostrum broadly triangular, rounded. Ocular peduncles stout, short, less than half length of shield, with longitudinal row of 3 tufts of short setae on dorsal surface; acicles terminating in simple spine. Antennular peduncles long, exceeding distal margin of cornea by about half of penultimate segment. Antennal peduncle exceeding distal margin of cornea by full length of fifth segment; second segment with distolateral angle produced and terminating in bifid spine; antennal acicle long, exceeding cornea by half length of acicle, terminating in sharp spine, otherwise unarmed except for setae on mesial margin and distally. Chelipeds (Fig. 16B–D) elongate, right stouter, exceeding left by about half length of fingers. Right cheliped with scattered setae; chela nearly smooth on all surfaces; carpus with dorsomesial and dorsolateral row of small spines or tubercles. Left cheliped with numerous short, transverse rows

of setae dorsally on merus and carpus, and dorsomesial and dorsolateral rows of small spines on carpus. Ambulatory legs (Fig. 17A–D) each with dactyls about 1.5 times as long as propodus, with ventromesial row of 10–14 slender spinules; segments unarmed except for scattered short setae on dorsal and ventral margins, and small dorsodistal spine on carpi. Fourth pereopod (Fig. 17E) semichelate, propodal rasp consisting of single row of spatulate or lanceolate scales. Anterior lobe of sternite XII (Fig. 18C) subdivided into 2 setose lobes. Uropods markedly asymmetrical. Telson (Fig. 18A, B) with prominent median cleft separating slightly asymmetrical posterior lobes; rounded terminal margins of posterior lobes each with row of prominent spines, 2 of which are larger on one or both lobes, and spines more numerous and slender in female. Coxae of fifth pereopods of male (Fig. 18C, D) symmetrical, each with similar short sexual tube protruding from gonopore. Female with paired, 1-segmented first gonopods (Fig 18E) modified as gonopods.

Distribution. Amphi-Atlantic: eastern Atlantic, from the Azores; western Atlantic, off northern coast of Espírito Santo, Brazil. Depth: 790 to 1575 m.

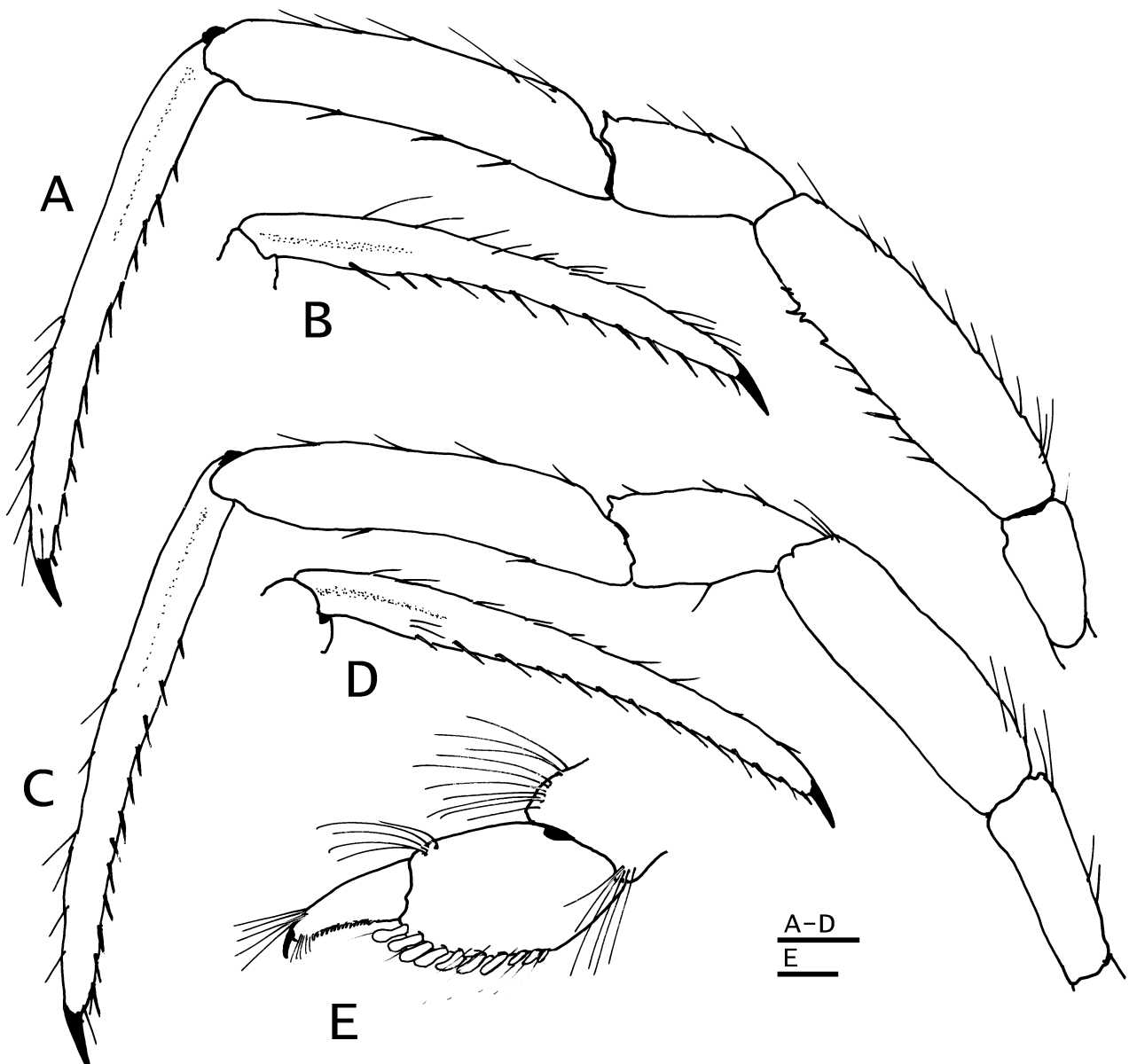


FIGURE 17. *Michelopagurus atlanticus* (Bouvier, 1922): male 2.9 mm, Brazil, TAAF MD55, sta 45 CB 79 (MZUSP 16813). A, left second pereopod, lateral; B, dactyl of same, mesial; C, left third pereopod, lateral; D, dactyl of same, mesial; E, propodus and dactyl of left fourth pereopod, lateral. Scales: 1 mm (A–D), 0.25 mm (E).

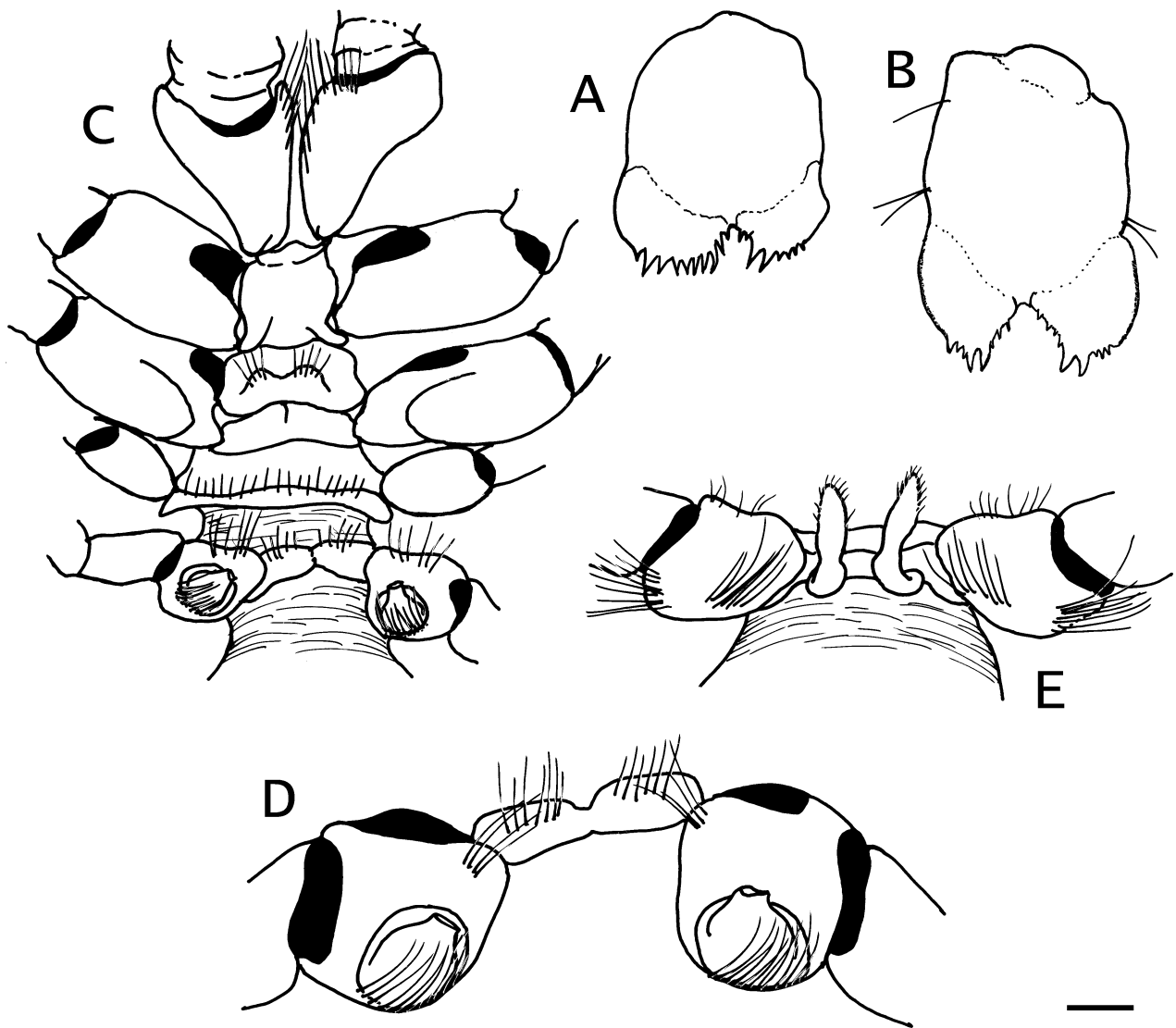


FIGURE 18. *Michelopagurus atlanticus* (Bouvier, 1922): A, female 2.1 mm, TAAF MD55, sta 43 CB 77 (MZUSP 16834); B, C, D, male 2.9 mm Brazil, TAAF MD55, sta 45 CB 79 (MZUSP 16813). A, B, telson, dorsal; C, sternum, coxae of pereopods, and sexual tubes, ventral; D, sternite XIV, coxae of fifth pereopods, and male sexual tubes, ventral; E, sternite XIV, coxae of fifth pereopods, and first gonopods of female, ventral. Scale: 0.25 mm (A, B, D, E), 0.5 mm (C).

Remarks. This species, originally described in *Pagurodes* Henderson, 1888, was assigned by McLaughlin (1997) to her new genus *Michelopagurus* McLaughlin, 1997. *Michelopagurus atlanticus* was previously known only from the female holotype collected in the Azores, eastern Atlantic. Given its depth range from the lower slope to the continental rise, it is not surprising to find *M. atlanticus* also in the western Atlantic as similar amphiatlantic distribution is also known for other deep-water paguroids such as species of the parapagurid genera *Parapagurus*, *Sympagurus*, and *Oncopagurus* (see Lemaitre 1999, 2004, 2014). Bouvier's (1922) original description of *M. atlanticus* included only a few, insufficient illustrations, whereas Ingle (1993) included detailed illustrations of the holotype. The discovery of a male and an additional female specimen of this species in the Brazilian collections reported herein, provide the opportunity to present a more complete diagnosis of this species.

***Nematopaguroides pusillus* Forest & de Saint Laurent, 1968**

(Figs. 19, 20)

Nematopaguroides? pusillus Forest & de Saint Laurent, 1968: 159, figs 142–146 (type locality: off Pernambuco, Brazil, Calypso, sta 23, 8°19.5'S, 34°39'W).

Nematopaguroides pusillus.—Coelho & Ramos, 1973: 166.—Coelho & Santos, 1980: 143.—Reed *et al.*, 1982: 768.—Reed *et al.*, 1982: 768.—Abele & Kim, 1986: 386, figs i–k.—Coelho & Ramos-Porto, 1987: 43.—Rieger, 1998: 417.—Melo, 1999: 118, figs 63, 64.—Wang & McLaughlin, 2000: 956.—Coelho *et al.*, 2007: 10, tab. 4.—McLaughlin *et al.*, 2010: 31.

New material. *Southeastern Florida.* R/V *Johnson*, Jeff's Reef, 27°32.8'N, 79°58.8'W, in *Oculina* reef samples, Cr. 27, JSL-II, dive 129a, 77.7 m, 23 Sep 1976: 2 males 1.3–1.5 mm, 1 female 1.2 mm, 1 ov female 1.1 mm (HBOI 089:06387); Cr. 42, JSL-II, dive 184a, 80.2 m, 15 Apr 1977: 2 males 1.1, 1.3 mm, 1 female 0.8 mm, 1 ov female 1.3 mm (HBOI 089:06385); Cr. 47, JSL-II, dive 438b, 81.4 m, 23 Aug 1977: 4 sex indet. (dismembered) 0.7–0.8 mm (HBOI 089:06386).

Brazil. Espírito Santo, TAAF MD55, sta 23 DC 40, 20°39.8'S, 34°41.1'W, 60 m, 17 May 1987: 1 male 1.4 mm (MZUSP 16832).

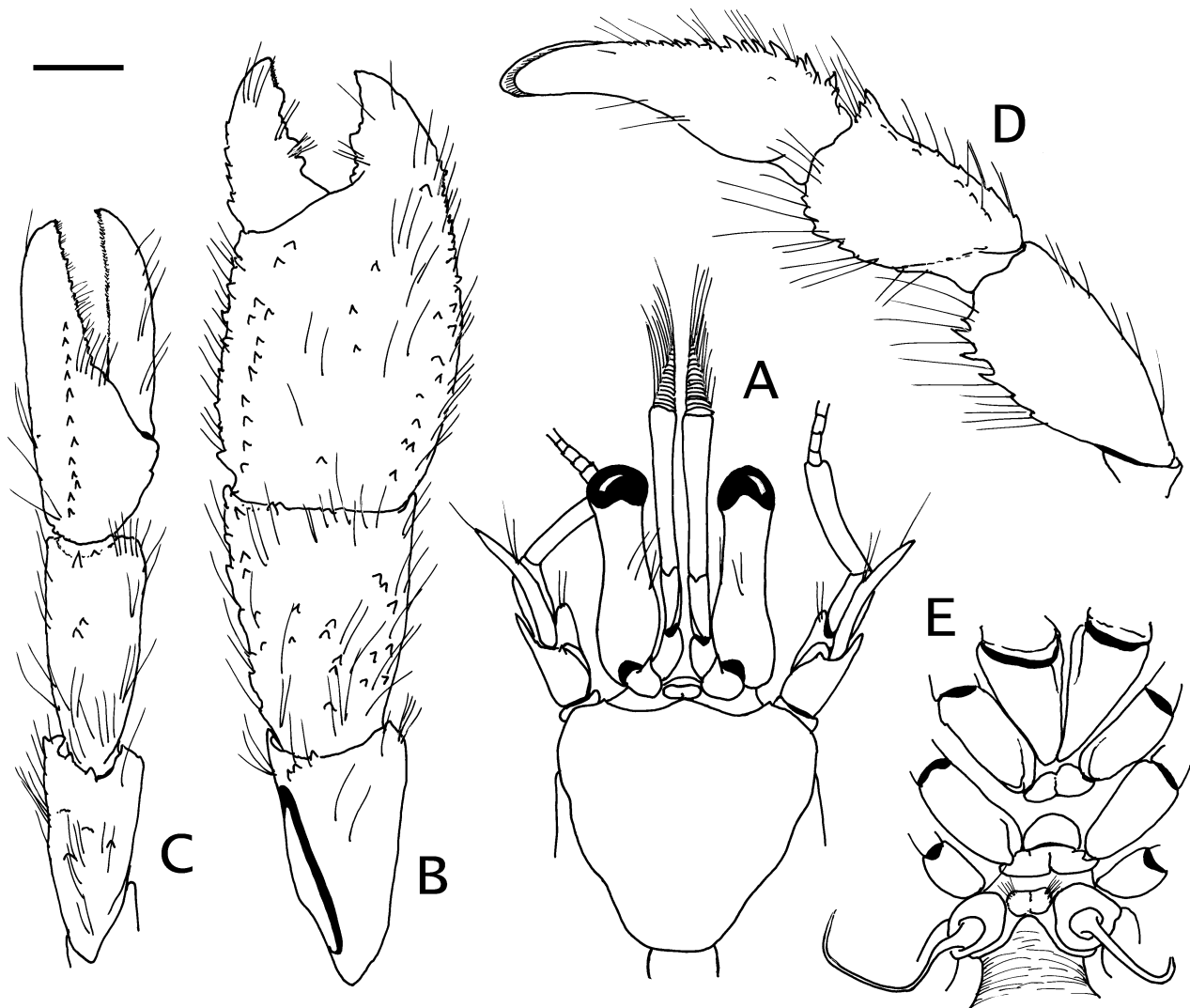


FIGURE 19. *Nematopaguroides pusillus* Forest & de Saint Laurent, 1968: male 1.4 mm, Brazil, TAAF MD55, sta DC 40 (MZUSP 16832). A, shield and cephalic appendages, dorsal; B, right cheliped, dorsal; C, left cheliped, dorsal; D, same, lateral; E, sternum, coxae of pereopods, and sexual tubes, ventral. Scale: 0.5 mm.

Diagnosis. (See also Forest & de Saint Laurent 1968). Shield (Fig. 19A) about as long as broad, naked or with scattered short setae; lateral projections terminating in minute spine; rostrum broadly triangular, rounded. Ocular peduncles slightly constricted medially, with scattered setae dorsally; cornea weakly dilated; acicles subtriangular, each terminating in simple terminal spine or rarely 2 small spines. Antennular peduncles exceeding distal margin of cornea by half length of ultimate segment, naked. Antennal peduncle exceeding distal margin of cornea by one-

fourth length of fifth segment; second segment with distolateral angle produced and terminating strong spine; antennal acicle reaching to proximal margin of cornea, terminating in sharp spine, unarmed except for tuft of setae on mesial margin and long setae distally; flagellum with scattered short setae ≤ 1 article in length. Chelipeds (Fig. 19B, C) markedly dissimilar, stout. Right cheliped sparsely setose; fingers distinctly shorter than palm, cutting edges each with 3 (dactyl) or 1 (fixed finger) large calcareous teeth; chela with row of small spines on dorsomesial and dorsolateral margins; carpus with dorsomesial row of small spines and scattered small spines on dorsal surface. Left cheliped with scattered, moderately long setae on merus, carpus, and chela; fingers twice as long as palm; chela with dorsolateral margin elevated and armed with row of sharp, mostly forwardly curving spines; carpus with a few dorsomesial spines; carpus with strong dorsodistal spine. Ambulatory legs (Fig. 20A, B) each with dactyl slightly longer than propodus, with ventromesial row of 6–8 long, slender spinules; meri, carpi and propodi with long setae or tufts of setae on dorsal margins; segments unarmed except for small, blunt dorsodistal spine on carpi. Fourth pereopod (Fig. 20C) semichelate, propodal rasp consisting of single row of ovate scales; lacking preungual process. Anterior lobe of sternite XII (Fig. 19E) subsemicircular. Uropods markedly asymmetrical. Telson (Fig. 20D) with prominent median cleft separating slightly asymmetrical posterior lobes; rounded terminal margins of posterior lobes each with row of 4 or 5 spines of similar size. Male with coxae of fifth pereopods symmetrical, each coxa with long, slender, and distally filamentous sexual tube (Fig. 19E) directed obliquely outward. Female with paired gonopores.

Distribution. Western Atlantic: known only from off southeastern Florida, and Brazil (Espírito Santo). Depth: 60 to 81.4 m.

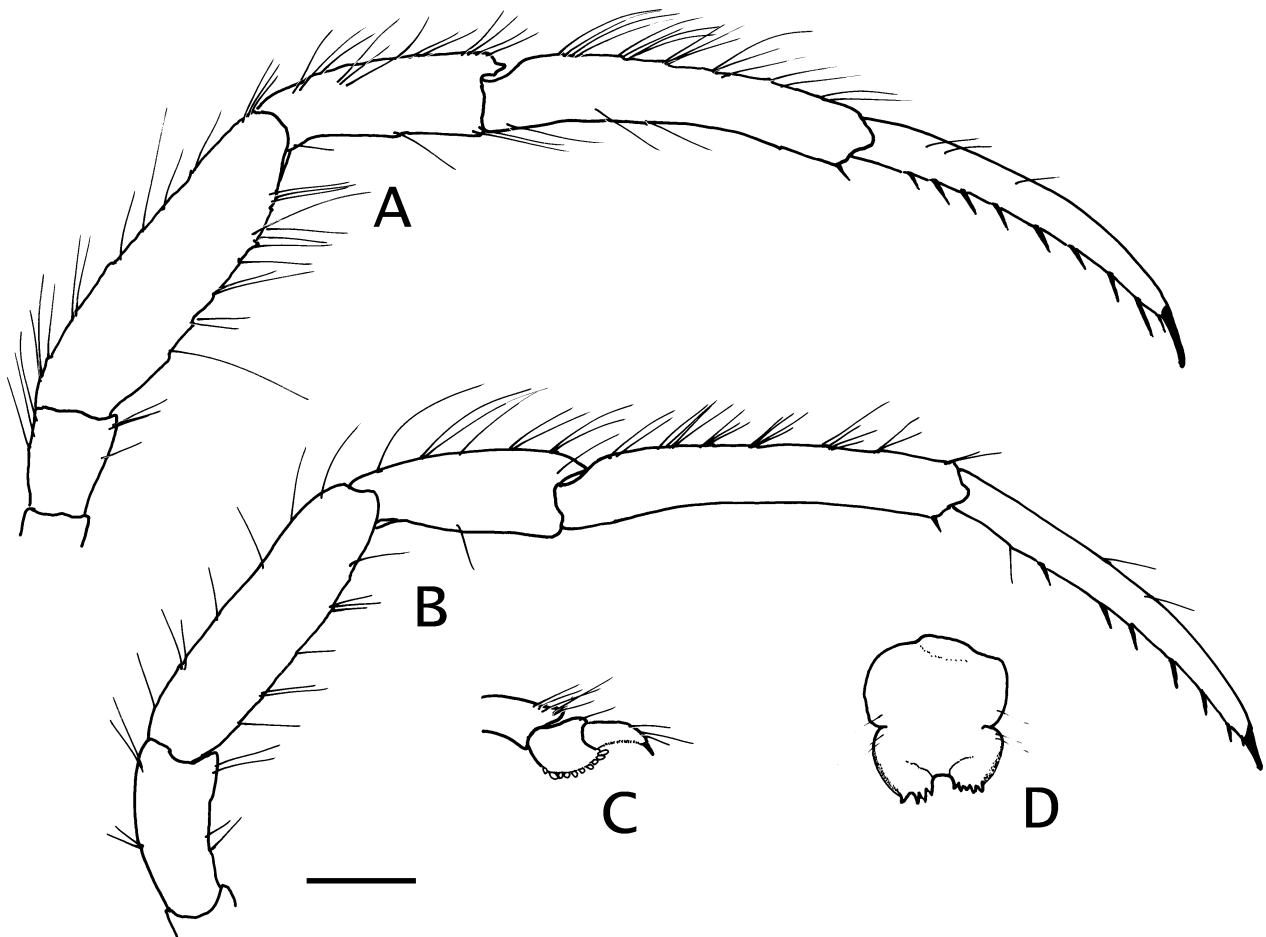


FIGURE 20. *Nematopaguroides pusillus* Forest & de Saint Laurent, 1968, male 1.4 mm, Brazil, TAAF MD55, sta DC 40 (MZUSP 16832): A, right second pereopod, lateral; B, right third pereopod, lateral; C, propodus and dactyl of right fourth pereopod, lateral; D, telson, dorsal. Scale: 0.5 mm.

Remarks. This rarely collected species was previously known only from the type material used by Forest & de Saint Laurent (1968) from off Pernambuco, Brazil, and specimens collected off southeastern Florida as part of an *Oculina* deep reef ecology study by Reed *et al.* (1982). In the latter study, however, only the number of specimens collected was reported, without including any taxonomic or morphological details. Various listings from Florida (Abele & Kim 1986) and Brazil (Coelho & Santos 1980; Coelho & Ramos-Porto 1987; Rieger 1998; Melo 1999; Coelho *et al.* 2007) have also included this species without reporting any new material. The discovery of an additional specimen of *N. pusillus* from the coast of Espírito Santo, Brazil, confirms the presence of this rare species along that portion of the southwestern Atlantic, while still leaving a large gap in its distribution between Bahia and Florida.

At the time Forest & de Saint Laurent (1968) described *N. pusillus*, they questionably placed it in *Nematopaguroides* because the only male known had paired sexual tubes, whereas males of the only other known species and type of the genus, *N. fagei* Forest & de Saint Laurent, 1968, had unpaired right sexual tube. When Wang & McLaughlin (2000) made the remarkable discovery of a third species of *Nematopaguroides*, *N. reconditus* Wang & McLaughlin, 2000, in the South China Sea, with males having a long sexual tube on the right side and a short sexual tube on the left side, they concluded that a left sexual tube could be present as well in species of *Nematopaguroides*, and thus concluded that both *N. reconditus* and *N. pusillus* could correctly belong in this genus.

Individuals of *Nematopaguroides pusillus* are minute in size, ranging in shield length 0.7–1.5 mm. The rareness of collections of this species may be attributed, in part, to the small size as well as the cryptic habitat, such as the dense *Oculina coral* reefs off the coast of eastern Florida, where it has been found.

***Pagurus brevidactylus* (Stimpson, 1858)**

Eupagurus brevidactylus Stimpson, 1858: 237 (type locality by neotype selection by McLaughlin, 1975): Bathsheba, Barbados, West Indies).

Pagurus brevidactylus.—McLaughlin, 1975: 360, figs 1–3.—Coelho & Santos, 1980: 143.—Lemaitre *et al.*, 1982: 675.—Rieger, 1998: 413.—Melo, 1999: 122, figs 65, 66.—Nucci *et al.*, 2007: 48, figs 1A, 2A, 3A, 4A.—Coelho *et al.*, 2007: 10, tab. 4.—Almeida *et al.*, 2010: 361.—McLaughlin *et al.*, 2010: 32.

New material. *Brazil.* Espírito Santo, TAAF MD55, sta 23 DC 40, 20°39.8'S, 34°41.1'W, 60 m, 17 May 1987: 1 ov female 1.6 mm (MZUSP 16832).

Diagnosis. See McLaughlin (1975), and Lemaitre *et al.* (1982).

Color. (From McLaughlin 1975: 363) “In life: Shield with broad black to blackish-green longitudinal stripes laterally, reddish-brown longitudinal median stripe. Ocular peduncles mottled light pink with brownish and greenish-black stripes; corneae deep pink; ocular acicles light pink. Antennular and antennal peduncles greenish or brownish-black; antennal flagella greenish-brown or black, interrupted every 3–6 articles by 1 white article. Chelipeds white with 2 dorsal longitudinal stripes of greenish or brownish-black continued onto carpi; lateral and mesial faces each with 1 or 2 similarly colored stripes. Ambulatory legs white with dorsal, lateral, mesial and ventral longitudinal stripes of greenish or brownish black and darker broad transverse band medially on each segment, lateral faces also with median longitudinal stripe of red or reddish-brown, occasionally greenish-brown. In preservative: greenish or brownish-black color of stripes turning to reddish-orange or orange and fading in time.”

Distribution. Western Atlantic: Bermuda, Florida, Gulf of Mexico, throughout the Caribbean, and Atlantic coast of South America from Venezuela to Santa Catarina, Brazil. Depth: shallow water to 73 m.

Remarks. Following the clarification of the identity of this species by McLaughlin (1975), *Pagurus brevidactylus* has been reported broadly in the western Atlantic, from Bermuda to Brazil (*e.g.*, Sánchez & Campos 1978; Lemaitre *et al.* 1982; Abele & Kim 1986; Sterrer 1986; Strasser & Price 1999; Hernández *et al.* 2007; Felder *et al.* 2009; Nucci *et al.* 2007). Currently, this abundant species is considered to exhibit significant morphological variations (Lemaitre *et al.* 1982), including various color patterns that deviate from the documented coloration provided by Provenzano (1959) and McLaughlin (1975), and conceivably reflect cryptic species confused under this name (D.L. Felder, pers. comm.). Ongoing molecular and morphological evaluations of populations of *P. brevidactylus* from throughout its presumed distributional range, might assist in reaching a precise definition of the boundaries and range of this taxon (Lemaitre *et al.*, in prep.).

***Pagurus heblingi* Nucci & Melo, 2003**

Pagurus heblingi Nucci & Melo, 2003: 351, fig. 1 (type locality: Cabo Frio, Rio de Janeiro).—Lemaitre & Cruz Castaño, 2004: 71.—Nucci & Melo, 2007: 54, figs 1D, 2D, 3D, 4D.—McLaughlin *et al.*, 2010: 33.

New material. *Brazil.* TAAF MD55, 53 CB 92, 360 m, 19°34'S, 38°55'W, 29 May 1987: 1 male 3.8 mm (MZUSP 16830); TAAF MD55, sta 57 CB 97, 600 m, 21°34'S, 40°08'W, 31 May 1987: 1 female 2.0 mm (MZUSP 16821); TAAF MD55, sta 63 CB 104, 23°42'S, 42°07'W, 430 m, 1 Jun 1987: 1 ov female 2.2 mm (MZUSP 16819).

Diagnosis. See Nucci & Melo (2003), and Nucci & Melo (2007).

Distribution. Southwestern Atlantic: from Espírito Santo to northern coast of São Paulo, Brazil. Depth: 300 to 600 m.

Remarks. This species was previously known exclusively from the type material collected along the coast of Cabo Frio, Rio de Janeiro (Nucci & Melo 2003), roughly near 22°52'44"S, 42°01'08"W. The material herein reported expands the horizontal range of this species for about 2° of latitude to the north and 1° of latitude to the south of the type locality, and also increases by 200 m the lower depth limit at which this species is known to live.

***Pagurus rotundimanus* Wass, 1963**

(Figs. 21, 22)

Pagurus rotundimanus Wass, 1963: 149, fig. 8 (type locality: Dry Tortugas, R/V *Oregon*, sta 1005, 24°20' N, 83°20' W).—Pequegnat, 1983: 121, fig. 66.—Lemaitre & Cruz Castaño, 2004: 77.—Felder *et al.*, 2009: 1071.—McLaughlin *et al.*, 2010: 34.

Type material. *Gulf of Mexico:* holotype male 4.0 mm, off Florida, R/V *Oregon*, sta 1005, 24°20'N, 83°20'W, 347 m, 13 Apr 1954 (USNM 97466). Paratypes, Florida Keys: 1 ov female 2.7 mm, Florida Keys, sta 68, [no depth data], 1 Aug 1932, coll. W. L. Schmitt (USNM 103425); 1 ov female 3.7 mm, Florida Keys, sta 30–32, 247 m, 2 Jul 1932, coll. W.L. Schmitt (USNM 103426); 2 males 3.7, 3.8 mm, 2 females 2.8, 4.2 mm, 1 ov female 3.3 mm, Florida Keys, sta 67, 256–360 m, 1 Aug 1932, coll. W.L. Schmitt (USNM 103431); 1 female 3.5 mm, 1 ov female 3.6 mm, Florida Keys, 17.5 miles S of no. 2 red buoy, Tortugas Expedition Carnegie Lab, sta 32–31, 280–289 m, 22 Jul 1931, coll. W.L. Schmitt (USNM 103436); 1 male 3.4 mm, Florida Keys, about 18 miles due S of no. 2 red buoy, Tortugas Expedition Carnegie Lab, sta 18–31, 375–404 m, 3 Jul 1931, coll. W.L. Schmitt (USNM 107820).

New material. *Gulf of Mexico.* Off Florida, R/V *Citation IV*, sta, E1A, 28°54'22"N, 86°24'24"W, BLM/MMS, NGOMCS/4503, 351 m, 14 May 1985, coll. LGL Ecological Research Associates: 1 male 2.4 mm (USNM 265248); off Florida, R/V *Citation IV*, sta E2A, 28°35'01"N, 86°45'44"W, BLM/MMS, NGOMCS/4502, 625 m, 13 May 1985, coll. LGL Ecological Research Associates: 2 males 2.4, 2.5 mm, 1 female 2.1 mm (USNM 265252); off Florida, R/V *Citation IV*, sta E01, 28°28'47"N, 86°02'32"W, BLM/MMS, NGOMCS/4504, 351–357 m, 14 May 1985, coll. LGL Ecological Research Associates: 2 males 2.1, 3.1 mm, 3 females 3.6–4.5 mm (USNM 265249); off Florida, R/V *Citation IV*, sta E2B, 28°18'58"N, 86°18'56"W, BLM/MMS, NGOMCS/4511, 600–625 m, 17 May 1985, coll. LGL Ecological Research Associates: 2 females 2.5, 2.8 mm (USNM 265251); off Florida, R/V *Citation IV*, sta E2D, 28°07'38"N, 85°51'36"W, BLM/MMS, NGOMCS/4508, 624–631 m, 16 May 1985, coll. LGL Ecological Research Associates: 1 male 1.9 mm (USNM 265253); off Louisiana, R/V *Citation V*, sta WC–1, 27°42'58"N, 92°52'05"W, BLM/MMS, NGOMCS/5501, 344–393 m, 7 Jun 1985, coll. LGL Ecological Research Associates: 2 females 2.1, 3.0 mm, 2 ov females 2.1, 2.8 mm (USNM 265254); off Louisiana, R/V *Gyre II*, sta W01, 27°37'00"N, 93°33'36"W, BLM/MMS, NGOMCS/2022, 342 m, 4 Apr 198, coll. LGL Ecological Research Associates: 1 male 3.4 mm, 1 female 3.1 mm (USNM 265250); 25°55'08"N, 96°25'43"W, 311–384 m, 13 Jun 1989, coll. M. Wicksten: 1 male 3.1 mm (USNM 259393).

Caribbean Sea. ESE of Cabo Gracias a Dios, coast of Nicaragua-Honduras, R/V *Pillsbury*, sta 1355, 14°40'N, 81°33'W, 440–797 m, 31 Jan 1971: 1 female 2.0 mm (USNM 1238335); Colombia, B/I *Ancón*, sta EA 268, 8°59'24.8"N–8°59'30.2"N, 76°45'42.8"W - 76°46'27.6"W, 500 m, 6 Jun 2008, coll. INVEMAR: 1 male 3.4 mm (USNM 1238334).

Diagnosis. Shield (Fig. 21A) about as long as broad or slightly broader than long, naked or with scattered short setae; lateral projections terminating in small spine; rostrum broadly triangular, rounded. Ocular peduncles about

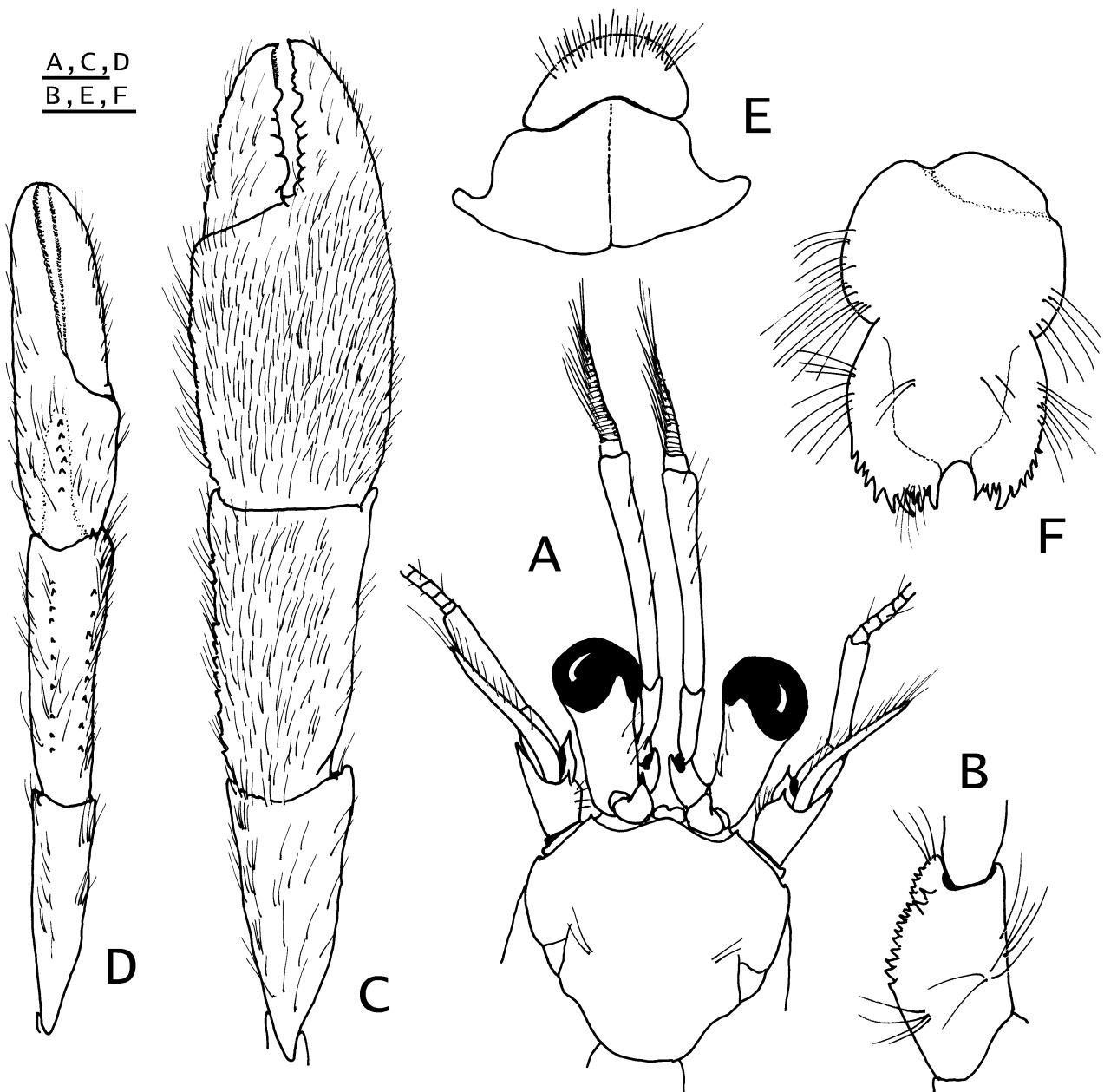


FIGURE 21. *Pagurus rotundimanus* Wass, 1963: male 3.4 mm, Colombia, B/I Ancón, sta EA 268 (USNM 1238334). A, shield and cephalic appendages, dorsal; B, ischium of left third maxilliped, outer view; C, right cheliped, dorsal; D, left cheliped, dorsal; E, sternite XII, ventral; F, telson, dorsal. Scales: 1 mm (A, C, D), 0.5 mm (B, E, F).

0.7 times as long as shield, with few short setae dorsally; cornea dilated; acicles subtriangular, each terminating in simple subterminal spine. Antennular peduncles exceeding distal margin of cornea by nearly full length of ultimate segment, with scattered short setae. Antennal peduncle exceeding distal margin of cornea by one-third length of fifth segment; second segment with distolateral angle produced and terminating strong spine; acicle reaching to or slightly exceeding distal margin of cornea, terminating in sharp spine, unarmed except for setae on mesial margin; flagellum with scattered short setae ≤ 1 article in length. Third maxilliped ischium (Fig. 21B) with simple or bifid accessory tooth. Chelipeds (Fig. 21C, D) markedly dissimilar in strength; tip of fingers of left reaching to about midlength of fingers of right. Right cheliped with dense, fine setae on dorsal surfaces of chela and carpus; fingers straight, distinctly shorter than palm, cutting edges each with 5 or 6 subequal, large calcareous teeth; chela mostly smooth except for dorsomesial row of small spines or tubercles; carpus smooth except for dorsomesial row of weak (Fig.) or strong spines. Left cheliped moderately covered with setae; fingers about 1.5 times as long as palm and terminating in small inwardly curved corneous claw; chela with elevated dorsomedian ridge armed with row of

small spines; carpus with dorsomesial and dorsolateral rows of small spines, and 2 small spines on dorsodistal margin laterally. Ambulatory legs (Fig. 22A–D) slender; dactyl long, about 1.8 times as long as propodus, unarmed except for row of long setae on nearly entire dorsal margin, and ventromesial row of long setae on distal half; meri, carpi and propodi unarmed except for short setae on dorsal margins, small dorsodistal spine on each carpus, and 2 or 3 small spines distally on ventral margin of merus of first ambulatory leg (second pereopod). Fourth pereopod (Fig. 22E) semichelate, propodal rasp consisting of single row of ovate scales; lacking preungual process. Anterior lobe of sternite XII (Fig. 21E) subsemicircular. Uropods markedly asymmetrical. Telson (Fig. 21F) nearly symmetrical, 1.5 times as long as broad, with prominent U-shaped median cleft separating posterior lobes; terminal margins of posterior lobes each with row of about 5–11 unequal blunt to sharp spines increasing in strength distally (2 or 3 most distal spines usually largest and ventrally curved).

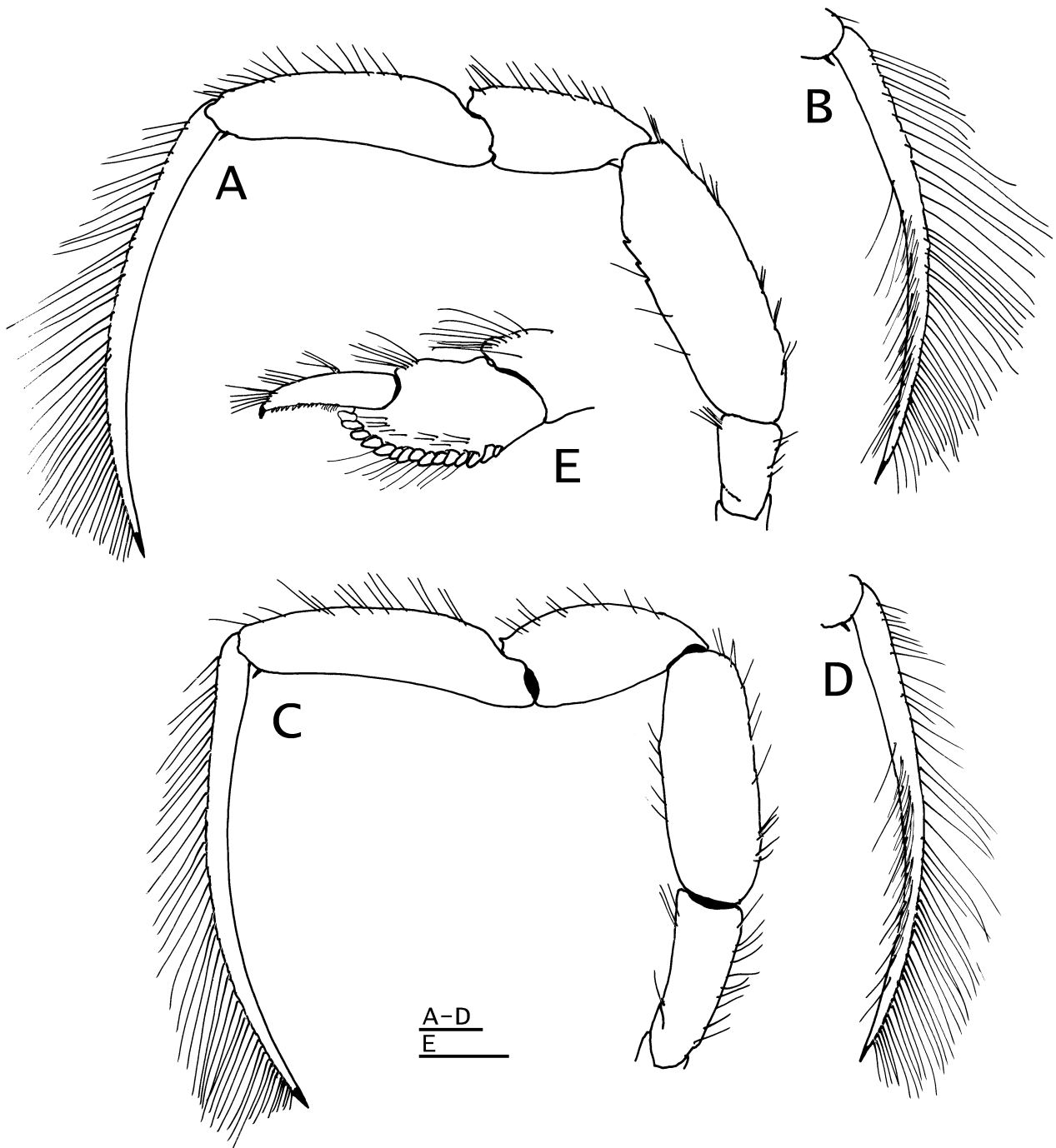


FIGURE 22. *Pagurus rotundimanus* Wass, 1963: male 3.4 mm, Colombia, B/I Ancón, sta EA 268 (USNM 1238334). A, left second pereopod, lateral; B, dactyl of same, mesial; C, left third pereopod, lateral; D, dactyl of same, mesial; E, propodus and dactyl of left fourth pereopod, lateral. Scales: 1 mm (A–D), 0.5 mm (E).

Distribution. Western Atlantic: Gulf of Mexico, Bahamas, and Caribbean, from off Nicaragua-Honduras border to Colombia. Depth: 247 to 631 m.

Color. Based on Wass (1963: 151, fig. 8): ambulatory legs each with light red band medially on merus and propodus, and right cheliped with light red band distally on merus and proximally on carpus.

Remarks. This rare species had not been mentioned in the literature since its original description by Wass (1963) from the Dry Tortugas, Florida, until Felder *et al.* (2009) updated its distribution in the Gulf of Mexico. The specimens reported herein of *Pagurus rotundimanus* in the southwest and southern Caribbean, significantly expands the distribution of this species both horizontally and vertically.

***Pylopagurus discoidalis* (A. Milne-Edwards, 1880)**

(Fig. 1E)

Eupagurus discoidalis A. Milne-Edwards, 1880: 41 (type locality: USSCS *Blake*, sta 157, off Monserrat, Caribbean Sea, Lesser Antilles).

Pylopagurus discoidalis.—Coelho, 1971: 232.—Coelho & Ramos, 1973: 166.—Coelho & Santos, 1980: 143.—Coelho & Ramos-Porto, 1987: 43.—Rieger, 1998: 416.—Melo, 1999: 144, figs 85, 86.—McLaughlin & Lemaitre, 2001: 451, figs 4–6 [and synonymy therein].—Lemaitre & McLaughlin, 2003: 482.—Coelho *et al.*, 2007: 10.—McLaughlin *et al.*, 2010: 35.—Nucci & Melo, 2011: 37, figs 1M, 2M, 3M.

New material. *Curaçao*. *Curasub* 12–09, 306 m, 24 May 2012: 1 male 6.3 mm, 1 ov female 5.8 mm, CURI 12030, CURI 12031 (USNM 1253259), 1 female 5.1 mm (USNM 1253260); *Curasub* 12–12, 290 m, 7 Aug 2012: 1 male 6.0 mm, CURI 12107 (USNM 1253261), 1 male 3.7 mm CURI 12136 (USNM 1253262); *Curasub* 12–13, 286 m, 8 Aug 2012: 1 female 5.7 mm, CURI 12143 (USNM 1253263); *Curasub* 12–14, 123–256 m, 9 Aug 2012: 1 female 5.1 mm, (USNM 1253264).

Brazil. TAAF MD55, 63 CB 104, 23°42'S, 42°07'W, 430 m, 1 Jun 1987: 3 females 1.8–2.1 mm, (MZUSP 16828); Bacia de Campos, Bloco BM–S–4, Belmonte 3, sta 4, 18°48'19.50"S, 032°18'05.37"W, 320 m, Vinicius Padula, 30 Nov 2009: 8 males 1.3–5.8 mm (MZUSP 23514).

Diagnosis. See McLaughlin & Lemaitre (2001), and Nucci & Melo (2011).

Distribution. Western Atlantic: southeastern coast of United States (North Carolina to Florida), Gulf of Mexico, Caribbean Sea, to Santa Catarina, Brazil. Depth: 11 to 1020 m.

Color (Fig. 1E). Shield, pleon, and fourth and fifth pereopods light orange. Ocular peduncles white with dark orange band basally. Right cheliped with coloration on dorsal (outer) surface of chela variable: white with dark orange band on dactyl and fixed finger, or white dark orange along midportion of palm from bases of fingers to proximal palm ridge; proximal surface of chela dark orange; merus and carpus white with prominent dark orange patches on dorsal, lateral and mesial surfaces. Left cheliped: chela white with dark orange proximally; merus and carpus white with wide dark orange band. Ambulatory legs (second and third pereopods): dactyl white with light orange proximal portion; propodus white with dark distal orange band; carpus white with distal and proximal dark orange bands.

Remarks. Although *Pylopagurus discoidalis* has been abundantly reported in the temperate to tropical western Atlantic (McLaughlin & Lemaitre 2001, 2003), its southern limit of distribution was previously known to be near the Equator, off the coast of Amapá, Brazil. The extent of the southernmost limit of this species was only recently discovered by Nucci & Melo (2011), who reported specimens from Amapá to Santa Catarina, Brazil. The materials reported herein from off Rio Janeiro, add more records of this species from its southern limits, and confirms that this species is common along almost the entire Brazilian coast.

The coloration of *Pylopagurus discoidalis* has been documented almost exclusively based on specimens that have retained color patterns after preservation. Until the present report, no photographs of live specimens of this species were available. The remarkable color photograph included herein (Fig. 1E), was taken of three specimens inhabiting scaphopod shells, collected in Curaçao during a *Curasub* dive and brought to the surface where they were kept alive in aquaria.

Family Parapaguridae

Oncopagurus gracilis (Henderson, 1888)

Parapagurus gracilis Henderson, 1888: 92, pl. 10, fig. 3 (type locality: off Alagoas, Brazil, HMS *Challenger*, sta 122, 09°05'S, 34°50'W, 640 m).

Sympagurus arcuatus A. Milne-Edwards & Bouvier, 1893: 67, pl. 5, figs 21–28 (type locality: St. Lucia, Caribbean Sea, USCGS Blake, sta 218, 13°49.12'N, 61°04.40'S).

Pylopagurus exquisitus Boone, 1927: 71, fig. 14 (type locality: *Pawnee I*, N of Glover Reef, off the coast of British Honduras [=Belize])

Oncopagurus gracilis.—Lemaitre, 1996: 194.—Lemaitre, 2014: 252, fig. 25A–J, 51.—McLaughlin *et al.*, 2005: 246.—Coelho *et al.*, 2007: 10, tab. 1.—Felder *et al.*, 2009: 1071.—McLaughlin *et al.*, 2010: 39.—Campos *et al.*, 2005: 139, figs. 99, 100.—Campos *et al.*, 2012: 240.

Type material. Lectotype designated by Lemaitre (1989), male 2.8 mm, off Alagoas, Brazil, HMS *Challenger*, sta 122, 09°05'S, 34°50'W, 640 m, 10.9.1883 (BMNH 1888: 33).

New material. *Southwestern Atlantic.* Brazil: TAAF MD55, sta 4 CP 07, 21°31'S, 40°07'W, 750–785 m, 10 May 1987: 1 male 4.0 mm, in gastropod shell with actinian polyp, (MZUSP 16812); TAAF MD55, sta 42 CB 76, 18°58'S, 37°49'W, 600–637 m, 27 May 1987: 8 males 2.2–3.3 mm, 1 ov female 2.4 mm, in gastropod shells (MZUSP 16817); TAAF MD55, sta 54 CB 93, 19°36'S, 38°53'W, 707–733 m, 30 May 1987: 19 males 1.5–3.4 mm, 1 female 1.8 mm, 12 ov females 2.1–2.7 mm, in gastropod shells, (MZUSP 16829), 4 males 2.4–2.9 mm, 1 female (parasitized) 1.9 mm, in gastropod shells, (MZUSP 16822), 2 males 2.2, 2.9 mm (MZUSP 16833); TAAF MD55, sta 57 CB 97, 21°34'S, 40°08'W, 600 m, 31 May 1987: 2 males 3.0, 3.1 mm, in gastropod shells (MZUSP 16821), 1 male 3.1 mm, 1 ov female 2.7 mm, in gastropod shells (MZUSP 16831); TAAF MD55, sta 58 CB 98, 21°35'S, 40°03'W, 900 m, 31 May 1987: 3 males 2.3–2.4 mm, 3 females 1.2–2.6 mm (MZUSP 16816); TAAF MD55, 63 CB 104, 430 m, 23°42'S, 42°07'W, 430 m, 1 Jun 1987: 4 males 1.8–2.1 mm, 7 ov females 1.7–2.2 mm, in gastropod shells (MZUSP 16819), 3 males 1.6–2.0 mm, 1 female 1.2 mm, 4 ov females 1.6–1.8 mm, in gastropod shells except for non-ov female in scaphopod (MZUSP 16828); TAAF MD55, sta 64 CB 105, 23°46'S, 42°09'W, 592–610 m, 2 Jun 1987: 6 males 3.4–3.6 mm, in gastropod shells, (MZUSP 16810), 7 males 1.8–3.0 mm, 1 female 1.6 mm, 2 ov females 1.9, 2.4 mm, in gastropod shells (MZUSP 16811), 19 males 1.9–3.1 mm, 1 ov female 2.1 mm (MZUSP 16820), 44 males 1.5–3.2 mm, 1 female 2.0 mm, 40 ov females 2.0–4.9 mm, in gastropod shells, (MZUSP 16824), 41 males 1.8–3.0 mm, 15 ov females 1.6–2.1 mm, (MZUSP 16823), 29 males 1.3–2.7 mm, 6 females 1.3–2.2 mm, 11 ov females 1.6–1.9 mm (MZUSP 16825); TAAF MD55, sta 65 CB 106, 830 m, 23°54'S, 42°10'W, 2 Jun 1987: 1 male 2.5 mm (MZUSP 16818).

Diagnosis. See Lemaitre (2014).

Distribution. Western Atlantic: from the Straits of Florida and Gulf of Mexico to off northern coast of São Paulo, Brazil. Eastern Atlantic: from Gulf of Guinea and off Angola. Depth: 146 to 900 m.

Remarks. This species had been previously reported from Brazil as far south as Alagoas (Coelho & Ramos-Porto 1987, as *Parapagurus bicristatus gracilis*; Rieger 1998, as *Parapagurus gracilis*; Melo 1999, as *Sympagurus gracilis*; Coelho *et al.* 2007; Lemaitre 2014). The abundant material reported herein is from much further south to nearly 24°S, off the coast of São Paulo, and in waters 266 m deeper than previously known.

As previously mentioned for the collecting locality of the lectotype of *Paguristes visor* (= *P. spinipes*), Henderson (1888: 93) indicated that HMS *Challenger*, sta 122, where the types of *Oncopagurus gracilis* were also collected, came from "off Pernambuco" at 09°05'S, 34°50'W, whereas those geographic coordinates are actually located further south, off the coast of the State of Alagoas. Thus the latter is the correct type locality as well for this parapagurid species.

Parapagurus pilosimanus Smith, 1879

(Fig. 23A)

Parapagurus pilosimanus Smith, 1879: 51 (type locality: off the coast of Nova Scotia).—Lemaitre, 1986: 529, figs. 1C, D, 3A–E, 4C, D, 5E, F, 6I, J, 7C, G, 8H, 9F–H.—Lemaitre, 1989: 13, FIG. 3, 4, 5A, 6, 39A, B.—Lemaitre, 1999: 308, fig. 47.—McLaughlin *et al.*, 2010: 39.—Cardoso & Lemaitre, 2012: 597, fig. 4.

Eupagurus jacobii A. Milne-Edwards, 1880: 42 (syntypes from Caribbean Lesser Antilles: Guadeloupe, St. Lucie and Martinique).

Sympagurus Grimaldii A. Milne-Edwards & Bouvier, 1897: 134 (type locality: Azores, *L'Hirondelle*, sta 211, 39°18'N, 33°32'W).

New material. *Southwestern Atlantic. Brazil:* Rio Grande do Norte: sta MT 74, 04°33.9768'S, 36°41.8026'W, 987 m, 15 May 2011: 1 male 8.8 mm (in zoanthid) (MZUSP 25789).

Diagnosis. See Lemaitre (1986, 1989).

Distribution. North, Central and South Atlantic (Lemaitre 1989, 1999; Cardoso & Lemaitre 2012). Depth: 102 to 3864 m.

Color (Fig. 23A). Freshly collected specimen (MZUSP 25789) with shield and ocular peduncles dirty white or cream, with light orange tones near anterior and posterior margins, somewhat iridescent. Antennules and antennae reddish. Chelipeds dirty white or cream; dactyls light orange distally; meri proximally with light orange tone fading distally to dirty white or cream. Ambulatory legs light orange with orange tone darker on dactyls.

Remarks. Despite this species being one of the most common and widely distributed parapagurids on the North, Central and South Atlantic, it had never before been reported in the western Atlantic further south than off the coast of French Guiana. Thus, this report extends the range of this species considerably to the south, from about 7°46'N (Lemaitre 1989) to 4°33'S off the coast of Rio Grande do Norte, Brazil.

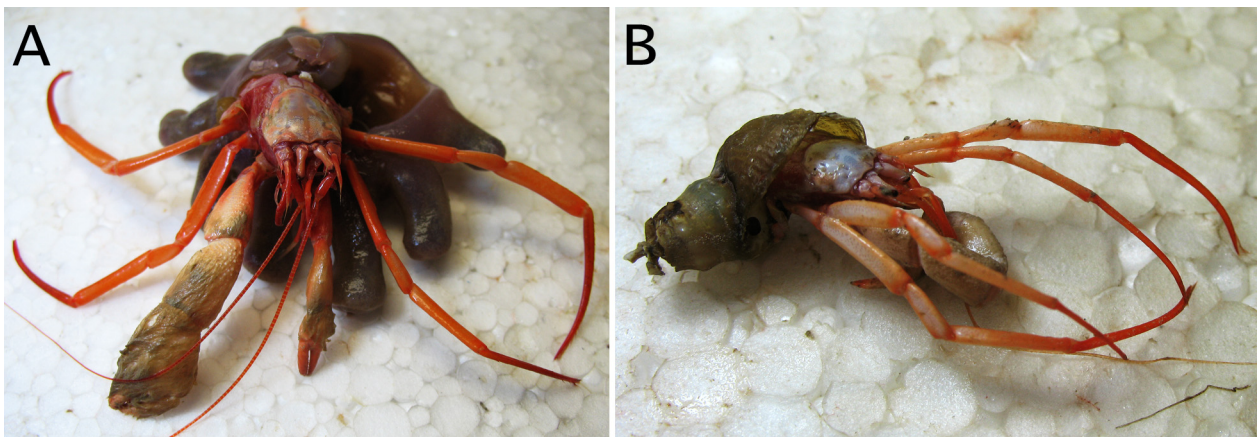


FIGURE 23. A, *Parapagurus pilosimanus* Smith, 1876, male 8.8 mm, in zoanthid carcinoecia, Rio Grande do Norte, Brazil, (MZUSP 25789); B, *Parapagurus alaminos* Lemaitre, 1986, male 5.4 mm, in gastropod shell with carcinoecia, Rio Grande do Norte, Brazil (MZUSP 25787). (Photos: Joel Braga, MZUSP)

Parapagurus alaminos Lemaitre, 1986

(Fig. 23B)

Parapagurus alaminos Lemaitre, 1986: 527, figs 1E, F, 2F–J, 4E–H, K, 5C, D, 6D–F, 7A, E, 8D, E, 9D, E (type locality: Gulf of Mexico, R/V *Alaminos*, sta 71–8–75, 20°05'N, 92°20'W).—Lemaitre, 1989: 21, figs 7, 8, 9.—Lemaitre, 1999: 308, fig. 47.—McLaughlin *et al.*, 2010: 39.

New material. *Brazil.* Rio Grande do Norte: sta MT 75, 04°28.9586'S, 36°51.0590'W, 915 m, 13 May 2011: 1 male 5.4 mm (in shell with carcinoecia) (MZUSP 25787).

Diagnosis. See Lemaitre (1986, 1989).

Distribution. Western Atlantic: from off North Carolina, the Gulf of Mexico and Caribbean, to off Rio Grande do Norte, Brazil. Eastern Atlantic: from the Azores and Canary Islands to the Gulf of Guinea. Depth: 850 to 3360 m.

Color (Fig. 23B). Freshly collected specimen (MZUSP 25787) with shield and ocular peduncles dirty white or cream. Antennules and antennae light orange. Chelipeds dirty white or cream. Ambulatory legs dirty white or cream, with ischia, meri, carpi and propodi light orange distally and along dorsal and ventral margins; dactyls light orange.

Remarks. The previous southernmost record of this species is from the southwestern Caribbean off the coasts of Panama and Colombia (Lemaitre 1989); thus, this report extends considerably the range of this species from about 9° N off the Caribbean coast of Colombia, to 4°33'S off the coast of Rio Grande do Norte, Brazil.

Sympagurus pictus Smith, 1883

Sympagurus pictus Smith, 1883: 37 (in part), pl. 5, figs 3, 3a, 5–8, not figs 2, 2a (= *Parapagurus pilosimanus* Smith, 1879 (see Lemaitre, 1989, 2004) [type locality by lectotype selection by Lemaitre (1989): off Martha's Vineyard, USFC sta 924, 39°57.30'N, 70°46'W]).

Sympagurus pictus.—Lemaitre, 1989: 38, figs. 15–17, 18B, 19, 39C, D, 40D.—Lemaitre, 2004: 122, figs. 1g_{1,2}, 2, 24, 34.—McLaughlin *et al.*, 2010: 40.

New material. *Southwestern Atlantic. Brazil:* Rio Grande do Norte, sta MT 64, 04°36.2400'S, 36°45.7395'W, 415 m, 12 May 2011: 1 ov female 10.3 mm (in anthozoan) (MZUSP 25791).

Diagnosis. See Lemaitre (1989, 2004).

Distribution. Western Atlantic: from Martha's Vineyard to the Gulf of Mexico, Caribbean Sea to off Rio Grande do Norte, Brazil. Depth: 180 to 2322 m.

Color. See Lemaitre (2004).

Remarks. This species, the adults of which typically live symbiotically with the large actinian *Sagartia consors* (Verrill), has not been previously recorded south of the coast of French Guiana. Thus, this report extends significantly the southernmost range of this species from about 7°06'N to 4°36'S off the coast of Rio Grande do Norte, Brazil.

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