



Shallow-water caridean shrimps from southern Bahia, Brazil, including the first record of *Synalpheus ul* (Ríos & Duffy, 2007) (Alpheidae) in the southwestern Atlantic Ocean

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Abstract

In this contribution, we report 33 species of shallow-water marine and estuarine caridean shrimps from southern Bahia, Brazil. Nine taxa are reported for the first time from Bahia: the alpheid *Alpheus* cf. *paracrinitus* Miers, 1881, *Alpheus* cf. *rostratus* W. Kim & Abele, 1988, *Automate* cf. *evermanni* Rathbun, 1901, *Leptalpheus* aff. *forceps* Williams, 1965, *Leptalpheus axianassae* Dworschak & Coelho, 1999, *Salmoneus carvachoi* Anker, 2007 [previously reported as *Salmoneus* cf. *ortmanni* (Rankin, 1898)] and *Synalpheus ul* (Ríos & Duffy, 2007) (previously reported as *Synalpheus* cf. *pandionis* Coutière, 1909); the hippolytid *Thor manningi* Chace, 1972; and the processid *Ambidexter symmetricus* Manning & Chace, 1971. *Synalpheus ul* is reported for the first time in the South Atlantic Ocean, significantly extending its southern limit in the western Atlantic, and is illustrated herein. The presence of *Alpheus bouvieri* A. Milne-Edwards, 1878, *A. cristulifrons* Rathbun, 1900 and *A. formosus* Gibbes, 1850 in Bahia is confirmed. The southern range limit of the hippolytid *Merguia rhizophorae* (Rathbun, 1900) is extended from the Mamoã River, Ilhéus (14°35'05.6"S; 39°03'10.5"W) to Barra do Cahy, Prado (17°00'45.0"S; 39°10'21.0"W).

Key words: Caridea, Palaemonidae, Alpheidae, Hippolytidae, Processidae, first records

Introduction

With 3438 species described so far, caridean shrimps represent the largest group among shrimp-like decapods and the second most diverse decapod infraorder after Brachyura (De Grave & Franssen 2011). Caridean shrimps are ecologically diversified occurring from tropical to polar regions, in intertidal, subtidal and pelagic habitats, on hard and soft bottoms as epi- or infaunal organisms, on algae and seagrass, or in symbiosis with other animals (Bauer 2004). They also successfully colonized freshwater environments (655 described species), where they occur in a wide variety of habitats from mountain streams to ancient lakes and estuaries (De Grave *et al.* 2008).

Studies on the taxonomic composition of the caridean fauna of the Brazilian state of Bahia have been few and sporadic. The coastline of Bahia is over 1100 km in extent, comprising more than 12% of the Brazilian coast. This long tropical coastline includes a great diversity of coastal environments that presumably shelter a diverse fauna, which is still only fragmentarily described. The first project that intensively and systematically surveyed the decapod crustacean fauna in Bahia was realized in 2003 (Almeida *et al.* 2010).

The first mentioning of a coastal caridean species from Bahia was that of Smith (1869), who reported *A. armillatus* H. Milne Edwards, 1837 [in H. Milne Edwards, 1834–1840] (as *A. heterochaelis* Say, 1818, see Christoffersen 1984) among material collected by the geologist C.F. Hartt in 1867, mainly in the Abrolhos Archipelago and Caravelas. Spence Bate (1888) reported three caridean species collected off Salvador during the Challenger Expedition, including *Alpheus intrinsecus* Spence Bate, 1888. Coutière (1909), in his important publication on the American snapping shrimp genus *Synalpheus* Spence Bate, 1888, reported three species from Bahia, based on materials from C.F. Hartt expeditions. A new subspecies of *S. minus* (Say, 1818) was designated, *S. minus bahiensis* Coutière, 1909, with the type locality in Plataforma, near Salvador. Several decades passed with apparently no other reports of carideans from Bahia. Gomes Corrêa (1972) compiled information on Decapoda of the Abrolhos Archipelago, adding to the list material collected by the staff of the Museu Nacional, Universidade Federal do Rio de Janeiro. Coelho & Ramos (1972), in a study on decapods from the east coast of South America between 5°N and 39°S, listed 12 caridean species from Bahia. Christoffersen (1979) examined material of 19

species from Bahia (Alpheidae, Ogyrididae, Hippolytidae, Processidae), all collected by the French vessel *Calypso* in 1961–62. Several stations were sampled along the coast of Bahia by REVIZEE (Avaliação do Potencial Sustentável de Recursos Vivos na Zona Econômica Exclusiva) Program Central Score. The caridean material collected during Cruises V (2001) and VI (2002) (R/V *Astro Garoupa*, Petrobrás), between 50 and 100 m, was reported in Serejo *et al.* (2006). The REVIZEE Program's Cruises Bahia I (1999) and II (2000) (R/V *Thalassa*, France) brought back a collection of various deep-water carideans (Serejo *et al.* 2007). A few studies on specific shrimp families include material from Bahia, for instance on the Pasiphaeidae (Tavares & Cardoso 2006), Oplophoridae (Cardoso & Young 2005), Glyphocrangonidae (Komai 2004) and Pandalidae (Cardoso 2009, 2011; Rego & Cardoso 2010). In addition, some estuarine Palaemoninae from Bahia were reported by Ferreira *et al.* (2010).

Between 2003 and 2008, several projects sponsored by the Universidade Estadual de Santa Cruz in Ilhéus, Bahia (UESC), were carried out to survey the crustacean fauna in coastal areas of the southern part of the state. Previous studies, which were limited to Ilhéus and Camamu Bay, resulted in several new records of shallow-water carideans in Bahia (Almeida *et al.*, 2006; 2007a; 2007b), and the description of a new palaemonid species, *Neopontonides brucei* Fransen & Almeida, 2009 (Fransen & Almeida, 2009). The objective of the present study is to determine the taxonomic composition of Caridea in shallow marine and estuarine waters of southern Bahia, and to provide some basic ecological data for the species encountered.

Material and methods

Most of the material examined in this study was collected during the projects “Inventariamento da Fauna de Crustáceos Decápodos do Município de Ilhéus, Bahia” (2003–2005) and “Diversidade de Crustáceos do Sudeste e Sul da Bahia, Brasil: I. Ambientes Costeiros” (2006–2008). The sampling methods during the first project in the estuaries of Ilhéus were described by Almeida *et al.* (2006). In the second project, the study area extended from Cairú (13°34'S; 38°54'W) to Mucuri (18°05'S; 39°33'W) in the southernmost part of the state, on the border with Espírito Santo (Fig. 1). Collection activities were approximately trimestral and covered almost all the coastal municipalities. Samples were qualitative, with no standardization effort, and were conducted in the intertidal and shallow subtidal zones during spring low tides. The most common method used to collect specimens was manual capture. Shrimps were sought in various marine and estuarine microhabitats, such as burrows in sand and mud, decomposing leaves and branches, among roots and trunks of mangrove trees, on and under rocks, among fouling growth on jetties, on algae, on coral rubble, and finally on other marine invertebrates. The infauna was sampled with a PVC suction pump 50 mm in diameter. At the time of capture, data on bottom type and salinity (measured with an optical refractometer) were recorded.

The list of species collected at each sampling station is given in Appendix 1. Geographical range, including previous records in Bahia, as well as ecological notes (field observations), are provided for each of the 33 species reported herein. In the material examined section, the state municipalities are listed from north to south. A survey of all previous records of Caridea from Bahia was performed through an exhaustive analysis of literature published through 2011. Unpublished monographs, dissertations, theses, and meeting communications were not included, nor were publications on general biology and fisheries. Comments on taxonomy (including recent taxonomic changes), currently known geographical range, and historical aspects were added where appropriate. The classification adopted here follows De Grave & Fransen (2011). Within each family, species are listed in alphabetical order.

All the material reported in this study is deposited in the crustacean collection of the Museu de Zoologia, Universidade Estadual de Santa Cruz, Ilhéus, Bahia, Brazil (MZUESC). Comparative material was examined at the Muséum national d'Histoire naturelle, Paris, France (MNHN). Drawings were made with the aid of a stereomicroscope equipped with a drawing tube. Carapace length (CL) was measured from the tip of the rostrum to the posterior margin of the carapace. Abbreviations used in the text: (f)—female; (juv)—juvenile; (m)—male; (ni)—sex not identified; (T)—transect; (CL)—carapace length.

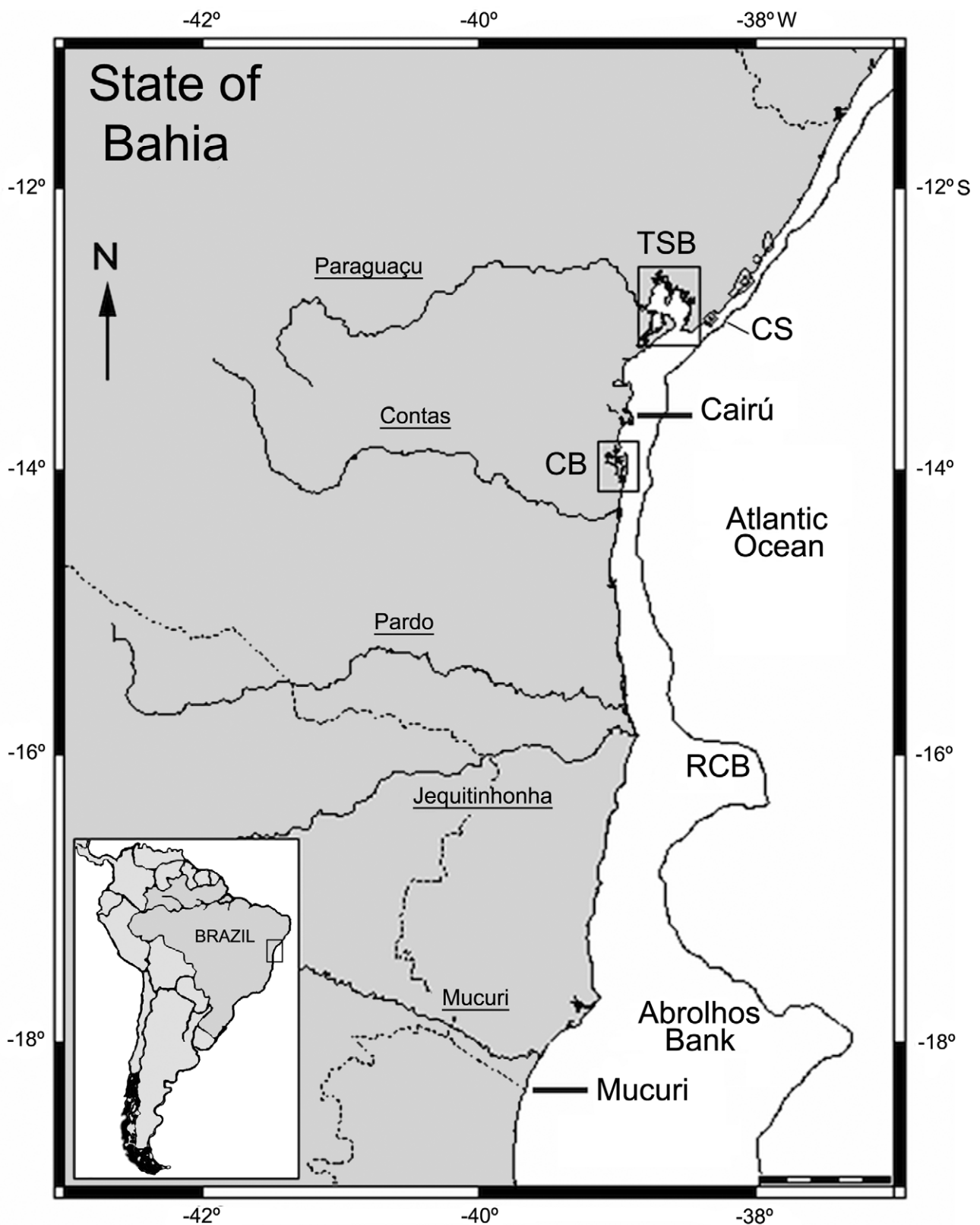


FIGURE 1. Location of the study area in southern Bahia, eastern Brazil. Horizontal bars indicate the northern (Cairú) and southern (Mucuri) limits. (CB) Camamu Bay, (RCB) Royal Charlotte Bank, (TSB) Todos os Santos Bay, (CS) outer border of the continental shelf. The main rivers are underlined. Scale bar: 100 km.

Results

Taxonomy

Infraorder Caridea Dana, 1852

Family Palaemonidae Rafinesque, 1815

Brachycarpus biunguiculatus (Lucas, 1846)

Palaemon biunguiculatus Lucas, 1846: 45, pl. 4, figs. 4–4a.

Material examined. 1 m, 05.V.2008, Itacaré, Concha Beach, mouth of Contas River, MZUESC 1202.

Distribution. Western Atlantic—Brazil (Fernando de Noronha, and from Amapá to Espírito Santo). Central Atlantic—Ascension and Saint Helena. Eastern Atlantic—Madeira and Canary Islands, Liberia, and Congo. Mediterranean. Indo-Pacific and Eastern Pacific (Williams 1984; Ramos-Porto & Coelho 1998; d’Udekem d’Acoz 1999).

Ecological notes. The single individual was collected on a sandy bottom in a tide pool together with *Palaemon northropi* (Rankin, 1898), in a salinity of 25 psu (area under influence of the Contas River mouth). Depth range: intertidal to 105 m (Ramos-Porto & Coelho 1998).

Previous records. Salvador (Coelho 1969a, as *B. biunguiculatus*); locality not informed (Coelho & Ramos-Porto 1972, as *Brachycarpus* sp.; Ramos-Porto & Coelho 1990, as *B. biunguiculatus*); REVIZEE Program Central Score (18°02’70’’S, 37°19’74’’W; 16°47’13’’S, 38°41’48’’W, and 13°38’98’’S, 38°45’94’’W) (Cardoso 2006, as *B. biunguiculatus*; Ferreira *et al.* 2010, as *B. biunguiculatus*); REVIZEE Program Central Score (St. C5-2R, C5-13R, and C5-16R) (Serejo *et al.* 2006, as *B. biunguiculatus*); REVIZEE Program Central Score (16°19’55’’S, 38°14’39’’W) (Ferreira *et al.* 2010, as *B. biunguiculatus*).

Remarks. In the sampling conducted during the REVIZEE Program Central Score, *B. biunguiculatus* was found at stations with depths ranging from 50 to 100 m (C5-2R, C5-13R, and C5-16R) and at stations C5-4F and C5-7F, to which were attributed much greater depths of 1700 to 1500 m, respectively (Serejo *et al.* 2006). As the latter depths are far beyond the usual depth limit of this species, it is likely that either collection station or depth attributions in Serejo *et al.* (2006) were erroneous.

Cuapetes americanus (Kingsley, 1878)

Anchistia americana Kingsley, 1878: 96.

Material examined. 6 m, 8 f, 01.VIII.2008, Cairú, Triana River, Boipeba Island, MZUESC 1264; 4 m, 10 f, 02.VIII.2008, Cairú, Moreré Beach, Boipeba Island, MZUESC 1289; 1 m, 3 f, 02.VIII.2008, Cairú, Moreré Beach, Boipeba Island, MZUESC 1290; 2 f, 02.VIII.2008, Cairú, Moreré Beach, Boipeba Island, MZUESC 1291; 2 m, 4 f, 03.VIII.2008, Cairú, Tassimirim Beach, Boipeba Island, MZUESC 1317; 1 m, 05.V.2008, Itacaré, Concha Beach, mouth of Contas River, MZUESC 1203; 1 f, 1 ni, 16.V.2007, Santa Cruz Cabralia, Coroa Vermelha Beach, MZUESC 862; 1 m, 16.V.2007, Santa Cruz Cabralia, Coroa Vermelha Beach, MZUESC 863; 2 m, 3 f, 07.III.2008, Santa Cruz Cabralia, mouth of João de Tiba River (sandstone reef), MZUESC 1151; 2 f, 17.V.2007, Porto Seguro, Mutá Beach (coral reef), MZUESC 896; 2 m, 2 f, 4 juv, 17.V.2007, Porto Seguro, Mutá Beach (coral reef), MZUESC 897; 2 ni, 17.V.2007, Porto Seguro, Mutá Beach (coral reef), MZUESC 898; 3 m, 1 f, 17.V.2007, Porto Seguro, Mutá Beach (coral reef), MZUESC 899; 1 m, 1 f, 17.V.2007, Porto Seguro, Mutá Beach (coral reef), MZUESC 900; 1 m, 1 f, 23.XI.2007, Prado, Cumuruxatiba Beach, MZUESC 1060; 1 ni (damaged), 19.III.2007, Nova Viçosa, Pontal da Barra Beach, St. 3, MZUESC 829.

Distribution. Western Atlantic—North Carolina to western Gulf of Mexico, West Indies and Brazil (Atol das Rocas, seamounts of North Brazilian Chain, and from Amapá to São Paulo) (Williams 1984, as *Periclimenes americanus*; Ramos-Porto & Coelho 1998, as *P. americanus*).

Ecological notes. In estuaries (under branches on mud bottom), on reefs and rocky shores, under rocks covered with algae and hydrozoans and in rock crevices; in concretions of calcareous algae, among barnacles on jetties and on live coral. Salinity range: 24–39 psu. Depth range: intertidal to 105 m (Ramos-Porto & Coelho 1990, as *P. americanus*).

Previous records. Camamu Bay (Almeida *et al.* 2007b, as *Kemponia americana*); Salvador (Vieira *et al.* 2012).

***Leander paulensis* Ortmann, 1897**

Leander paulensis Ortmann, 1897: 192, pl. 1, fig. 14.

Material examined. 1 m, 1 f, 13.XI.2006, Maraú, Ponta do Mutá, MZUESC 771; 1 f, 23.XI.2007, Prado, Cumuruxatiba Beach, MZUESC 1059; 1 f, 29.VIII.2007, Caravelas, Caravelas River, Barra de Caravelas, St. 4, MZUESC 1005. See report by Almeida *et al.* (2006).

Distribution. Western Atlantic—Florida, West Indies, and Brazil (Maranhão to São Paulo) (Ramos-Porto 1986).

Ecological notes. On drifted algae on sandy bottom (shallow subtidal); associated with an unidentified hydrozoan; also, on rocky bottom. Salinity range: 35–38 psu.

Previous records. locality not informed (Ramos-Porto 1986; Ramos-Porto & Coelho 1990); Ilhéus (Almeida *et al.* 2006, 2007a); Camamu Bay (Almeida *et al.* 2007b); Caravelas (Ferreira *et al.* 2010).

***Macrobrachium acanthurus* (Wiegmann, 1836)**

Palaemon acanthurus Wiegmann, 1836: 150.

Material examined. 1 m, 1 f, 07.V.2008, Canavieiras, Patipe River, MZUESC 1237. See report by Almeida *et al.* (2006).

Distribution. North Carolina to Texas, Mexico, Cuba, Haiti, Dominican Republic, Puerto Rico, Nicaragua, Panama, Colombia, Venezuela, Suriname and Brazil (Pará to Rio Grande do Sul) (Melo 2003).

Ecological notes. Juveniles were collected in the mangrove of Acuípe River, at low tide, in pools among roots of *Rhizophora mangle*. The specimen from the Almada River estuary, a young female (MZUESC 560) (see Almeida *et al.* 2006), was found among roots of the water hyacinth *Eichhornia crassipes*, and may have been carried there by the river current. In the Patipe River, adult specimens were obtained from plant debris, at a salinity of 9 psu.

Previous records. locality not informed (von Ihering 1897, as *Palaemon acanthurus*; Sawaya 1946, as *M. acanthurus*; Holthuis 1952, as *M. acanthurus*); Ilhéus (Almeida *et al.* 2006, 2008a, as *M. acanthurus*; Ferreira *et al.* 2010, as *M. acanthurus*); Camamu Bay (Almeida *et al.* 2007b, as *M. acanthurus*); Itacaré, Uruçuca and Una (Almeida *et al.* 2008a, as *M. acanthurus*); Mar Grande and Mucuri (Ferreira *et al.* 2010, as *M. acanthurus*).

***Palaemon northropi* (Rankin, 1898)**

Leander northropi Rankin, 1898: 245, pl. 30, fig. 4.

Material examined. 6 m, 10 f, 01.VIII.2008, Cairú, Triana River, Boipeba Island, MZUESC 1265; 1 m, 3 f, 01.VIII.2008, Cairú, Triana River, Boipeba Island, MZUESC 1266; 4 m, 7 f, 13.XI.2006, Maraú, Ponta do Mutá, MZUESC 769; 4 m, 7 f, 05.V.2008, Itacaré, Concha Beach, mouth of Contas River, MZUESC 1204; 1 m, 4 f, 3 juv, 05.V.2008, Itacaré, Contas River, MZUESC 1213; 1 ni, 10.VIII.2003, Ilhéus, Jairí Beach, Olivença, MZUESC 35; 1 m, 29.IV.2003, Ilhéus, Back-door Beach, Olivença, MZUESC 154; 2 ni, 11.VII.2003, Ilhéus, Back-door Beach, Olivença, MZUESC 216; 4 ni, 11.VII.2003, Ilhéus, Back-door Beach, Olivença, MZUESC 217; 7 ni, 06.V.2004, Ilhéus, Sirihya Beach, Olivença, MZUESC 329; 14 ni, 10.VII.2004, Ilhéus, Sirihya Beach, Olivença, MZUESC 330; 1 f, 28.V.2004, Ilhéus, Batuba Beach, Olivença, MZUESC 635; 1 m, 5 f, 09.III.2008, Belmonte, Mojiquiçaba

River, MZUESC 1181; 2 f, 1 juv, 08.III.2008, Santa Cruz Cabrália, João de Tiba River, near Santo André Beach, MZUESC 1168; 2 m, 3 f, 18.III.2007, Mucuri, mouth of Mucuri River, St. 1, MZUESC 798. See also report by Almeida *et al.* (2006).

Distribution. Western Atlantic—Bermuda, West Indies, Central America, northern South America, Brazil (Ceará to Santa Catarina) and Uruguay (Ramos-Porto & Coelho 1990).

Ecological notes. In marine and estuarine habitats. Most specimens were collected during low tide in tide pools, on the river edge, under branches, on rocky, sandy and muddy bottoms. Some have been collected together with other palaemonids *Palaemon pandaliformis* (Stimpson, 1871) and *Brachycarpus biunguiculatus*. Salinity range: 12–35 psu.

Previous records. locality not informed [Coelho & Ramos 1972, as *Palaemon (Palaeander) northropi*; Ramos-Porto & Coelho 1990, as *P. (P.) northropi*]; Ilhéus [Almeida *et al.* 2006, as *P. (P.) northropi*].

***Palaemon pandaliformis* (Stimpson, 1871)**

Leander pandaliformis Stimpson, 1871: 130.

Material examined. 28 m, 5 f, 07.V.2008, Canavieiras, Patipe River, MZUESC 1238; 9 m, 18.III.2007, Mucuri, mouth of Mucuri River, St. 1, MZUESC 799. See also report by Almeida *et al.* (2006).

Distribution. Cuba, Puerto Rico, Barbados, Trinidad and Tobago, Guatemala, Nicaragua, Panama, Venezuela and Brazil (from Rio Grande do Norte to Rio Grande do Sul, including Minas Gerais) (Melo 2003).

Ecological notes. Individuals were collected in estuaries, on sand and mud, under stones, on submerged wood and plant debris and among marginal vegetation. Salinity range: 9–12 psu.

Previous records. Ilhéus [Almeida *et al.* 2006, 2008a, as *Palaemon (Palaemon) pandaliformis*].

***Urocaris longicaudata* Stimpson, 1860**

Urocaris longicaudata Stimpson, 1860: 39.

Material examined. 4 m, 13 f, 13.XI.2006, Maraú, Ponta do Mutá, MZUESC 770; 1 m, 14.XI.2006, Maraú, Barra Grande (Barra Grande Pier), MZUESC 783; 2 m, 1 f, 23.XI.2007, Prado, Cumuruxatiba Beach, MZUESC 1061.

Distribution. Western Atlantic—North Carolina to southwest Florida, West Indies to Brazil (Pará to São Paulo) (Williams 1984; Ramos-Porto & Coelho 1998).

Ecological notes. Shallow subtidal on drifting algae and seagrass on sand bottom (Maraú) and on *Sargassum* sp. (Prado). Salinity range: 35 psu. Depth range: 0.5 to 72 m (Ramos-Porto & Coelho 1990).

Previous records. locality not informed (Coelho & Ramos 1972, as *Periclimenes* sp. B); Abrolhos (Gomes Corrêa 1972, as *Periclimenes longicaudatus*; Vieira *et al.* 2012, as *Urocaris longicaudata*); Camamu Bay (Almeida *et al.* 2007b, as *P. longicaudatus*).

Family Alpheidae Rafinesque, 1815

***Alpheus cf. armillatus* H. Milne Edwards, 1837 [in H. Milne Edwards, 1834–1840]**

Alpheus armillatus H. Milne Edwards, 1837 [in H. Milne Edwards, 1834–1840]: 354.

Material examined. 1 m, 1 f, 01.VIII.2008, Cairú, Triana River, Boipeba Island, MZUESC 1267; 3 m, 3 f, 01.VIII.2008, Cairú, Triana River, Boipeba Island, MZUESC 1268; 2 m, 7 f, 02.VIII.2008, Cairú, Moreré Beach, Boipeba Island, MZUESC 1292; 2 m, 1 f, 02.VIII.2008, Cairú, Moreré Beach, Boipeba Island, MZUESC 1293; 5 m, 4 f, 02.VIII.2008, Cairú, Moreré Beach, Boipeba Island, MZUESC 1294; 2 f, 03.VIII.2008, Cairú, Tassimirim Beach, Boipeba Island, MZUESC 1318; 5 m, 8 f, 03.VIII.2008, Cairú, Tassimirim Beach, Boipeba Island, MZUESC 1319; 8 m, 8 f, 3 juv, 05.V.2008, Itacaré, Concha Beach, mouth of Contas River, MZUESC 1205; 1 f, 05.V.2008, Itacaré, Concha Beach, mouth of Contas River, MZUESC 1206; 1 ni, 06.VI.2003, Ilhéus, Sirihya

Beach, Olivença, MZUESC 178; 2 f, 16.V.2007, Santa Cruz Cabrália, Coroa Vermelha Beach, MZUESC 864; 1 ni, 16.V.2007, Santa Cruz Cabrália, Coroa Vermelha Beach, MZUESC 865; 2 m, 4 f, 1 juv, 08.III.2008, Santa Cruz Cabrália, João de Tiba River near Santo André Beach, MZUESC 1169; 2 m, 1 f, 17.V.2007, Porto Seguro, Buranhem River, Municipal Pier of Porto Seguro, MZUESC 924; 3 m, 6 f, 23.XI.2007, Prado, Cumuruxatiba Beach, MZUESC 1062; 1 f, 28.VIII.2007, Caravelas, Caravelas River, St. 1, MZUESC 972; 2 m, 3 f, 28.VIII.2007, Caravelas, Caravelas River, Farol Abrolhos Iate Clube, St. 2, MZUESC 984; 17 m, 8 f, 28.VIII.2007, Caravelas, Caravelas River, Farol Abrolhos Iate Clube, St. 2, MZUESC 985; 3 f, 28.VIII.2007, Caravelas, Caravelas River, Farol Abrolhos Iate Clube, St. 2, MZUESC 986; 1 f, 28.VIII.2007, Caravelas, Caravelas River, Farol Abrolhos Iate Clube, St. 2, MZUESC 987; 2 m, 2 f, 29.VIII.2007, Caravelas, Caravelas River, Barra de Caravelas, St. 4, MZUESC 1006; 1 m, 30.VIII.2007, Caravelas, Pontal do Sul, MZUESC 1018; 1 f, 30.VIII.2007, Caravelas, Pontal do Sul, MZUESC 1019; 1 f, 2 m, 28.VIII.2007, Caravelas, Caravelas River, St. 1, MZUESC 1087; 3 m, 6 f, 16 ni, 19.III.2007, Nova Viçosa, Pontal da Barra Beach, St. 2, MZUESC 822. See report by Almeida *et al.* (2006).

Distribution. Western Atlantic—Bermuda, North Carolina to Brazil (Fernando de Noronha, Ceará to Santa Catarina) (Christoffersen 1998).

Ecological notes. The specimens were collected on reefs, under rocks, wood debris and rubble, on sand and mud, on *Halimeda* sp., in crevices of dead coral rubble, on jetties (on an unidentified octocoral), in rock crevices, and on calcareous algae concretions. Salinity range: 19–39 psu.

Previous records. Abrolhos (Smith 1869, as *A. heterochaelis*; Gomes Corrêa 1972, as *A. armillatus*) [see Christoffersen 1984]; Abrolhos Bank (RAP, St. 36) (Young & Serejo 2005); Ilhéus (Almeida *et al.* 2006, as *A. armillatus*); Camamu Bay (Almeida *et al.* 2007b, as *Alpheus* cf. *armillatus*)

Remarks. *Alpheus armillatus* is a large species complex with six nominal species in the eastern Pacific and four nominal species in the western Atlantic, two of them currently seen as synonyms of *A. armillatus* (Anker 2001; Mathews, 2006; Mathews & Anker 2009). However, molecular data suggest the existence of at least 19 distinct ESUs within this complex, including 11 in the western Atlantic (Mathews & Anker 2009). The western Atlantic species of the *A. armillatus* complex are currently being revised (A. Anker, pers. com.). *Alpheus* cf. *armillatus* was the most abundant alpheid in our samples. Two distinct color patterns of *A. cf. armillatus* indicate existence of at least two species in Bahia.

***Alpheus bouvieri* A. Milne-Edwards, 1878**

(Fig. 2A)

Alpheus Bouvieri A. Milne-Edwards, 1878: 231.

Material examined. 2 m, 1 f, 02.VIII.2008, Cairú, Moreré Beach, Boipeba Island, MZUESC 1295. See report by Almeida *et al.* (2006).

Distribution. Western Atlantic—Bermuda, Florida, West Indies, Panama and Brazil (Fernando de Noronha, Ceará to Rio Grande do Sul). Central Atlantic—Ascension Island. Eastern Atlantic—Cape Verde, Senegal to Gulf of Guinea and Congo (Crosnier & Forest 1966; Chace 1972; Christoffersen 1979, 1998; Manning & Chace 1990; Anker *et al.* 2009a).

Ecological notes. Under rocks at the mouth of Cachoeira River (Ilhéus) (Almeida *et al.* 2006) and in crevices of coral rubble. Salinity range: 39 psu.

Previous records. Abrolhos (material in MNRJ and R/V Calypso, St. 84A) (Christoffersen 1979); Ilhéus (Almeida *et al.* 2006).

Remarks. In the western Atlantic, *A. bouvieri* can be easily confused with the amphi-Atlantic *A. agilis* Anker, Hurt & Knowlton, 2009. However, *A. bouvieri* can be separated from *A. agilis* by the absence of spiniform setae on the P3 and P4 ischium, as well as the much more distinct rostral carina (Anker *et al.* 2009a). Based on these characters, the material from southern Bahia was identified as *A. bouvieri*. The color pattern of *A. bouvieri* consists of transverse brownish bands on the carapace and abdomen and includes a characteristic whitish spot on the mesial surface of the major chela palm (Fig. 2A).

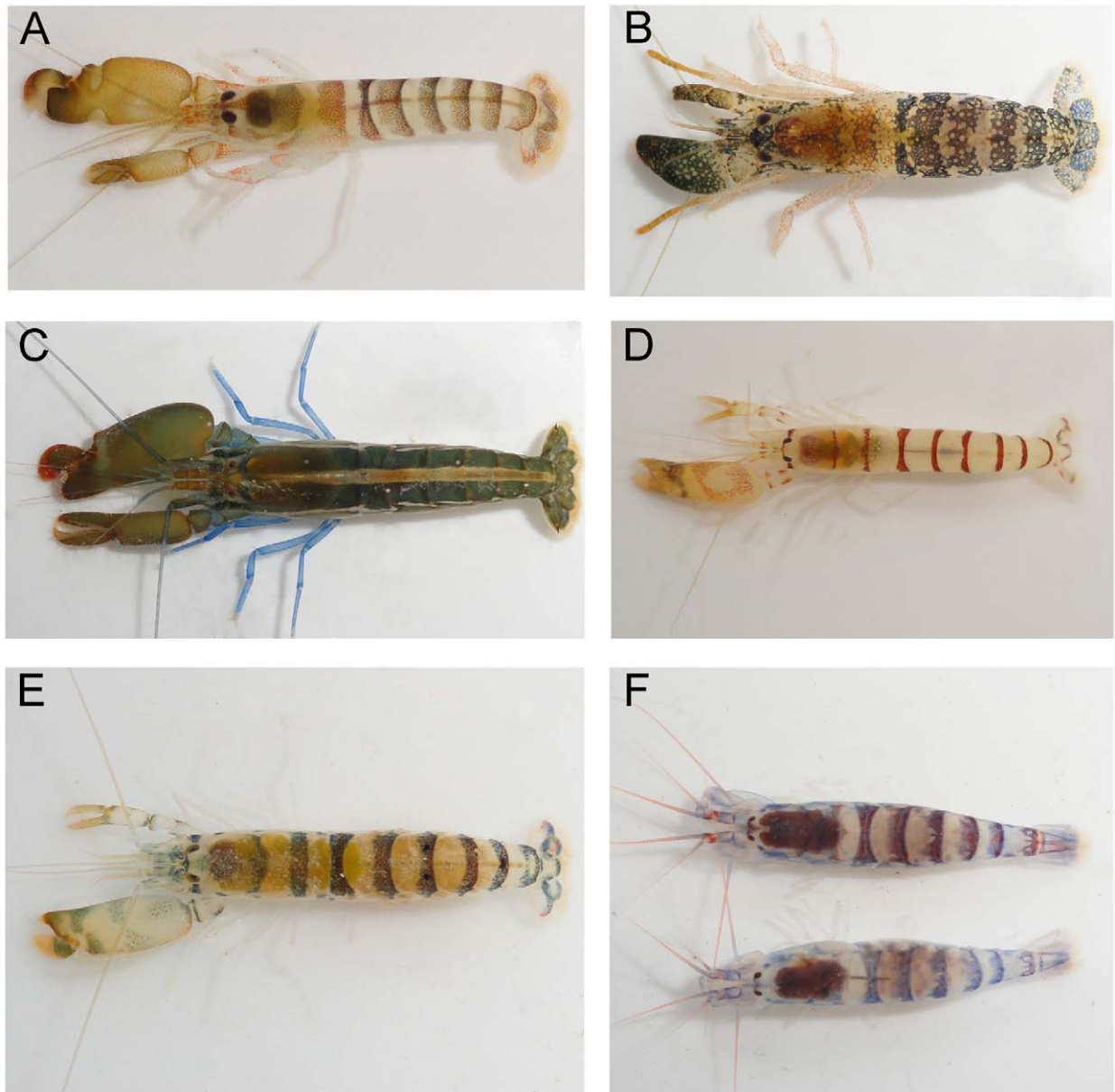


FIGURE 2. Alpheid shrimps from southern Bahia, Brazil. (A) *Alpheus bowieri* A. Milne-Edwards, 1878, male from Cachoeira River, Maramata Beach, Ilhéus. (B) *Alpheus cristulifrons* Rathbun, 1900, ovigerous female from Tassimirim Beach, Cairú. (C) *Alpheus formosus* Gibbes, 1850, male from Tassimirim Beach, Cairú. (D) *Alpheus* cf. *paracrinitus* Miers, 1881, male from Taipus de Fora Beach, Maraú. (E) *Alpheus* cf. *rostratus* W. Kim & Abele, 1988, ovigerous female from Taipus de Fora Beach, Maraú. (F) *Salmeoneus carvachoi* Anker, 2007, two ovigerous individuals from Maraú River, Maraú.

Alpheus chacei Carvacho, 1979

Alpheus chacei Carvacho, 1979: 455, figs. 4–6.

Material examined. 1 m, 01.VIII.2008, Cairú, Triana River, Boipeba Island, MZUESC 1269; 1 m, 18.VIII.2007, Maraú, Tanque Island, T2, MZUESC 1103.

Distribution. Western Atlantic—French Antilles (Guadeloupe) and Brazil (Paraíba to São Paulo) (Christoffersen 1979, as *A. maxilliplanus* Christoffersen 1979; Christoffersen 1984, 1998).

Ecological notes. On mud bottoms. Salinity range: 24–31 psu. Depth range: 0–2 m.

Previous records. Camamu Bay (Almeida *et al.* 2007b).

***Alpheus cristulifrons* Rathbun, 1900**

(Fig. 2B)

Alpheus cristulifrons Rathbun, 1900: 152.

Material examined. 1 m, 1 f, 16.V.2007, Santa Cruz Cabrália, Coroa Vermelha Beach, MZUESC 866.

Distribution. Western Atlantic—Florida, Gulf of Mexico, West Indies, Central America, northern South America and Brazil (Atol das Rocas, Fernando de Noronha, Rio Grande do Norte to Rio de Janeiro) (Christoffersen 1998; Anker *et al.* 2008a).

Ecological notes. The present specimens were collected on coral rubble, at a salinity of 39 psu. Typically in hard substrates (coral reef matrix, coral rubble, concretions of coralline algae), occasionally in sponges, typical depth range 1–5 m, exceptionally down to 52 m (Christoffersen 1979; Anker *et al.* 2008a; Serejo *et al.* 2006; see also remarks below).

Previous record: REVIZEE Program Central Score (St. C5-48R) (Serejo *et al.* 2006); this record is below the typical depth reported for *A. cristulifrons* and therefore requires confirmation.

Remarks. *Alpheus cristulifrons* can be easily recognized by the characteristic frontal margin of the carapace, including the anteriorly broadening orbital hoods and a very short rostrum continued posteriorly by a sharp rostral carina; the ovoid, smooth major chela; the male minor chela with sub-balaeniceps setae on the dactylus; the very stout third and fourth pereopods, with their meri armed with a strong distoventral tooth (see Anker *et al.* 2008a); and the unique colour pattern (Fig. 2B). The colour pattern of the Bahian specimens of *A. cristulifrons* matches well that of the Panamanian specimens in Anker *et al.* (2008a).

***Alpheus estuariensis* Christoffersen, 1984**

Alpheus estuariensis Christoffersen, 1984: 191, figs. 1–2.

Material examined. 4 m, 5 f, 1 ni, 01.VIII.2008, Cairú, Triana River, Boipeba Island, MZUESC 1270; 4 m, 7 f, 6 juv, 08.V.2008, Una, Comandatuba Village, MZUESC 1249; 2 m, 7 f, 3 juv, 06.V.2008, Canavieiras, Pardo River, MZUESC 1219; 1 m, 3 juv, 09.III.2008, Belmonte, Mojiçuiçaba River, MZUESC 1182; 2 m, 4 f, 2 ni, 07.III.2008, Santa Cruz Cabrália, mouth of João de Tiba River (sandstone reef), MZUESC 1165; 4 m, 2 f, 07.III.2008, Santa Cruz Cabrália, mouth of Yaya River, MZUESC 1166; 4 m, 4 f, 08.III.2008, Santa Cruz Cabrália, João de Tiba River, near Santo André Beach, MZUESC 1170; 1 ni, 22.XI.2007, Prado, Barra do Cahy, MZUESC 1047; 1 m, 18.III.2007, Mucuri, Mucuri River, St. 1, MZUESC 800. See also report by Almeida *et al.* (2006).

Distribution. Western Atlantic—Florida, Mississippi to Texas, Cuba, Dominican Republic, Trinidad and Tobago, Curaçao and Brazil (Pará to Paraná) (Christoffersen 1984; Pires *et al.* 2008).

Ecological notes. In estuaries, on mud, in burrows under rocks, debris, among herbaceous vegetation and roots of *Rhizophora mangle*, and in rotting wood. Specimens of *A. estuariensis* were often collected together with unidentified gobiid fishes (Teleostei: Perciformes) and with the alpheid shrimp *Salmones carvalhoi* Anker, 2007, suggesting a possible association. Salinity range: 2–38 psu. Depth range: intertidal to 22 m (Christoffersen 1984).

Previous records. Ilhéus (Almeida *et al.* 2006); Camamu Bay (Almeida *et al.* 2007b).

***Alpheus formosus* Gibbes, 1850**

(Fig. 2C)

Alpheus formosus Gibbes, 1850: 196.

Material examined. 2 m, 3 f, 03.VIII.2008, Cairú, Tassimirim Beach, Boipeba Island, MZUESC 1320; 1 f, 1 ni, 16.V.2007, Santa Cruz Cabrália, Coroa Vermelha Beach, MZUESC 867; 1 ni, 16.V.2007, Santa Cruz Cabrália, Coroa Vermelha Beach, MZUESC 868.

Distribution. Western Atlantic—Bermuda, North Carolina to Brazil (Atol das Rocas, Fernando de Noronha, Ceará to São Paulo) (Christoffersen 1998; Anker *et al.* 2008b).

Ecological notes. Specimens were collected on coral reefs, from crevices of coral rubble and concretions of calcareous algae. Salinity range: 33–39 psu. Depth range: intertidal to 42 m (Anker *et al.* 2008b).

Previous records. Abrolhos (Gomes Corrêa 1972, as *A. formosus*; Christoffersen 1979, as *A. formosus*); Camamu Bay (Almeida *et al.* 2007b, as *Alpheus* cf. *formosus*).

Remarks. *Alpheus formosus* differs from the closely related *A. paraformosus* Anker, Hurt & Knowlton, 2008 in the presence of balaeniceps setae on the minor chela fingers in both sexes; the more posteriorly extending orbito-rostral grooves; and some details of the color pattern (Anker *et al.* 2008b; see also Fig. 2C). The latter species is currently known only from the western Caribbean Sea.

***Alpheus heterochaelis* Say, 1818**

Alpheus heterochaelis Say, 1818: 243.

Material examined. See report by Almeida *et al.* (2006).

Distribution. Western Atlantic—North Carolina to Brazil (Bahia) (Christoffersen 1984, Almeida *et al.* 2006).

Ecological notes. Estuaries, in the shallow subtidal (precise depth not recorded). Depth range: intertidal to 9 m (Christoffersen 1984).

Previous records. Abrolhos Bank (RAP, St. 4, 34, and 38) (Young & Serejo 2005); Ilhéus (Almeida *et al.* 2006).

Remarks. Many previous records of *A. heterochaelis* from Brazil were based on misidentifications and confusion with *A. armillatus*, *A. bowieri* and *A. nuttingi* (Schmitt, 1924), among others (Christoffersen 1984). However, according to this author, *A. heterochaelis* s. str. does occur in Brazil, for example, in Pará and Paraíba states. Almeida *et al.* (2006) extended the southern distribution of *A. heterochaelis* to Ilhéus, Bahia. *Alpheus pontederiae* de Rochebrune, 1883, which also occurs in Brazil (see below), differs from *A. heterochaelis* by the presence of two small prominences on the mesial side of the major chela pollex, and by the distolateral spiniform seta of the uropodal exopod being flanked by two small, acute teeth. The record of *A. heterochaelis* from the Abrolhos Bank (Young & Serejo 2005) is extremely doubtful, since this species is typically found in estuarine habitats.

***Alpheus intrinsecus* Spence Bate, 1888**

Alpheus intrinsecus Spence Bate, 1888: 557, pl. 100, fig. 1.

Material examined. See report by Almeida *et al.* (2006).

Distribution. Western Atlantic—Puerto Rico to Brazil (Piauí to Santa Catarina). Eastern Atlantic—Western Sahara to Gabon (Crosnier & Forest 1966; Christoffersen 1979).

Ecological notes. The material reported by Almeida *et al.* (2006) was collected in estuarine conditions, near the mouth of the Cachoeira River. Depth range: intertidal to 40 m (Christoffersen 1979).

Previous records. *Challenger* Expedition, off Salvador (Spence Bate 1888); Ilhéus (Almeida *et al.* 2006, 2007a); Camamu Bay (Almeida *et al.* 2007b).

***Alpheus* cf. *packardii* Kingsley, 1880**

Alpheus packardii Kingsley, 1880: 417.

Material examined. 2 m, 1 f, 02.VIII.2008, Cairú, Moreré Beach, Boipeba Island, MZUESC 1297; 1 f, 02.VIII.2008, Cairú, Moreré Beach, Boipeba Island, MZUESC 1298; 1 m, 16.V.2007, Santa Cruz Cabrália, Coroa Vermelha Beach, MZUESC 869.

Distribution. Western Atlantic—Bermuda, Virginia to South Carolina, Florida, Gulf of Mexico, Bahamas, Mexico (Quintana Roo and Yucatan), West Indies and Brazil (Atol das Rocas, Fernando de Noronha, Amapá to São Paulo) (Christoffersen 1979, 1998, as *A. normanni* Kingsley, 1878; Martínez-Iglesias *et al.* 1996, as *A. normanni*).

Ecological notes. Species collected on coral reefs, in crevices of coral rubble and in *Halimeda* clumps. Salinity = 39 psu. Depth range: intertidal to 70 m (Christoffersen 1979, as *A. normanni*).

Previous records. Itapagipe (= Itapagipe Peninsula, Salvador) (Christoffersen 1979, as *Alpheus normanni*); R/V *Wladimir Besnard* (St. 3770, 17°16.7'S, 39°05'W) (Christoffersen 1979, as *A. normanni*); R/V *Calypso* (St. 56, 69, 75, 81–83) (Christoffersen 1979, as *A. normanni*); Abrolhos Bank (RAP, St. 2 and 38) (Young & Serejo 2005, as *A. normanni*); Camamu Bay (Almeida *et al.* 2007b, *Alpheus* cf. *packardii*).

Remarks. Kingsley (1878) described *A. normanni* based on specimens from the Pacific coast of Panama. Two years later the same author described *A. packardii* based on specimens from Key West, Florida (Kingsley 1880). Chace (1937) compared the eastern Pacific and the western Atlantic (Bermuda) materials of *A. normanni* and *A. packardii* and concluded that they are identical morphologically, placing *A. packardii* in the synonymy of *A. normanni*. Both Chace (1972) and Christoffersen (1979) continued to treat *A. packardii* as a junior synonym of *A. normanni*. Kim & Abele (1988) again compared specimens from the eastern Pacific and western Atlantic (Florida). These authors found consistent morphological differences between the eastern Pacific and western Atlantic specimens, viz. in the fingers of the minor chela, and removed *A. packardii* from the synonymy of *A. normanni*. However, the taxonomy of both *A. normanni* and *A. packardii* remains unsettled due to the presence of several cryptic taxa in the eastern Pacific and western Atlantic (A. Anker, in study). Thus, it is presently impossible to determine the true identity of the Bahian material.

***Alpheus* cf. *paracrinitus* Miers, 1881**

(Fig. 2D)

Alpheus paracrinitus Miers, 1881: 365, pl. 16, fig. 6.

Material examined. 1 f, 02.VIII.2008, Cairú, Moreré Beach, Boipeba Island, MZUESC 1296.

Distribution. Western Atlantic—Bermuda, West Indies, Panama and Brazil (Paraíba and Espírito Santo). Central Atlantic—Ascension Island. Eastern Atlantic—Cape Verde to Gulf of Guinea and Angola. Eastern Pacific and Indo-West Pacific (Crosnier & Forest 1966; Chace 1972, 1988; Banner & Banner 1982; Kim & Abele 1988; Manning & Chace 1990; Christoffersen 1998).

Ecological notes. The single specimen was collected in the intertidal zone in crevices of coral rubble, at a salinity of 39 psu.

Previous records. None.

Remarks. The variation in the color patterns as well as preliminary molecular data indicate that *A. paracrinitus*, previously considered to be a pantropical species (Crosnier & Forest 1966; Chace 1972, 1988; Banner & Banner 1982; Kim & Abele 1988), is in fact a species complex (Knowlton & Mills 1992; Anker 2001; Williams *et al.* 2001; A. Anker, in study). The single specimen from southern Bahia has narrow reddish transverse bands on the carapace and abdomen and red-brownish-white mottled major chela (Fig. 2D). Its taxonomic identity cannot be established until the entire *A. paracrinitus* complex is revised (A. Anker, pers. comm.)

***Alpheus pontederiae* de Rochebrune, 1883**

Alpheus Pontederiae de Rochebrune, 1883: 174

Material examined. 2 f, 12.IX.2006, Maraú, Maraú River, MZUESC 1111; 3 m, 4 f, 3 juv, 07.V.2008, Canavieiras, Patipe River, MZUESC 1239; 3 ni, 18.III.2007, Mucuri, Mucuri River, St. 1, MZUESC 801. See also report by Almeida *et al.* (2006).

Distribution. Western Atlantic—Brazil (Pará, Maranhão, Alagoas, São Paulo, Paraná). Eastern Atlantic—Senegal to Congo (Christoffersen 1984; Almeida *et al.* 2006).

Ecological notes. Mainly in mangroves and estuaries, on sand-mud bottoms, under rocks and wood; also in beds of the oyster *Crassostrea rhizophorae* Guilding, 1828. Salinity range: 3–20 psu. Depth range: intertidal to 30 m (Christoffersen 1984).

Previous records. Ilhéus (Almeida *et al.* 2006).

Remarks. *Alpheus pontederiae* resembles *A. heterochaelis* in the presence of balaeniceps setae on the fingers of the minor chela and by the rounded ventral margin of pollex of larger chela, among other characters (Christoffersen 1984), but differs from the latter species by two characters mentioned in the section on *A. heterochaelis* (see above).

***Alpheus cf. rostratus* W. Kim & Abele, 1988**

(Fig. 2E)

Alpheus rostratus W. Kim & Abele, 1988: 51, fig. 21.

Material examined. 1 m, 1 f, 01.VIII.2008, Cairú, Triana River, Boipeba Island, MZUESC 1271; 1 f, 03.VIII.2008, Cairú, Tassimirim Beach, Boipeba Island, MZUESC 1321; 6 m, 4 f, 1 juv, 16.V.2007, Santa Cruz Cabralia, Coroa Vermelha Beach, MZUESC 870.

Distribution. *Alpheus cf. rostratus*: Western Atlantic—Brazil (Bahia) (present study). *Alpheus rostratus*: Eastern Pacific—Gulf of California to Colombia (Kim & Abele 1988; Ramos 1995).

Ecological notes. On coral reefs, in crevices of rocks and concretions of calcareous algae; also in estuaries (specimens found in palm tree roots on muddy bottom). Salinity range: 24–39 psu.

Previous records. None.

Remarks. This species is morphologically close to *A. cf. paracrinitus* but differs from it in the color pattern. *Alpheus cf. rostratus* has wide transverse bands on the carapace and abdomen and a pair of dark dorsal spots on the third abdominal somite (see Figs. 2D and 2E for comparison). A similar color pattern exists in the eastern Pacific *A. rostratus*, which belongs to the *A. paracrinitus* complex (A. Anker, pers. comm.). Some minor morphological differences were noted between *A. cf. rostratus* and *A. rostratus*, based on the original description and figures (Kim & Abele 1988). For example, *A. cf. rostratus* differs from *A. rostratus* by the more strongly produced distodorsal margin of the antepenultimate article of the third maxilliped. In *A. cf. rostratus*, the distolateral tooth of the scaphocerite extends slightly beyond the anterior margin of the blade, and the cleft between the blade and the tooth is approximately 1/3 of the total length of the scaphocerite. In contrast, in *A. rostratus*, the distolateral tooth of the scaphocerite extends conspicuously beyond the anterior margin of the blade, and the cleft between the blade and the tooth slightly less than 1/2 of the total length of the scaphocerite. In *A. rostratus*, the tooth on the ventromesial carina of the antennular peduncle is concave, whereas in *A. cf. rostratus*, the anterior margin of this tooth is nearly straight. These differences, if shown to be valid and consistent, suggest that the Bahian material may belong to a new species close to *A. rostratus*. However, only a taxonomic revision of the entire *A. paracrinitus* complex will clarify the identity of *A. cf. rostratus* and *A. cf. paracrinitus*. Therefore, all records of *A. paracrinitus* from Brazil (Christoffersen 1998) need to be treated with a lot of caution.

***Automate cf. evermanni* Rathbun, 1901**

(Fig. 3)

Automate evermanni Rathbun, 1901: 112, fig. 22.

Material examined. 1 f, 23.XI.2007, Prado, Cumuruxatiba Beach, MZUESC 1063.

Distribution. Western Atlantic—North Carolina to Brazil (Amapá to Rio Grande do Sul). Eastern Atlantic—Cape Verde, Senegal to Nigeria (Crosnier & Forest 1966; Christoffersen 1998; Coelho *et al.* 2006).

Ecological notes. The single specimen from Bahia was collected from a burrow of unidentified host (or perhaps its own burrow, see Dworschak & Coelho 1999), in fine sand in the intertidal zone, at a salinity of 35 psu. Although primarily a shallow-water species (less than 50 m), *A. evermanni* has been recorded from as deep as 250 m (Rathbun 1901; Crosnier & Forest 1966; Dworschak & Coelho 1999).

Previous records. None.

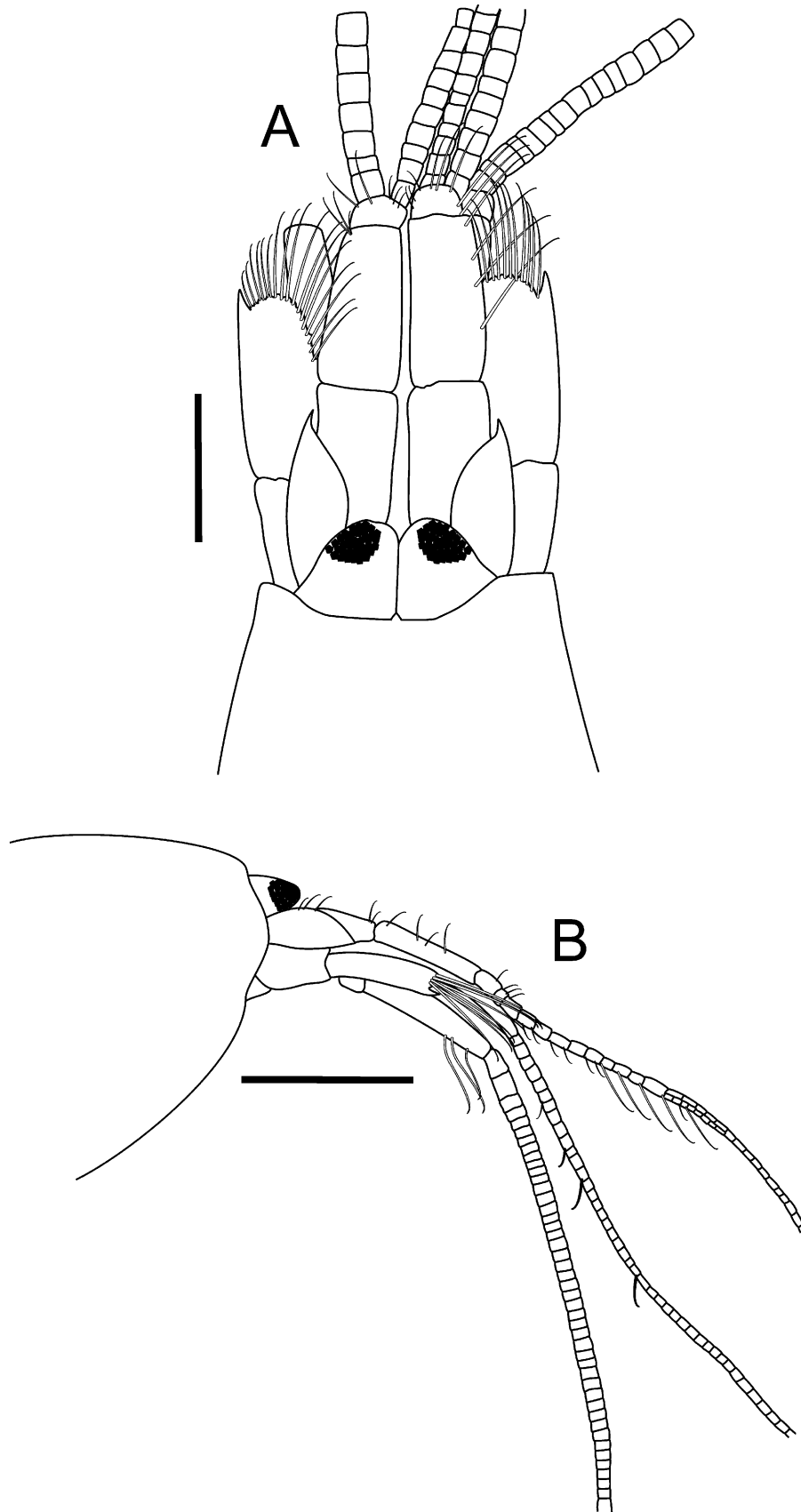


FIGURE 3. *Automate* cf. *evermanni* Rathbun, 1901, female (CL=3.3 mm) (MZUESC 1063), Cumuruxatiba Beach, Prado, state of Bahia, Brazil. (A) head and cephalic appendages, dorsal view; (B) head and cephalic appendages, lateral view. Scale bars: A = 0.5 mm; B = 1 mm.

Remarks. *Automate evermanni* may be a species complex (A. Anker, pers. comm.). The present specimen has several appendages missing, including both chelipeds. However, it was possible to distinguish it from the two other western Atlantic species, viz. *A. dolichognatha* De Man, 1888 (also a species complex) and *A. rectifrons* Chace, 1972 (Chace 1972; Christoffersen 1998), based on the configuration of the frontal region (Fig. 3A).

***Leptalpheus axianassae* Dworschak & Coelho, 1999**

(Fig. 4)

Leptalpheus axianassae Dworschak & Coelho, 1999: 477, figs. 1–30.

Material examined. 1 m, 1 ni, 05.V.2008, Itacaré, Contas River, MZUESC 1214.

Distribution. Western Atlantic—Florida and Brazil (Pernambuco and São Paulo) (Dworschak & Coelho 1999; Anker *et al.* 2006).

Ecological notes. The present specimens were collected from burrows of unknown hosts in the muddy intertidal zone, at a salinity of 30 psu. The species is considered to be a commensal of *Axianassa australis* Rodrigues & Shimizu, 1992 (Gebiidea: Axianassidae) (Dworschak & Coelho 1999; Anker *et al.* 2006). Several specimens of *Lepidophthalmus siriboia* Felder & Rodrigues, 1993 (Axiidea: Callianassidae) were collected at the same site, but none was caught together with *L. axianassae*.

Previous records. None.

Remarks. This first record of *L. axianassae* from Bahia fills a significant gap in the species distribution in Brazil, which extends from Pernambuco to São Paulo. The species is easily recognizable by the short antennular peduncles (with articles slightly longer than wide) (Fig. 4A) and the presence of only one large, triangular, obtuse tooth on the cutting edge of the major chela pollex (Fig. 4C, D; see also Dworschak & Coelho 1999, p. 480, fig. 18). Another important feature of *L. axianassae*, viz. the presence of a small tubercle on the eyestalks, was not observed to avoid damage of the rare material.

***Leptalpheus* aff. *forceps* Williams, 1965**

(Fig. 5A–D)

Material examined. 1 m, 07.V.2008, Canavieiras, Patipe River, MZUESC 1240.

Comparative material. *L. forceps* (Fig. 5E–G), 1 m, 1 f, 21.IV.2004, North Bridge, Fort Pierce, Florida, USA, MNHN-Na-15682.

Distribution. Western Atlantic—Brazil (Bahia) (present study).

Ecological notes. The single specimen was collected from a burrow of unknown host in mud, at a salinity of 3 psu.

Previous records. None.

Remarks. The specimen collected (CL=2.7 mm) was compared with *L. forceps* from Florida. The Bahian specimen differed from the Florida specimens in the dentition of the major chela (cf. Figs. 5D, G) and in the proportions of the articles of the antennular peduncle (cf. Figs. 5A, E). More material of this possibly undescribed species is needed to confirm its identity.

***Salmoneus carvachoi* Anker, 2007**

(Fig. 2F)

Salmoneus carvachoi Anker, 2007: 27, fig. 3.

Material examined. 1 ni, 01.VIII.2008, Cairú, Triana River, Boipeba Island, MZUESC 1272; 1 f, 18.VIII.2007, Maraú, Tanque Island, T2, MZUESC 1108; 2 ni, 08.V.2008, Una, Comandatuba Village, MZUESC 1250; 2 ni, 06.V.2008, Canavieiras, Pardo River, MZUESC 1220; 1 ni, 08.III.2008, Santa Cruz Cabrália, João de Tiba River, near Santo André Beach, MZUESC 1171.

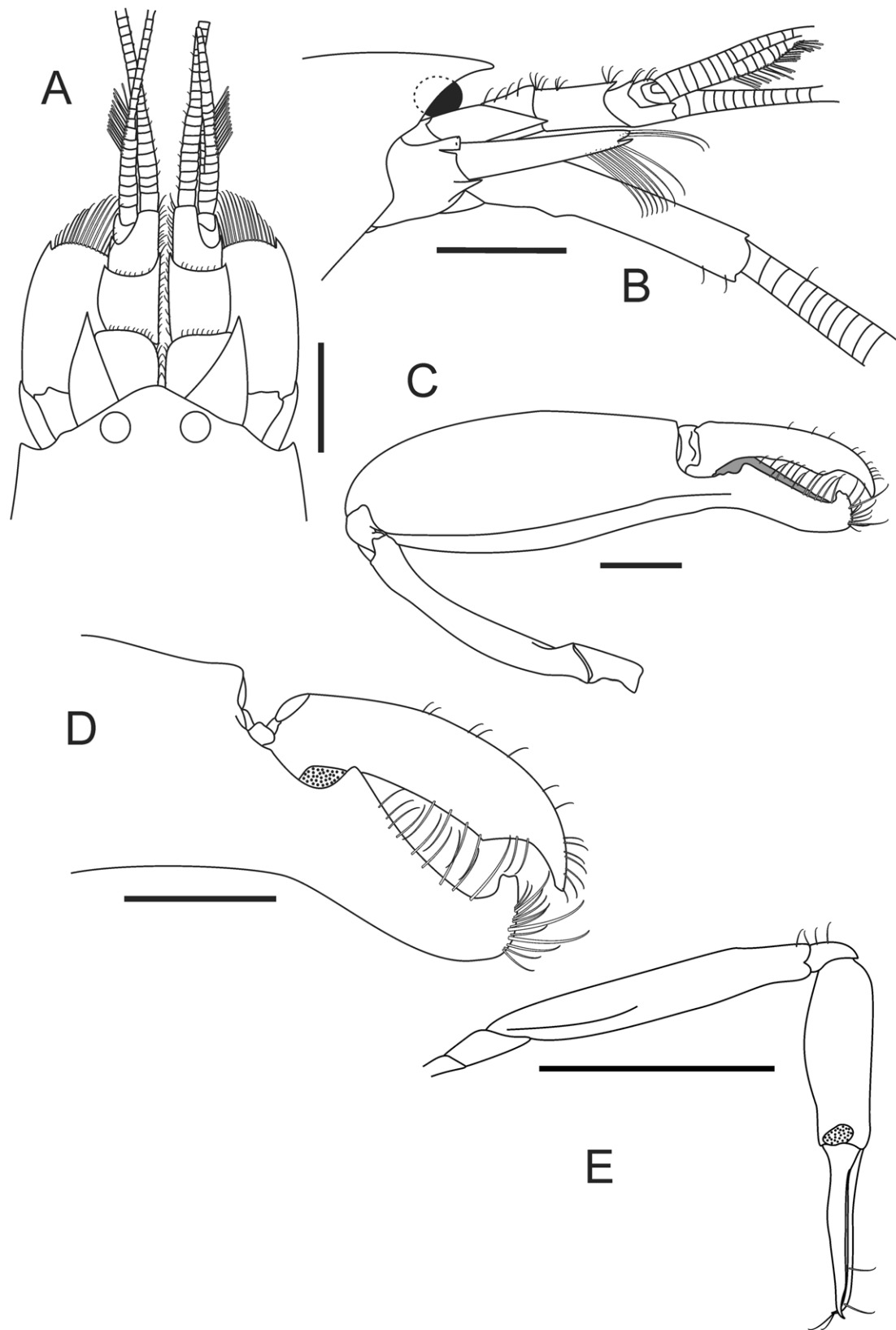


FIGURE 4. *Leptalpheus axianassae* Dworschak & Coelho, 1999, male (CL=5.9 mm) (MZUESC 1214), Contas River, Itacaré, state of Bahia, Brazil. (A) head and cephalic appendages, dorsal view; (B) head and cephalic appendages, lateral view; (C) right major chela, ventrolateral view; (D) right major chela, distal portion, mesial view; (E) left minor chela, dorsal view. Scale bars: A, B, E, F = 1 mm; C, D = 0.5 mm.

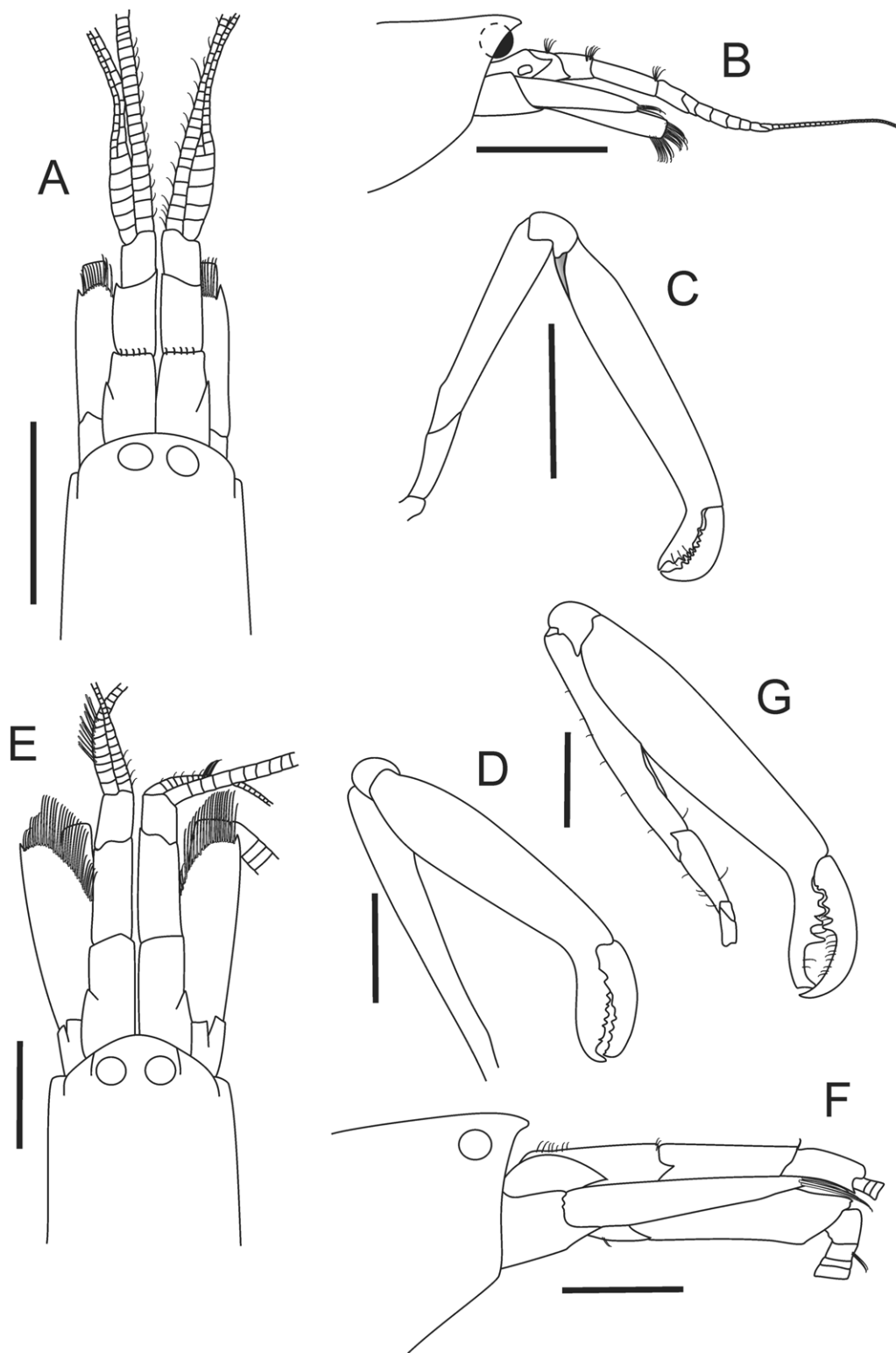


FIGURE 5. (A–D) *Leptalpheus* aff. *forceps* Williams, 1965, young male (CL=2.7 mm) (MZUESC 1240), Patipe River, Canavieiras, state of Bahia, Brazil. (A) head and cephalic appendages, dorsal view; (B) head and cephalic appendages, lateral view; (C) left major chela, ventral view; (D) left major chela, lateral view. (E–G) *Leptalpheus forceps* Williams, 1965, male (E, F) and ovigerous female (G) (CL not measured) (MNHN-Na-15682), Fort Pierce, Florida, USA. (A) head and cephalic appendages, dorsal view; (B) head and cephalic appendages, lateral view; (C) major chela, lateral view. Scale bars: A, B, E, F = 1 mm; C, D = 0.5 mm.

Distribution. Western Atlantic—Mexico (Yucatan), Guadeloupe and Brazil (Paraíba, Pernambuco, Bahia, São Paulo and Paraná) (Anker 2007; 2010).

Ecological notes. Intertidal areas in estuaries, in burrows in mud, under rocks and rubble. Salinity range: 24–35 psu. Depth range: intertidal to 22 m [Christoffersen 1982, as *S. ortmanni* (Rankin, 1898); Anker 2007]. Several specimens of *S. carvachoi* were found in association with burrows of *Alpheus estuariensis*; this was also observed by Ramos-Porto *et al.* (1994, as *S. ortmanni*).

Previous records. Camamu Bay (Almeida *et al.* 2007b, as *Salmoneus* cf. *ortmanni*).

Remarks. *Salmoneus carvachoi* was initially reported from Brazil as *S. ortmanni* (Christoffersen 1982; Ramos-Porto *et al.* 1994). The material from Camamu Bay (see Almeida *et al.* 2007) was re-examined and all diagnostic characters of *S. carvachoi* were readily recognized in these specimens, confirming its occurrence in Bahia. The occurrence of *S. ortmanni* in Brazil is presently restricted to Atol das Rocas (Anker 2007).

***Synalpheus apioceros* Coutière, 1909**

Synalpheus apioceros Coutière, 1909: 27, fig. 9.

Material examined. 2 f, 2 ni, 07.III.2008, Santa Cruz Cabralia, mouth of João de Tiba River (sandstone reef), MZUESC 1152; 1 f, 28.VIII.2007, Caravelas, Caravelas River, Farol Abrolhos Iate Clube, St. 2, MZUESC 988; 62 ni, 28.VIII.2007, Caravelas, Caravelas River, St. 1, MZUESC 1088; 2 f, 8 ni, 19.III.2007, Nova Viçosa, Pontal da Barra Beach, St. 3, MZUESC 830.

Distribution. Western Atlantic—southern Florida to Suriname, western Gulf of Mexico and Brazil (seamounts of North Brazilian Chain, Amapá to Santa Catarina) (Chace 1972; Christoffersen 1998; Coelho Filho 2006).

Ecological notes. In the intertidal, on reefs, under rocks and wood, and on jetties (on octocorals and among barnacles). Salinity range: 31–37 psu.

Previous records. *Synalpheus* cf. *apioceros*—Almeida *et al.* (2007b), Camamu Bay.

Remarks. *Synalpheus apioceros* is morphologically somewhat variable and may require a taxonomic revision based on both morphology and DNA (A. Anker, pers. comm.). The material from Bahia matches the description of *S. apioceros* in Coutière (1909).

***Synalpheus* cf. *brevicarpus* (Herrick, 1891)**

Alpheus saulcyi var. *brevicarpus* Herrick, 1891: 384 (? part.); pl. 4, figs. 1–3; pl. 21, figs. 1–4, 8, 9; pl. 22, figs. 1, 2, 4–10, 12–16; pl. 23, figs. 1–8; pl. 24, figs. 1, 3.

Material examined. 1 ni, 07.III.2008, Santa Cruz Cabralia, mouth of João de Tiba River (sandstone reef), MZUESC 1153.

Distribution. Western Atlantic—Bermuda, Florida, Bahamas, West Indies, Panama and Brazil (Ceará to Rio Grande do Sul) (Christoffersen 1979, 1998; Bezerra & Coelho 2006). The Eastern Pacific records correspond to *S. digueti* Coutière, 1909 (which also corresponds to multiple species) (A. Anker, pers. comm.).

Ecological notes. The single Bahian specimen was collected on a sandstone reef, under a rock covered with hydrozoans and algae, at a salinity of 36 psu.

Previous records. R/V Calypso (St. 84 and 89) (Christoffersen 1979, as *Synalpheus brevicarpus*).

Remarks. *Synalpheus brevicarpus* is a transisthmian species complex, which includes *S. brevicarpus sensu* Herrick, 1891, *S. brevicarpus guerini* Coutière, 1909, *S. digueti* Coutière, 1909, as well as several undescribed species (A. Anker, in study).

***Synalpheus fritzmülleri* Coutière, 1909**

Synalpheus fritzmülleri Coutière, 1909: 35, fig. 18.

Material examined. 2 f, 3 ni, 03.VIII.2008, Cairú, Tassimirim Beach, Boipeba Island, MZUESC 1322; 1 ni, 09.III.2008, Belmonte, Mojiçuiçaba Beach, MZUESC 1185; 10 ni, 16.V.2007, Santa Cruz Cabrália, Coroa Vermelha Beach, MZUESC 871; 4 f, 6 ni, 07.III.2008, Santa Cruz Cabrália, mouth of João de Tiba River (sandstone reef), MZUESC 1154; 3 ni, 07.III.2008, Santa Cruz Cabrália, mouth of João de Tiba River (sandstone reef), MZUESC 1162; 1 f, 1 ni, 17.V.2007, Porto Seguro, Mutá Beach (sandstone reef), MZUESC 901; 2 juv, 19.III.2007, Nova Viçosa, Pontal da Barra Beach, near St. 2, MZUESC 818; 1 ni, 19.III.2007, Nova Viçosa, Pontal da Barra Beach, St. 3, MZUESC 831. See also report by Almeida *et al.* (2006).

Distribution. Western Atlantic—Bermuda, Carolinas, Florida, northern Gulf of Mexico (Texas), Mexico (Veracruz, Quintana Roo), Colombia (Providencia), West Indies, Venezuela and Brazil (São Pedro and São Paulo Archipelago, Pernambuco to Santa Catarina). Central Atlantic—Ascension and Saint Helena Islands. Records from the eastern Pacific (e.g., Tres Mariás Archipelago, Mexico) refer to other species (Christoffersen 1979, 1998; Holthuis *et al.* 1980; Manning & Chace 1990; A. Anker, pers. comm.).

Ecological notes. Reefs and generally hard bottoms, under rocks covered with algae and hydrozoans, in tide pools, in rock crevices, in concretions of calcareous algae, in sabellariid reefs, on jetties among barnacles, etc. Salinity range: 28–41 psu. Depth range: intertidal to 75 m (Christoffersen 1979).

Previous records. locality not informed (Coutière 1909, as *Synalpheus fritzmuelleri elongatus* Coutière, 1909). “Continental Platform” (= Plataforma, Salvador, Hartt Explorations) (Christoffersen 1979, as *S. fritzmuelleri*), Salvador, Itaparica Island and Abrolhos (R/V *Calypso*, St. 85) (Christoffersen 1979, as *S. fritzmuellerii*); Ilhéus (Almeida *et al.* 2006); Camamu Bay (Almeida *et al.* 2007b, as *Synalpheus cf. fritzmuelleri*).

Remarks. *Synalpheus fritzmuelleri* is morphologically quite variable and may require a more thorough study integrating both morphology and DNA (A. Anker, pers. com.).

Synalpheus ul (Ríos & Duffy, 2007)

(Figs. 6–8)

Zuzalpheus ul Ríos & Duffy, 2007: 63, pl. 5, figs. 27–30.

Material examined. 1 m, 30.X.2004, Camamu Bay, trawl, St. 4 (13°54'06"S; 39°00'22"W), MZUESC 709.

Distribution. Western Atlantic—Belize, Panama, Jamaica, Curaçao, Barbados and Brazil (state of Bahia, Camamu Bay) (Hultgren *et al.* 2010, 2011; present study).

Ecological notes. The single specimen came up with a trawl, and its presumed sponge remains unknown. In the Caribbean Sea, *S. ul* is found in the canals of various demosponge from the genera *Hymeniacidon* Bowerbank, 1859, *Hyatella* Férussac, 1821, *Lissodendoryx* Topsent, 1892, *Spirastrella* Schmidt, 1868, *Agelas* Duchassaing & Michelotti, 1864 and *Xestospongia* de Laubenfels, 1932 (Ríos & Duffy 2007; Macdonald *et al.* 2009; Hultgren *et al.* 2010, 2011).

Previous records. Camamu Bay [Almeida *et al.* 2007b, as *Synalpheus cf. pandionis*, in part (lot MZUESC 709, erroneously referred to as ovigerous female, p. 16, figs. 3B, C, G, and p. 17, fig. 4)].

Remarks. Almeida *et al.* (2007b) reported *S. cf. pandionis* from Camamu Bay, Bahia, based on two specimens, thus extending the southern range of the *S. pandionis* complex. However, a reanalysis of this material following the publication of Ríos & Duffy (2007) revealed that neither of the two specimens of *S. cf. pandionis* represents *S. pandionis s. str.* One of them has all the diagnostic characters of *S. ul*, originally described from Belize and Panama (Ríos & Duffy 2007). The scaphocerite of the Bahian specimen of *S. ul* has a distinct blade (Fig. 7G) similar to that of *S. pandionis*. However, it differs from *S. pandionis* in having unequal spiniform setae on the posterior margin of the telson, with the lateral pair being shorter than the mesial pair (Fig. 6D); these setae are subequal in length in *S. pandionis*. In *S. ul*, the distolateral tooth of the uropodal exopod is adjacent to the preceding spiniform seta (Figs. 6E, F) (vs. more separated and with a small lobe between them in *S. pandionis*); and the mesial protuberance (erroneously referred as lateral side in Ríos & Duffy 2007) on the base of the major chela pollex, characteristic of *S. pandionis*, is absent (Fig. 7F). *Synalpheus ul* also resembles *S. hoetjesi* Hultgren, Macdonald & Duffy, 2010, but differs from it by the presence of a scaphocerite blade (20–75% the length of scaphocerite vs. absent or vestigial in *S. hoetjesi*) (Fig. 7G), the shape of the distal superior margin on the major chela (gently sloping in *S. ul* vs. bulging over the accessory tooth in *S. hoetjesi*) (Figs. 7A, B), and the thickness of the spiniform

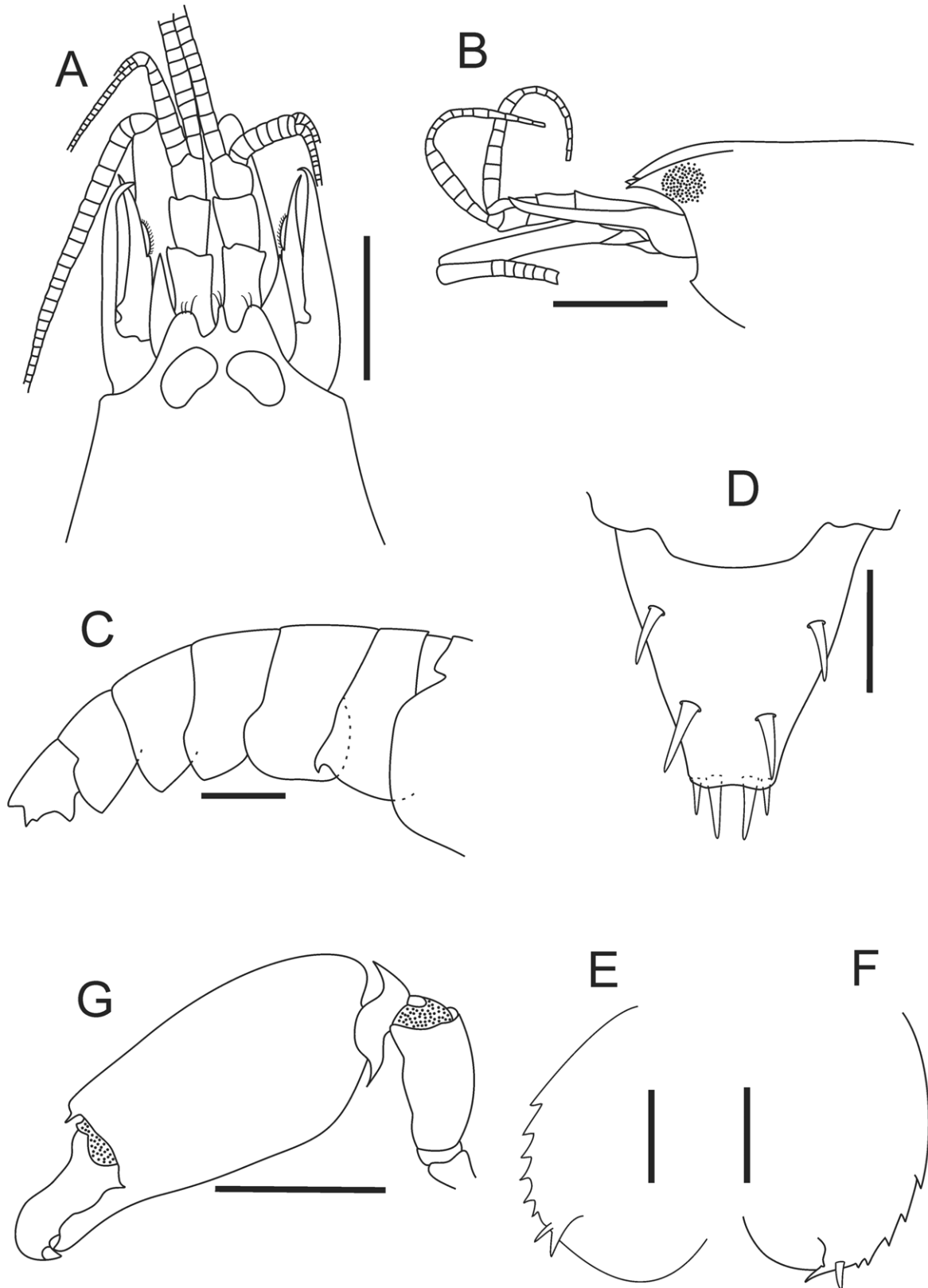


FIGURE 6. *Synalpheus ul* (Ríos & Duffy, 2007), male (CL=4.7 mm) (MZUESC 709), Camamu Bay, state of Bahia, Brazil. (A) head and cephalic appendages, dorsal view; (B) head and cephalic appendages, lateral view; (C) abdomen, lateral view; (D) telson, dorsal view; (E) left exopodite of the uropod, dorsal view; (F) right exopodite of the uropod, dorsal view; (G) left major chela, lateral view. Scale bars: A–C = 1 mm; D, E = 0.5 mm; F = 2 mm.

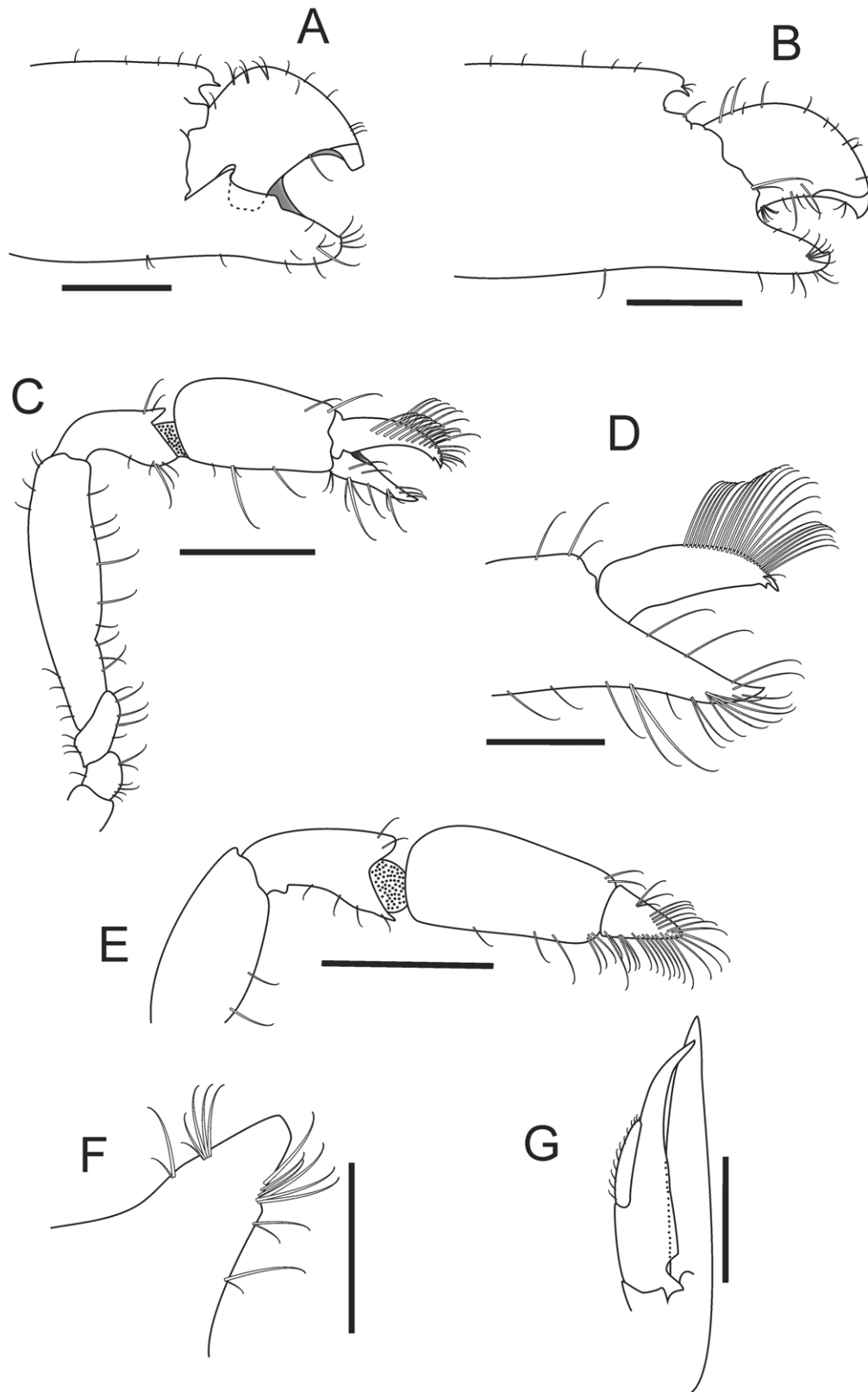


FIGURE 7. *Synalpheus ul* (Ríos & Duffy, 2007), male (CL=4.7 mm) (MZUESC 709), Camamu Bay, state of Bahia, Brazil. (A) left major chela, distal portion, lateral view; (B) left major chela, distal portion, mesial view; (C) right minor chela, lateral view; (D) right minor chela, distal portion, mesial view; (E) right minor chela, dorsal view; (F) pollex of left major chela, ventral view; (G) right basicerite, dorsal view. Scale bars: A– C, E = 1 mm; D, F, G = 0.5 mm.

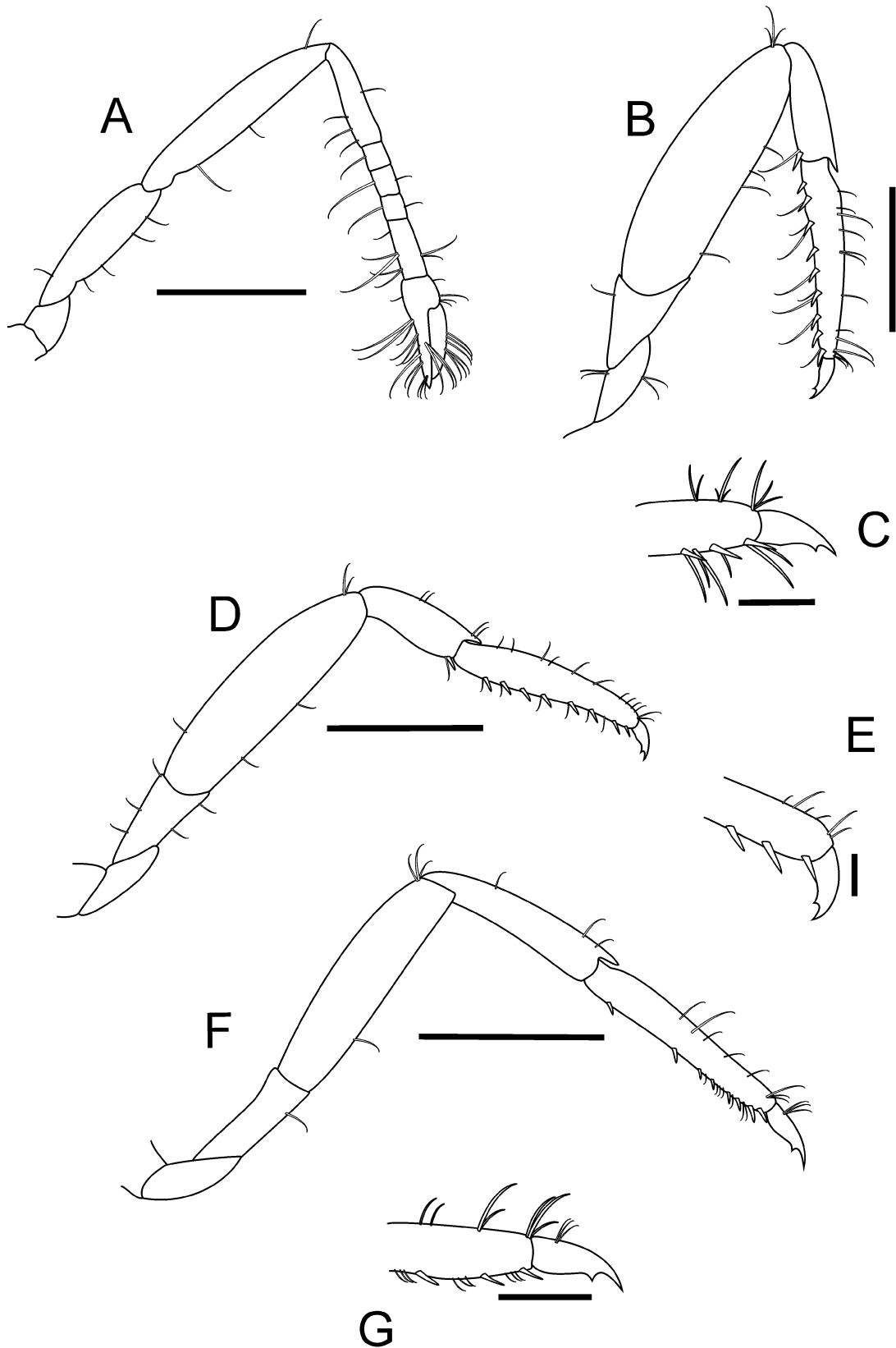


FIGURE 8. *Synalpheus ul* (Ríos & Duffy, 2007), male (CL=4.7 mm) (MZUESC 709), Camamu Bay, state of Bahia, Brazil. (A) right pereiopod 2, lateral view; (B) right pereiopod 3, lateral view; (C) right pereiopod 3, distal portion, lateral view; (D) right pereiopod 4, lateral view; (E) right pereiopod 4, distal portion, lateral view; (F) right pereiopod 5, lateral view; (G) right pereiopod 5, distal portion, lateral view. Scale bars: A, B, D, F = 1 mm; C, E, G = 0.5 mm.

setae on the posterior margin of the telson (mesial subequal to lateral in *S. ul* vs. mesial larger than lateral in *S. hoetjesi*). The present record of *S. ul* from Bahia, the first for Brazil and the southwestern Atlantic Ocean, significantly extends the southern range of this species.

Family Hippolytidae Spence Bate, 1888

Hippolyte obliquimanus Dana, 1852

Hippolyte obliquimanus Dana, 1852: 24.

Material examined. 2 ni, 10.VII.2004, Ilhéus, Sirihya Beach, Olivença, MZUESC 501; 3 m, 4 f, 09.III.2008, Belmonte, Mojiquiçaba Beach, MZUESC 1186; 1 f, 16.V.2007, Santa Cruz Cabralia, Coroa Vermelha Beach, MZUESC 872; 1 m, 17.V.2007, Porto Seguro, Mutá Beach (coral reef), MZUESC 902; 15 ni, 17.V.2007, Porto Seguro, Mutá Beach (coral reef), MZUESC 903; 3 m, 9 f, 1 ni, 17.V.2007, Porto Seguro, Mutá Beach (coral reef), MZUESC 904; 2 m, 3 f, 17.V.2007, Porto Seguro, Mutá Beach (coral reef), MZUESC 905; 1 m, 1 f, 23.XI.2007, Prado, Cumuruxatiba Beach, MZUESC 1064; 1 m, 6 f, 23.XI.2007, Prado, Cumuruxatiba Beach, MZUESC 1065; 1 f, 23.XI.2007, Prado, Cumuruxatiba Beach, MZUESC 1066.

Distribution. Western Atlantic—North Carolina, Florida, West Indies, Venezuela and Brazil (Paraíba to Rio de Janeiro) (Ramos-Porto & Coelho 1993, as *H. curacaoense* Schmitt, 1924; d'Udekem d'Acoz 1997).

Ecological notes. On coral and rocky reefs, in tide pools, on green, brown and red algae. Salinity range: 35–41 psu.

Previous records. Itacaré, Porto Seguro and Nova Viçosa (d'Udekem d'Acoz 1997); Camamu Bay (Almeida *et al.* 2007b).

Remarks. d'Udekem d'Acoz (1997) placed *Hippolyte exilirostratus* Dana, 1852 and *H. curacaoensis* Schmitt, 1924, both previously cited from Brazil (Coelho & Ramos 1972; Christoffersen 1998), in the synonymy of *H. obliquimanus*.

Latreutes parvulus (Stimpson, 1871)

Rhynchocyclus parvulus Stimpson, 1871: 124.

Material examined. 1 f, 18.IX.2004, Ilhéus, Cachoeira River, St. 8, Pontal, trawl, MZUESC 589; 1 f, 17.V.2007, Porto Seguro, Mutá Beach (coral reef), MZUESC 906; 1 f, 17.V.2007, Porto Seguro, Mutá Beach (coral reef), MZUESC 907; 2 m, 8 f, 29.VIII.2007, Caravelas, Caravelas River, Barra de Caravelas, St. 4, MZUESC 1007; 6 f, 1 ni, 29.VIII.2007, Caravelas, Caravelas River, Barra de Caravelas, St. 4, MZUESC 1008.

Distribution. Western Atlantic—New Jersey, USA, to Buenos Aires, Argentina. Eastern Atlantic—Western Sahara to Congo (Christoffersen 1982).

Ecological notes. Collected mainly on algae (red and brown). Salinity range: 38–39 psu. Depth range: intertidal to 124 m (Christoffersen 1982).

Previous records. Salvador (Christoffersen 1982); Camamu Bay (Almeida *et al.* 2007b).

Lysmata cf. intermedia (Kingsley, 1878)

Hippolysmata intermedia Kingsley, 1878: 90.

Material examined. 1 f, 1 ni, 03.VIII.2008, Cairú, Tassimirim Beach, Boipeba Island, MZUESC 1323.

Distribution. Western Atlantic—Florida Keys to Trinidad and Tobago, Curaçao and Brazil (Pernambuco to Rio de Janeiro) (Christoffersen 1998; d'Udekem d'Acoz 2000; Almeida *et al.* 2007b).

Ecological notes. Material from Boipeba Island was collected on a reef, within crevices of calcareous algae concretions, at a salinity of 33 psu.

Previous records. Camamu Bay (Almeida *et al.* 2007b, as *Lysmata cf. intermedia*).

Remarks. *Lysmata intermedia* is a species complex (Anker *et al.* 2009b). Almeida *et al.* (2007b) reported some differences between *L. cf. intermedia* from Camamu Bay, Bahia, and topotypical specimens of *L. intermedia* (d'Udekem d'Acoz 2000). The main difference observed (here confirmed by the analysis of two additional individuals) was in the number of articles in the P2 carpus (23–25, more commonly 23 in *L. cf. intermedia* vs. 25–31, more commonly 28–30 in *L. intermedia*). Other small differences were observed in the number of articles in the P2 merus and in the spinulation of the P3–P5 merus and propodus, suggesting that this material belongs to a hitherto undescribed species.

***Merguia rhizophorae* (Rathbun, 1900)**

Hippolysmata rhizophorae Rathbun, 1900: 153, pl. 8, fig. 9.

Material examined. 1 ni, 22.XI.2007, Prado, Barra do Cahy, MZUESC 1048. See also report by Almeida *et al.* (2006).

Distribution. Western Atlantic—Panama, Suriname and Brazil (Piauí to Bahia). Eastern Atlantic—Niger delta in Nigeria (Chace 1972; Bruce 1993; Christoffersen 1998; Almeida *et al.* 2006).

Ecological notes. The present specimen was collected intertidally under a rock, at salinity of 15 psu. *Merguia rhizophorae* was also collected in the mangrove of Mamoã River, at low tide, in decomposing branches of *Rhizophora mangle* (see Almeida *et al.* 2006).

Previous records. Ilhéus (Almeida *et al.* 2006).

Remarks. Almeida *et al.* (2006) extended the known Brazilian geographic range of *M. rhizophorae* from the state of Alagoas to Ilhéus in southern Bahia (Mamoã River, 14°35'05.6"S; 39°03'10.5"W). The Barra do Cahy specimen represents only a minor southward range extension (17°00'45.0"S; 39°10'21.0"W) of this species. A photograph of an adult individual of *M. rhizophorae* from southern Bahia (Ilhéus) was provided by Almeida *et al.* (2006).

***Thor manningi* Chace, 1972**

Thor manningi Chace, 1972: 137, figs. 59–60.

Material examined. 1 f, 03.VIII.2008, Cairú, Tassimirim Beach, Boipeba Island, MZUESC 1324.

Distribution. Western Atlantic—Bermuda, North Carolina to Brazil (seamounts of the North Brazilian Chain, Fernando de Noronha, Ceará to São Paulo). Central Atlantic—Ascension Island (Manning & Chace 1990; Christoffersen 1998; Coelho Filho 2006).

Ecological notes. The single specimen examined was collected in a concretion of calcareous algae, at a salinity of 33 psu. Depth range: intertidal to 42 m (Chace 1972).

Previous records. None.

Remarks. The first illustrations of *T. manningi* from Brazil were provided by Almeida *et al.* (2008b). The present specimen agrees well with the previously reported material.

Superfamily Processoidea Ortmann, 1896

Family Processidae Ortmann, 1896

***Ambidexter symmetricus* Manning & Chace, 1971**
(Fig. 9)

Ambidexter symmetricus Manning & Chace, 1971: 3, figs. 1–2.

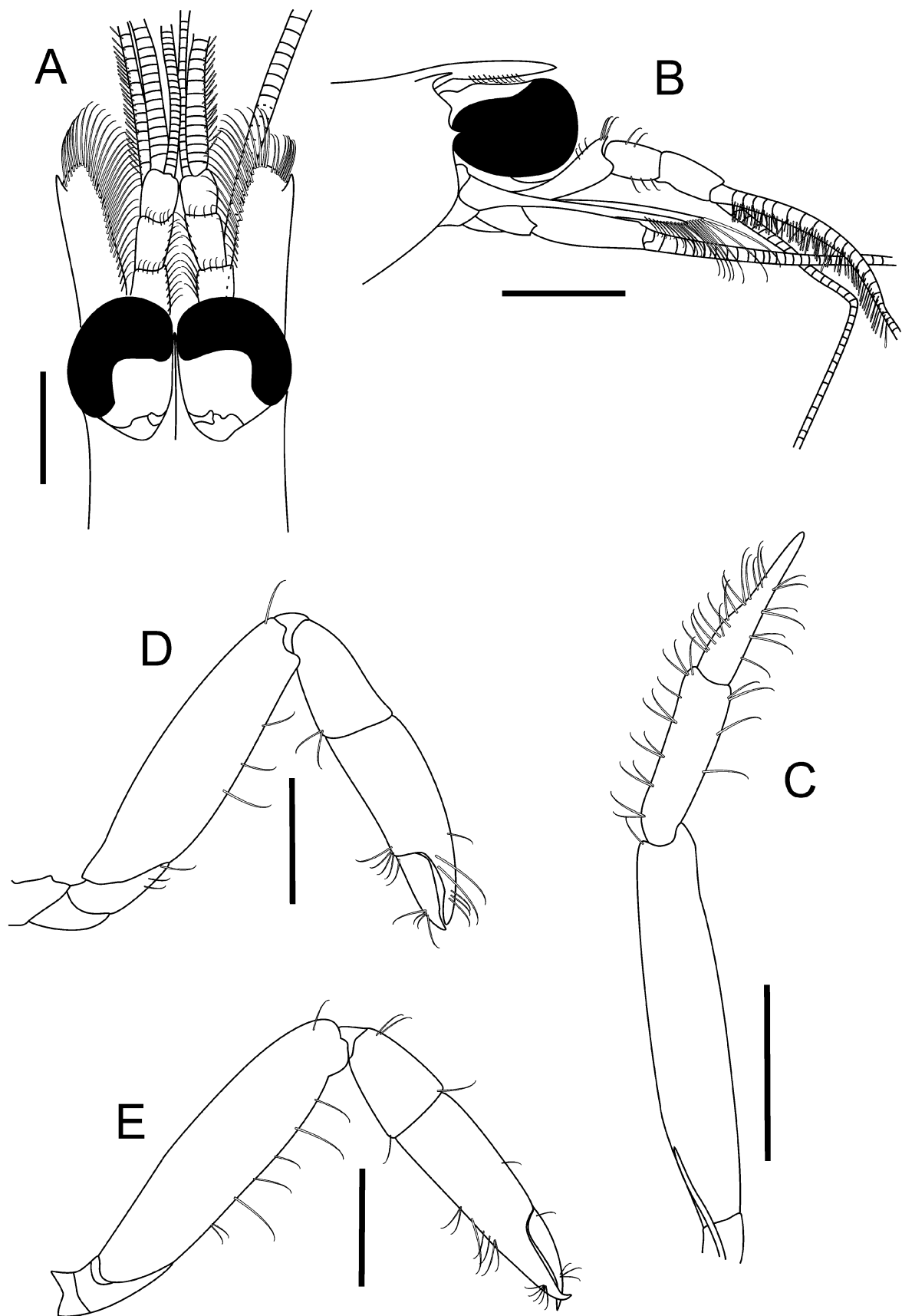


FIGURE 9. *Ambidexter symmetricus* Manning & Chace, 1971, male (CL=4.2 mm) (MZUESC 1110), Tanque Island, Maraú, state of Bahia, Brazil. (A) head and cephalic appendages, dorsal view; (B) head and cephalic appendages, lateral view; (C) right third maxilliped, lateral view; (D) right pereiopod 1, lateral view; (E) left pereiopod 1, lateral view. Scale bars: A–C = 1 mm; D, E = 0.5 mm.

Material examined. 1 ni, 18.VIII.2007, Maraú, Tanque Island, T2, MZUESC 1106; 1 m, 17.VIII.2007, Maraú, Tanque Island, T3, MZUESC 1110.

Distribution. Western Atlantic—Florida to Brazil (Pernambuco to Santa Catarina) (Christoffersen 1998).

Ecological notes. The material examined was collected at a depth of 0.8–1 m and salinity 31–32 psu. The type of bottom was not recorded.

Previous records. None.

Remarks. An identification key to the Brazilian Processidae was provided by Almeida & Bezerra (2011). *Ambidexter* Manning & Chace, 1971 is readily recognized by the chelate first pereopods (vs. only one, usually the right, of the first pereopods chelate in *Processa* Leach, 1815 and *Nikoides* Paulson, 1875) (Manning & Chace 1971).

Discussion

With the addition of *Alpheus* cf. *paracrinitus*, *A.* cf. *rostratus*, *Automate* cf. *evermanni*, *Leptalpheus* aff. *forceps*, *L. axianassae*, *Salmoneus carvachoi*, *Synalpheus* ul, *Thor manningi* and *Ambidexter symmetricus*, 64 species of caridean shrimps are currently reported from shallow (0–100 m) marine and brackish waters of Bahia (Smith 1869; Spence Bate 1888; von Ihering 1897; Coutière 1909; Coelho 1969a; Coelho & Ramos 1972; Gomes Corrêa 1972; Christoffersen 1979, 1982; Ramos-Porto 1986; Ramos-Porto & Coelho 1990; Udekem d’Acoz 1997; Guterres *et al.* 2005; Cardoso 2006; Coelho *et al.* 2006; Rhyne & Lin 2006; Serejo *et al.* 2006; Almeida *et al.* 2006, 2007a, 2007b; Fransen & Almeida 2009; Laubenheimer & Rhyne 2010; Almeida & Bezerra 2011; Vieira *et al.* 2012; this study). If only the southern part of the state is considered (Cairú to Mucuri), the total number of species known from this area is 57.

TABLE 1. Caridean shrimps found in southern Bahia and the northern and southern limits of their geographic range in the western Atlantic Ocean.

Species	Northern Limit	Southern Limit	Reference from Bahia	Observations
Family Pasiphaeidae				
<i>Leptochela serratorbita</i>	North Carolina	São Paulo	Cardoso (2006)	-
Family Gnathophyllidae				
<i>Gnathophyllum americanum</i>	Florida	Bahia	Coelho & Ramos (1972, as <i>Gnathophyllum</i> sp.)	-
Family Palaemonidae				
<i>Ancylomenes pedersoni</i>	North Carolina	Espírito Santo	Vieira <i>et al.</i> (2012)	-
<i>Brachycarpus biunguiculatus</i>	Amapá	Espírito Santo	Coelho (1969)	-
<i>Cuapetes americanus</i>	North Carolina	São Paulo	Almeida <i>et al.</i> (2007b, as <i>Kemponia americana</i>)	-
<i>Holthuisaeus bermudensis</i>	Florida	Bahia	Serejo <i>et al.</i> (2006, as <i>Periclimenaeus bermudensis</i>)	-
<i>Leander paulensis</i>	Florida	São Paulo	Ramos-Porto (1986)	-
<i>Leander tenuicornis</i>	Newfoundland	Bahia	Ramos-Porto (1986)	-
<i>Macrobrachium acanthurus</i>	North Carolina	Rio Grande do Sul	von Ihering (1897, as <i>Palaemon acanthurus</i>)	Freshwater species
<i>Nematopalaemon schmitti</i>	Guiana	São Paulo	Almeida <i>et al.</i> (2007a)	-

Continued on next page...

TABLE 1. (Continued)

Species	Northern Limit	Southern Limit	Reference from Bahia	Observations
Family Palaemonidae				
<i>Neopontonides brucei</i>	Panama	São Paulo	Fransen & Almeida (2009)	-
<i>Palaemon northropi</i>	West Indies	Uruguay	Coelho & Ramos [1972, as <i>Palaemon (Palaeander) northropi</i>]	-
<i>Palaemon pandaliformis</i>	West Indies	Rio Grande do Sul	Almeida <i>et al.</i> [2006, as <i>Palaemon (Palaemon) pandaliformis</i>]	Freshwater species
<i>Periclimenes yucatanicus</i>	Florida	Bahia	Ramos-Porto & Coelho (1990)	-
<i>Urocaris longicaudata</i>	North Carolina	São Paulo	Coelho & Ramos (1972, as <i>Periclimenes</i> sp. B)	-
Family Alpheidae				
<i>Alpheus amblyonyx</i>	West Indies	Espírito Santo	Christoffersen (1979)	-
<i>Alpheus</i> cf. <i>armillatus</i>	North Carolina	Santa Catarina	Smith (1869, as <i>Alpheus heterochaelis</i>)	Species complex, with more than one species involved in the study area; identity of the material unknown
<i>Alpheus bouvieri</i>	Florida	Rio Grande do Sul	Christoffersen (1979)	-
<i>Alpheus chacei</i>	West Indies	São Paulo	Almeida <i>et al.</i> (2007b)	-
<i>Alpheus cristulifrons</i>	Florida	Rio de Janeiro	Serejo <i>et al.</i> (2006)	-
<i>Alpheus estuariensis</i>	Florida	Paraná	Almeida <i>et al.</i> (2006)	-
<i>Alpheus</i> cf. <i>floridanus</i>	Florida	Rio Grande do Sul	Christoffersen (1979)	Species complex (A. Anker, pers. comm.); identity of the material unknown
<i>Alpheus formosus</i>	North Carolina	São Paulo	Gomes Corrêa (1972)	-
<i>Alpheus heterochaelis</i>	North Carolina	Bahia	Almeida <i>et al.</i> (2006)	-
<i>Alpheus intrinsecus</i>	West Indies	Santa Catarina	Spence Bate (1888)	-
<i>Alpheus macrocheles</i>	West Indies	Espírito Santo	Guterres <i>et al.</i> (2005)	-
<i>Alpheus</i> cf. <i>packardii</i>	Virginia	São Paulo	Christoffersen (1979, as <i>Alpheus normanni</i>)	Species complex; identity of the material unknown
<i>Alpheus</i> cf. <i>paracrinitus</i>	West Indies	Espírito Santo	This study	<i>Alpheus paracrinitus</i> species complex; identity of the material unknown
<i>Alpheus pontederiae</i>	Pará	Paraná	Almeida <i>et al.</i> (2006)	-
<i>Alpheus</i> cf. <i>rostratus</i>	?	?	This study	<i>Alpheus paracrinitus</i> species complex; identity of the material unknown
<i>Alpheus simus</i>	Florida	Bahia	Christoffersen (1979, as <i>Thunor rathbunae</i>)	-
<i>Alpheus vanderbilti</i>	Florida	Bahia	Christoffersen (1979)	-
<i>Automate</i> cf. <i>evermanni</i>	North Carolina	Rio Grande do Sul	This study	Species complex; identity of the material unknown
<i>Leptalpheus axianassae</i>	Florida	São Paulo	This study	-
<i>Leptalpheus</i> aff. <i>forceps</i>	?	?	This study	Status unknown, possible new species

Continued on next page...

TABLE 1. (Continued)

Species	Northern Limit	Southern Limit	Reference from Bahia	Observations
Family Alpheidae				
<i>Salmoneus carvachoi</i>	West Indies	Paraná	Almeida <i>et al.</i> [2007b, as <i>Salmoneus cf. ortmanni</i>]	-
<i>Synalpheus androsi</i>	Bahamas	Bahia	Coelho <i>et al.</i> (2006)	Record needs confirmation
<i>Synalpheus apioceros</i>	Florida	Santa Catarina	Almeida <i>et al.</i> (2007b)	Possible species complex; identity of the material unknown
<i>Synalpheus cf. brevicarpus</i>	Florida	Rio Grande do Sul	Christoffersen (1979)	Possible species complex, with more than one species involved in the study area; identity of the material unknown
<i>Synalpheus brooksi</i>	Florida	Bahia	Gomes Corrêa (1972, as <i>Synalpheus longicarpus</i>)	-
<i>Synalpheus fritzmuelleri</i>	North Carolina	Santa Catarina	Coutière [1909, as <i>Synalpheus fritzmuelleri elongatus</i> (sic)]	Species complex; identity of the material unknown
<i>Synalpheus hemphilli</i>	North Carolina	Bahia	Christoffersen (1979)	-
<i>Synalpheus longicarpus</i>	North Carolina	Rio de Janeiro	Christoffersen (1979)	<i>Synalpheus pandionis</i> species complex (Ríos & Duffy 2007)
<i>Synalpheus minus</i>	North Carolina	São Paulo	Spence Bate (1888, as <i>Alpheus minus</i>)	-
<i>Synalpheus sanctithomae</i>	Florida	Bahia	Christoffersen (1979)	-
<i>Synalpheus townsendi</i>	North Carolina	Rio de Janeiro	Coutière (1909)	-
<i>Synalpheus ul</i>	Belize	Bahia	Almeida <i>et al.</i> (2007b, as <i>Synalpheus cf. pandionis</i>)	-
Family Hippolytidae				
<i>Exhyppolysmata oplophoroides</i>	North Carolina	Uruguay	Almeida <i>et al.</i> (2007a)	-
<i>Hippolyte obliquimanus</i>	North Carolina	Rio de Janeiro	d'Udekem d'Acoz (1997)	-
<i>Latreutes fucorum</i>	New Foundland	Bahia	Coelhos & Ramos (1972)	-
<i>Latreutes parvulus</i>	New Jersey	Argentina	Christoffersen (1982)	-
<i>Lysmata ankeri</i>	Florida	Rio de Janeiro	Rhyne & Lin (2006)	-
<i>Lysmata bahia</i>	Panama	São Paulo	Rhyne & Lin (2006)	-
<i>Lysmata cf. intermedia</i>	?	?	Almeida <i>et al.</i> (2007b)	<i>Lysmata intermedia</i> species complex, possibly new species
<i>Lysmata rauli</i>	Bahia	Rio de Janeiro	Laubenheimer & Rhyne (2010)	-
<i>Merguia rhizophorae</i>	Panama	Bahia	Almeida <i>et al.</i> (2006)	-
<i>Thor manningi</i>	North Carolina	São Paulo	This study	-
<i>Tozeuma carolinense</i>	Massachusetts	São Paulo	Coelho & Ramos (1972)	-
<i>Trachycaris restricta</i>	Florida	Espírito Santo	Coelho & Ramos (1972)	-
Family Processidae				
<i>Ambidexter symmetricus</i>	Florida	Santa Catarina	This study	-
<i>Nikoides schmitti</i>	North Carolina	Bahia	Almeida & Bezerra (2011)	-
<i>Processa bermudensis</i>	North Carolina	Paraná	Christoffersen (1979)	-
<i>Processa brasiliensis</i>	Pernambuco	Espírito Santo	Christoffersen (1979)	-
<i>Processa fimbriata</i>	North Carolina	Rio de Janeiro	Christoffersen (1979)	-

A more accurate zoogeographical analysis of the shallow-water carideans from Bahia is difficult at present, mainly because of several factors. Some areas or habitats, such as estuarine mud bottoms, crevices of living and dead corals, conglomerates of calcareous algae and sponges, remain underexplored. The geographical ranges of some recently described species, e.g., *Lysmata ankeri* Rhyne & Lin, 2006, *L. rauli* Laubenheimer & Rhyne, 2010, and *Neopontonides brucei* Fransen & Almeida, 2009, are poorly known. Many carideans, in particular many pontoniines and alpheidids, are difficult to collect because of their small size and (ecologically) cryptic or symbiotic life habits; this is especially true for numerous infaunal Alpheididae. Finally, the existence of a number of (morphologically) cryptic species complexes in the Alpheididae (Anker 2001; Anker *et al.* 2008a, 2008b, 2008c, 2009a; Mathews & Anker 2009), some of them under study (see above), currently does not allow a more precise picture of the actual diversity in this group.

Following the longitudinal patterns of distribution proposed by Melo (1985), species with amphi-Atlantic (n=10), amphi-American (n=2), Circumtropical (n=5) and western Atlantic or western + central Atlantic (n=45) distributions are represented in the study area (excluding freshwater species *Macrobrachium acanthurus* and *Palaemon pandaliformis*). Several species that were previously considered to be widely distributed and highly variable morphologically are species complexes (Anker 2001); some of them have been resolved recently (e.g., Anker *et al.* 2008a; 2008b, 2008c, 2009a).

In the western Atlantic, Bahia is considered to be part of the Brazilian Province (Coelho & Ramos 1972; Coelho *et al.* 1978; Boschi 2000). The majority of the western Atlantic species occurring in Bahia have Antillean (n=18) or Carolinian (n=17) distribution patterns, according to Melo (1985). Because of the similar climate with a low annual thermal gradient, the Brazilian Province shares a large number of species with the Antillean Province. However, the total number of species in the Caribbean region is much higher (almost double) than that in the Brazilian Province including the Guyanas (Boschi 2000).

Among the Antillean, Carolinian and Virginian species present in Bahia (n=37), approximately 70% (n=26) have disjunct distributions, i.e., with a gap, usually in the Guyana region (Guyanas, Amapá, and Pará). This region has predominantly soft bottoms (mud and sand), and is strongly influenced by freshwater discharge from major rivers of the Equatorial region (Coelho 1969b; Coelho & Ramos 1972). Gaps in species ranges may be due to their ecology, i.e. species missing in the Guyanas may not be adapted to oceanographic conditions resulting from too much freshwater in the coastal areas. However, gaps may be also due to undersampling (which is true for the Guyanas and northern states of Brazil) or poor taxonomic resolution.

Almost half of the marine shallow-water carideans of Bahia have their southern limits of distribution somewhere between Bahia and Rio de Janeiro (Table 1). For brachyuran crabs (see Almeida & Coelho 2008), this pattern suggests that Bahia constitutes a transition zone between the Brazilian and Paulista zoogeographic provinces. A similar analysis for caridean shrimps should be attempted in the future, however, only after filling major gaps in taxonomic and biogeographic knowledge of this diverse group.

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APPENDIX 1. List of species by collection station during the projects conducted in southern Bahia from 2003 to 2008.

I. List of stations of the project “Inventariamento da Fauna de Crustáceos do Município de Ilhéus, Bahia”, sponsored by the Universidade Estadual de Santa Cruz, Ilhéus (2003–2005).

List of stations (in alphabetical order):

Locality/Station	Coordinates	Species collected
Acuípe River, St. 2, after bridge of highway BA-001	15°05'21.8"S; 38°59'56.4"W	<i>Alpheus pontederiae</i>
Acuípe River, St. 3	15°04'53.6"S; 39°00'13.8"W	<i>Macrobrachium acanthurus, Palaemon pandaliformis</i>
Acuípe River, St. 5, Acuípe River tributary	15°04'58.6"S; 38°59'53.4"W	<i>Alpheus pontederiae</i>
Almada River, St. 2 mouth of Almada River	14°46'27.2"S; 39°03'14.8"W	<i>Alpheus cf. armillatus, Palaemon northropi</i>
Almada River, St. 4 at bridge of Ilhéus-Itacaré highway	14°45'07.5"S; 39°03'51.2"W	<i>Macrobrachium acanthurus</i>
Back-door Beach, Olivença	14°55'52"S; 39°00'59"W	<i>Palaemon northropi</i>
Batuba Beach, Olivença	14°56'32.8"S; 39°00'43.3"W	<i>Palaemon northropi</i>
Cachoeira River, St. 4 trawl	14°48'15.6"S; 39°04'22.3"W	<i>Alpheus heterochaelis, Alpheus pontederiae, Leander paulensis</i>
Cachoeira River, St. 6 trawl	14°48'49.9"S; 39°03'19"W and 14°48'51.5"S; 39°02'28.1"W	<i>Alpheus intrinsecus</i>
Cachoeira River, St. 7, Lomanto Junior Bridge, trawl	14°48'57.3"S; 39°02'30.5"W	<i>Leander paulensis</i>
Cachoeira River, St. 8, Pontal, trawl	14°48'10"S; 39°02'12.3"W	<i>Alpheus cf. armillatus, Alpheus intrinsecus, Latreutes parvulus, Leander paulensis, Synalpheus fritzmuelleri</i>
Jairí Beach, Olivença	14°58'42.8"S; 39°00'06.8"W	<i>Palaemon northropi</i>
Mamoã River	14°35'05.6"S; 39°03'10.5"W	<i>Alpheus estuariensis, Merguia rhizophorae</i>
Parque Municipal da Boa Esperança, Ribeirão Iguape	14°47'01.3"S; 39°03'49.6"W	<i>Alpheus pontederiae</i>
Maramata Beach	14°48'28.7"S; 39°01'33.3"W	<i>Alpheus bouvieri, Palaemon northropi</i>
Santana River, St. 3 Trawl	14°50'35.8"S; 39°02'45.1"W	<i>Alpheus heterochaelis</i>
Santana River, St. 4 Trawl	14°50'14.4"S; 39°02'39.2"W	<i>Leander paulensis</i>
Sirihyba Beach, Olivença	14°57'32.5"S; 39°00'21.5"W	<i>Alpheus cf. armillatus, Hippolyte obliquimanus, Palaemon northropi</i>

II. List of collection stations of the project “Diversidade de Crustáceos do Sudeste e Sul da Bahia, Brasil: I. Ambientes Costeiros”, sponsored by the Universidade Estadual de Santa Cruz, Ilhéus (2006–2008).

List of stations (in alphabetical order):

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Locality/Station	Coordinates	Species collected
Belmonte, Mojiçuçaba Beach	16°05'10.8"S; 38°56'51.7"W	<i>Hippolyte obliquimanus</i> , <i>Synalpheus fritzmuelleri</i>
Belmonte, Mojiçuçaba River	16°05'13.8"S; 38°56'53.8"W	<i>Alpheus estuariensis</i> , <i>Palaemon northropi</i>
Cairú, Moreré Beach, Boipeba Island	13°36'49.5"S; 38°54'16.2"W	<i>Alpheus</i> cf. <i>armillatus</i> , <i>A. bouvieri</i> , <i>A.</i> cf. <i>packardii</i> , <i>A.</i> cf. <i>paracrinitus</i> , <i>Cuapetes americanus</i>
Cairú, Tassimirim Beach, Boipeba Island	13°34'49.6"S; 38°54'49.4"W	<i>Alpheus</i> cf. <i>armillatus</i> , <i>A. formosus</i> , <i>A.</i> cf. <i>rostratus</i> , <i>Cuapetes americanus</i> , <i>Lysmata</i> cf. <i>intermedia</i> , <i>Synalpheus fritzmuelleri</i> , <i>Thor manningi</i>
Cairú, Triana River, Boipeba Island	13°35'00.6"S; 38°55'49.2"W	<i>Alpheus</i> cf. <i>armillatus</i> , <i>A. chacei</i> , <i>A. estuariensis</i> , <i>A.</i> cf. <i>rostratus</i> , <i>Cuapetes americanus</i> , <i>Palaemon northropi</i> , <i>Salmoneus carvachoi</i>
Canavieiras, Pardo River	15°41'33.7"S; 38°56'07.0"W	<i>Alpheus estuariensis</i> , <i>Salmoneus carvachoi</i>
Canavieiras, Patipe River	15°38'44.8"S; 38°56'30.2"W	<i>Alpheus pontederiae</i> , <i>Leptalpheus</i> aff. <i>forceps</i> , <i>Palaemon pandaliformis</i>
Caravelas, Caravelas River, St. 1	17°44'39.4"S; 39°14'49.7"W	<i>Alpheus</i> cf. <i>armillatus</i> , <i>Synalpheus apioceros</i>
Caravelas, Caravelas River, Farol Abrolhos Iate Clube, St. 2	17°44'44.2"S; 39°14'31.7"W	<i>Alpheus</i> cf. <i>armillatus</i> , <i>Synalpheus apioceros</i>
Caravelas, Caravelas River, Barra de Caravelas, St. 4	17°44'16.3"S; 39°11'16.3"W	<i>Alpheus</i> cf. <i>armillatus</i> , <i>Leander paulensis</i>
Caravelas, Pontal do Sul	17°45'05.6"S; 39°11'35.4"W	<i>Alpheus</i> cf. <i>armillatus</i>
Itacaré, Concha Beach, mouth of Contas River	14°16'31.4"S; 38°59'14.5"W	<i>Alpheus</i> cf. <i>armillatus</i> , <i>Brachycarpus biunguiculatus</i> , <i>Cuapetes americanus</i> , <i>Palaemon northropi</i>
Itacaré, Contas River	14°16'38.2"S; 38°59'41.7"W	<i>Leptalpheus axianassae</i> , <i>Palaemon northropi</i>
Maraú, Barra Grande (Barra Grande Pier)	13°53'26.1"S; 38°57'09.4"W	<i>Urocaris longicaudata</i>
Maraú, Ponta do Mutá	13°52'48.2"S; 38°56'53"W	<i>Leander paulensis</i> , <i>Palaemon northropi</i> , <i>Urocaris longicaudata</i>
Maraú, Maraú River	14°06'60.2"S; 39°02'84.7"W	<i>Alpheus pontederiae</i>
Maraú, Tanque Island, Transect 2, Van Veen	14°00'59.0"S; 38°59'15.6"W	<i>Alpheus chacei</i> , <i>Ambidexter symmetricus</i> , <i>Salmoneus carvachoi</i>
Maraú, Tanque Island, Transect 3, Van Veen	14°00'47.8"S; 38°59'00.5"W	<i>Ambidexter symmetricus</i>
Mucuri, Mucuri River, St. 1 mouth	18°05.633'S; 39°33.113'W	<i>Alpheus estuariensis</i> , <i>A. pontederiae</i> , <i>Palaemon northropi</i> , <i>P. pandaliformis</i>
Nova Viçosa, Pontal da Barra Beach, St. 2	17°53'22.7"S; 39°21'53.5"W	<i>Alpheus</i> cf. <i>armillatus</i>
Nova Viçosa, Pontal da Barra Beach, near St. 2	17°53'22.7"S; 39°21'53.5"W	<i>Synalpheus fritzmuelleri</i>
Nova Viçosa, Pontal da Barra Beach, St. 3, Pier	17°53'00.9"S; 39°21'48.2"W	<i>Cuapetes americanus</i> , <i>Synalpheus apioceros</i> , <i>Synalpheus fritzmuelleri</i>
Porto Seguro, Mutá Beach (coral reef)	16°21'52.2"S; 39°00'15.9"W	<i>Cuapetes americanus</i> , <i>Hippolyte obliquimanus</i> , <i>Latreutes parvulus</i> , <i>Synalpheus fritzmuelleri</i>
Porto Seguro, Buranhem River, Municipal Pier of Porto Seguro	16°26'48.5"S; 39°03'40.3"W	<i>Alpheus</i> cf. <i>armillatus</i>
Prado, Barra do Cahy	17°00'45.0"S; 39°10'21.0"W	<i>Alpheus estuariensis</i> , <i>Merguia rhizophorae</i>
Prado, Cumuruxatiba Beach	17°06'18.6"S; 39°10'50.4"W	<i>Alpheus</i> cf. <i>armillatus</i> , <i>Automate</i> cf. <i>evermanni</i> , <i>Cuapetes americanus</i> , <i>Hippolyte obliquimanus</i> , <i>Leander paulensis</i> , <i>Urocaris longicaudata</i>
Santa Cruz Cabrália, Coroa Vermelha Beach	16°19'58.5"S; 39°00'21.5"W	<i>Alpheus</i> cf. <i>armillatus</i> , <i>A. cristulifrons</i> , <i>A. formosus</i> , <i>A.</i> cf. <i>packardii</i> , <i>A.</i> cf. <i>rostratus</i> , <i>Cuapetes americanus</i> , <i>Hippolyte obliquimanus</i> , <i>S. fritzmuelleri</i>
Santa Cruz Cabrália, João de Tiba River, mouth	17°06'18.6"S; 39°10'50.4"W	<i>Alpheus estuariensis</i> , <i>Cuapetes americanus</i> , <i>Synalpheus apioceros</i> , <i>S.</i> cf. <i>brevicarpus</i> , <i>S. fritzmuelleri</i>
Santa Cruz Cabrália, João de Tiba River, near Santo André Beach	16°15'03.9"S; 39°00'54.9"W	<i>Alpheus</i> cf. <i>armillatus</i> , <i>A. estuariensis</i> , <i>Palaemon northropi</i> , <i>Salmoneus carvachoi</i>
Santa Cruz Cabrália, Yaya River, mouth	17°06'18.6"S; 39°10'50.4"W	<i>Alpheus estuariensis</i>
Una, Comandatuba Village	15°21'09.3"S; 38°59'13.6"W	<i>Alpheus estuariensis</i> , <i>Salmoneus carvachoi</i>