

New records of decapod crustaceans from the coast of Sergipe state, Brazil

Samara de Paiva Barros-Alves¹, Douglas Fernandes Rodrigues Alves^{1*}, Sonja Luana Rezende da Silva¹, Carmen Regina Parisotto Guimarães² and Gustavo Luis Hirose¹

1 Universidade Federal de Sergipe – UFS, Laboratório de Carcinologia, São Cristóvão, Sergipe, Brazil

2 Universidade Federal de Sergipe – UFS, Laboratório de Bentos Costeiro, São Cristóvão, Sergipe, Brazil

* Corresponding author. E-mail: douglas_biologo@yahoo.com.br

Abstract: The objective of this study is to report seven decapod crustacean species for the first time from Sergipe state, northeastern Brazil. The specimens were sampled from January 2012 to June 2015, on continental shelf and estuaries. *Alpheus buckupi*, *Synalpheus ul*, *Lysmata bahia*, *L. cf. intermedia*, *Paguristes tortugae*, *Macrocoeloma laevigatum* and *Pilumnoides coelhoi* are reported. This study records fill gaps in the geographical distribution of these decapods that have previous records for adjacent areas.

Keywords: shrimp; Caridea; Anomura; Brachyura, new records

INTRODUCTION

Decapod crustaceans represent one of the most important groups of the megafauna in the consolidated and unconsolidated sublittoral, mostly comprising members of the infraorders Caridea, Brachyura and Anomura (Martin and Davis 2001; De Grave et al. 2009). The distribution of decapod crustaceans along the Brazilian coast is constantly changing, not only with an increasing number of species that inhabit these waters via the introduction of exotic species (Tavares and Amouroux 2003; Tavares and Mendonça 2004; Almeida et al. 2012b), or description of new species (Brandão et al. 2012; Almeida et al. 2013, 2014; Soledade et al. 2013), but also by the expansion of the distribution limits of these organisms (Martinelli and Isaac 2001; Targino et al. 2001; Cobo et al. 2002; Alves et al. 2006; Camargo et al. 2010; Hirose 2012; Rosa and Almeida 2012; Rosa 2013, 2014; Sousa et al. 2014; Barros-Alves et al. in press). However, studies that aim to describe the diversity of the decapod crustaceans in some states in the north and northeast of Brazil are still scarce. This scenario has been minimized by conducting large surveys, such as those undertaken by REVIZEE Program: “Programme

for the Evaluation of the Sustainable Potential of the Living Resources in the Exclusive Economic Zone” (Cabral et al. 2000; Viana et al. 2003; Coelho Filho 2006) and specific studies carried out in recent decades in some states of the north and northeast of Brazil (e.g. Coelho 1971; Almeida et al. 2003, 2006, 2012a; Coelho et al. 2007; Almeida and Coelho 2008; Alencar et al. 2013).

The researches concerning the composition of decapod crustaceans fauna for the state of Sergipe started with the studies of Coelho (1969, 1972), Coelho and Ramos (1972), Coelho et al. (1983), and Barreto et al. (1993). The studies of Coelho et al. (1983, 2004) were, until recently, the main surveys of the decapod fauna for the coast of Sergipe. New studies have been expanding the knowledge with the registration of new occurrences for the state, such as for commensal porcellanid crab *Polyonyx gibbesi* Haig, 1856 (Hirose 2012); mud-shrimps *Axianassa australis* Rodrigues & Shimizu, 1992 (Rosa and Almeida 2012); for some portunid crabs *Callinectes sapidus* Rathbun, 1896 (Rosa 2013); *Callinectes bocourti* A. Milne-Edwards, 1879, *Callinectes exasperatus* (Gersstaecker, 1856), *Callinectes marginatus* (A. Milne-Edwards, 1861) and *Charybdis hellerii* (A. Milne-Edwards, 1867) (Rosa 2014); for caridean shrimp *Trachycaris restricta* (A. Milne-Edwards, 1878) (Sousa et al. 2014).

Thus, to enhance our understanding about the geographical distribution of decapod crustaceans, this study presents seven new records of occurrence of decapod crustaceans, including four caridean shrimps, one anomuran and two brachyuran crabs.

MATERIALS AND METHODS

Samples were taken during a sampling program for decapod crustaceans, conducted from January 2012 to June 2015 in two environments: 1) the continental shelf, between the mouth of the Sergipe River and the Vaza-Barris River, in isobaths of 5, 15 and 30 m, through trawls performed by a shrimping boat equipped with a

double-rig net; 2) the estuary of the Vaza-Barris River, where decapods were sampled via active search with the use of hand nets. All sampling was carried out according to state and federal laws regulating wildlife collection (SISBIO #24097-1).

In the laboratory, specimens were identified according to the specific literature (Holthuis 1993; Melo 1996, 1999; d'Udekem d'Acoz 2000; Rhyne and Lin 2006; Ríos and Duffy 2007; Almeida et al. 2013; Soledade and Almeida 2013). The classification adopted in this study follows De Grave et al. (2009). The brachyuran crabs were measured by carapace width (CW), hermit crabs by the cephalothoracic shield length (CSL) and the caridean shrimps by the carapace length (CL), using a digital caliper (accuracy 0.01 mm) and, when necessary, a stereomicroscope equipped with imaging and measuring tools. Specimens were classified with the following demographic categories: adult male, non-ovigerous adult female, ovigerous females and juveniles.

The specimens were preserved in 70% ethanol and deposited in the scientific collection of the Carcinology Laboratory of the Federal University of Sergipe (CARCINO), and in the Carcinological collection of the Museum of Zoology of the University of São Paulo (MZUSP).

RESULTS

Infraorder Caridea Dana, 1852

Superfamily Alpheoidea Rafinesque, 1815

Family Alpheidae Rafinesque, 1815

Alpheus buckupi Almeida, Terossi, Araújo-Silva & Mantelatto, 2013 (Figure 1A)

Material examined: 1 male, 1 ovigerous female, 1 juvenile – CARCINO 103; size range: $4.9 \leq CL \leq 7.3$ mm; Aracaju, Rio Vaza-Barris ($11^{\circ}05'47''$ S, $037^{\circ}09'30''$ W); coll. D. Alves & G.L. Hirose; 13.VII.2014.

Distribution: Western Atlantic – Venezuela (Orinoco Delta) and Brazil (Ceará, Rio Grande do Norte, Pernambuco, Alagoas, Sergipe, Bahia and São Paulo). Eastern Atlantic – São Tomé and Príncipe (Almeida et al. 2013; this study).

Remarks: The specimens examined were collected in estuarine environment, on intertidal zone, living in an unidentified sponge found on mangrove roots, at a salinity of 38.

Synalpheus ul (Ríos & Duffy, 2007) (Figure 1B)

Material examined: 2 females (3.4 and 4.1 mm CL) – CARCINO 104; Aracaju, continental shelf ($11^{\circ}04'05''$ S, $037^{\circ}05'43''$ W); coll. G.L. Hirose; 07.VI.2014.

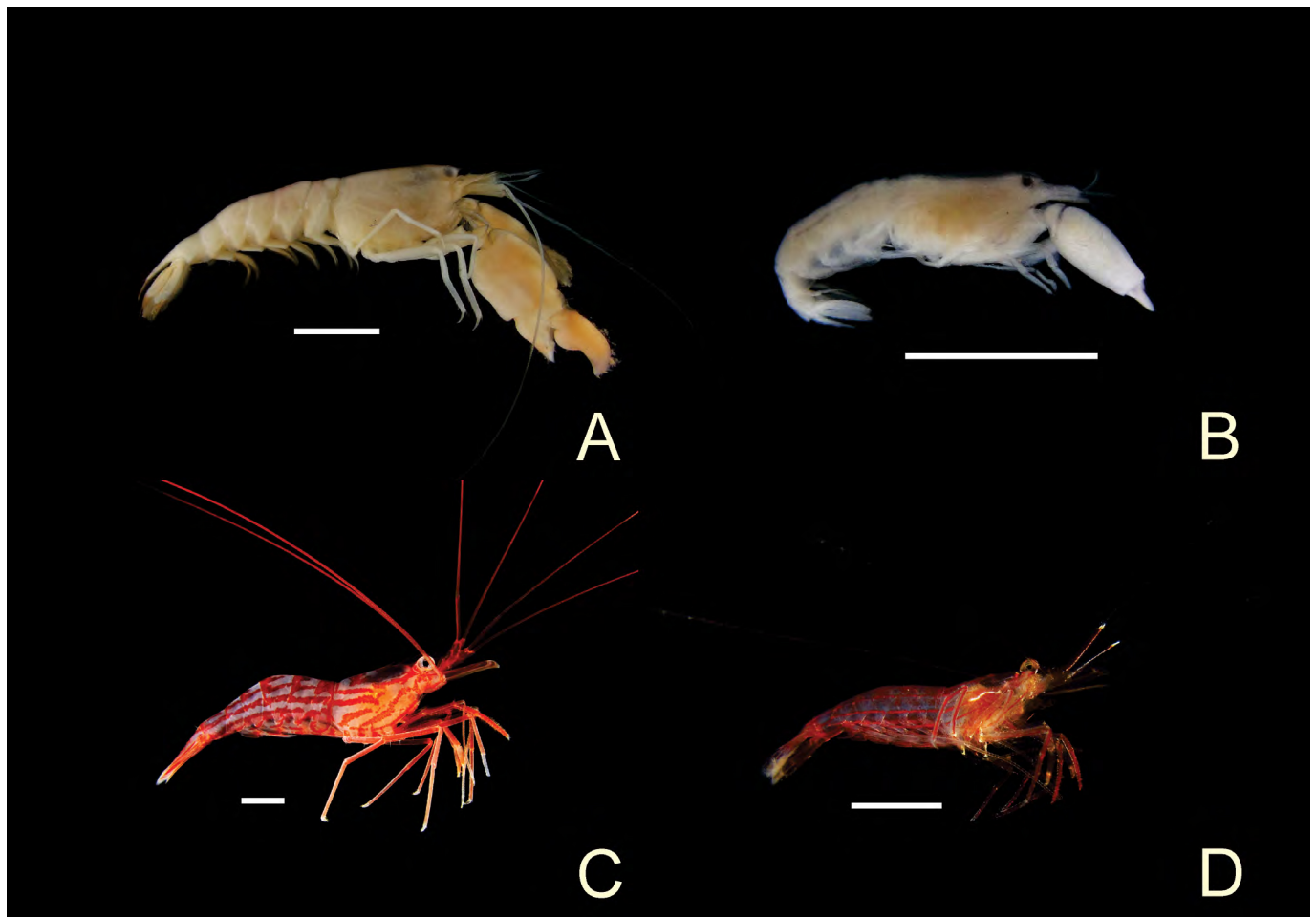


Figure 1. Lateral view: **A**, *Alpheus buckupi* Almeida, Terossi, Araújo-Silva & Mantelatto, 2013; **B**, *Synalpheus ul* (Ríos & Duffy, 2007); **C**, *Lysmata bahia* Rhyne & Lin, 2006; **D**, *Lysmata cf. intermedia* (Kingsley, 1978). Scale bars = 5.0 mm.

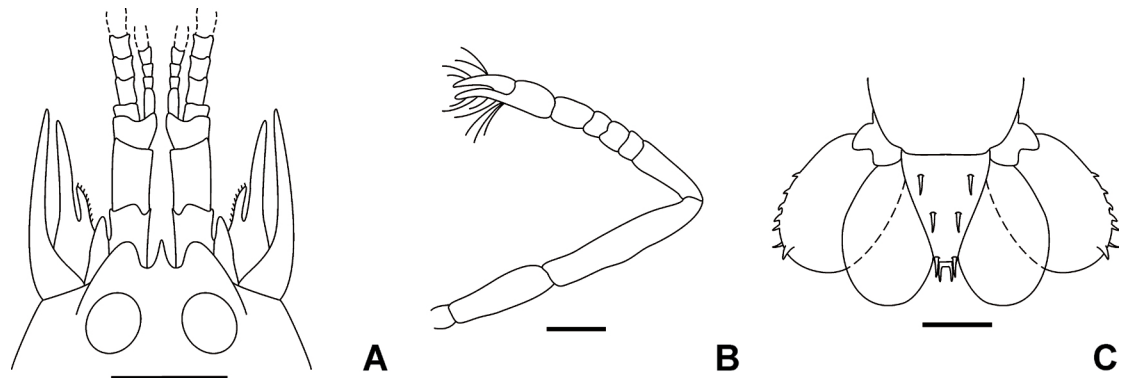


Figure 2. *Synalpheus ul* (Ríos & Duffy, 2007). **A**, Anterior region and cephalic appendages, dorsal view; **B**, left second pereiopod; **C**, telson and uropods, dorsal view. Scale bars = 0.5 mm.

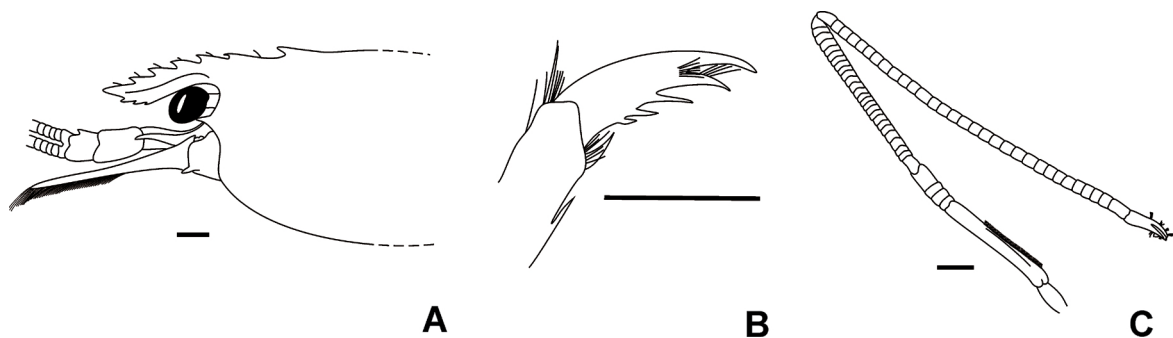


Figure 3. *Lysmata bahia* Rhyne & Lin, 2006. **A**, Anterior region, lateral view; **B**, dactylus of right fifth pereiopod **C**, right second pereiopod. Scale bars = 1.0 mm.

Distribution: Western Atlantic – Belize, Panama, Jamaica, Dominican Republic, St. Martin, Barbados, Curaçao and Brazil (Pernambuco, Alagoas, Sergipe and Bahia) (Hultgren et al. 2011; Almeida et al. 2012a; Anker and Pachelle 2014; this study).

Remarks: The specimens examined were collected in biogenic substrates mainly composed of an unidentified Bryozoa, in 30 m depth, at a salinity of 38. The present specimens agree with the description provided by Ríos and Duffy (2007): presence of the scaphocerite blade reduced, acute lateral spine robust, not overreaching antennular peduncle, slightly shorter than basicerite lateral spine (Figure 2A); the second pereiopod with carpus 5-segmented, slightly longer than merus (Figure 2B); and uropods with five fixed teeth on outer margin of exopod (Figure 2C).

Family Hippolytidae Spence Bate, 1888

Lysmata bahia Rhyne & Lin, 2006 (Figure 1C)

Material examined: 1 hermaphrodite (9.1 mm CL) – CARCINO 106; Aracaju, continental shelf (11°04'05" S, 037°05'43" W); coll. G.L. Hirose & D. Alves; 05.XI.2013 and 1 hermaphrodite (9.4 mm CL) – CARCINO 114; Aracaju, continental shelf (10°57'49" S, 037°02'17" W); coll. G.L. Hirose & D. Alves; 14.XI.2015.

Distribution: Western Atlantic – Panama (Bocas del Toro) and Brazil (Sergipe, Bahia, Rio de Janeiro and São

Paulo) (Rhyne and Lin 2006; this study).

Remarks: The specimens examined were collected on sand bottom, in 5 m depth, at a salinity of 38. The present specimens agree with the description provided by Rhyne and Lin (2006): presence of the rostrum reaching level of middle of intermediate segment of antennular peduncle; dorsal margin with six teeth; ventral margin with three teeth (Figure 3A); third–fifth pereiopod with dactyli biunguiculate, dorsal unguis larger than ventral, flexor margin with three spines, decreasing in size from tip (Figure 3B); and second pereiopod with merus subdivided in 26 segments and carpus with 31 segments (Figure 3C). Merus of the third and fourth pereiopods with seven and four spines, respectively. Fifth pereiopod with merus unarmed.

Lysmata* cf. *intermedia (Kingsley, 1978) (Figure 1D)

Material examined: 1 ovigerous female (3.0 mm CL) – CARCINO 107; Aracaju, continental shelf (11°04'05" S, 037°05'43" W); coll. G.L. Hirose; 07.VI.2014.

Distribution: Western Atlantic – Florida Keys to Trinidad and Tobago, Curaçao and Brazil (Pernambuco, Sergipe, Bahia to São Paulo) (Ramos-Porto and Coelho 1995; Christoffersen 1998; Udekem d'Acoz 2000; Almeida et al. 2007; Barros-Alves et al. in press; this study).

Remarks: The specimens examined were collected on sand bottom, at 5 m depth, at a salinity of 39. The present material agrees with the description provided

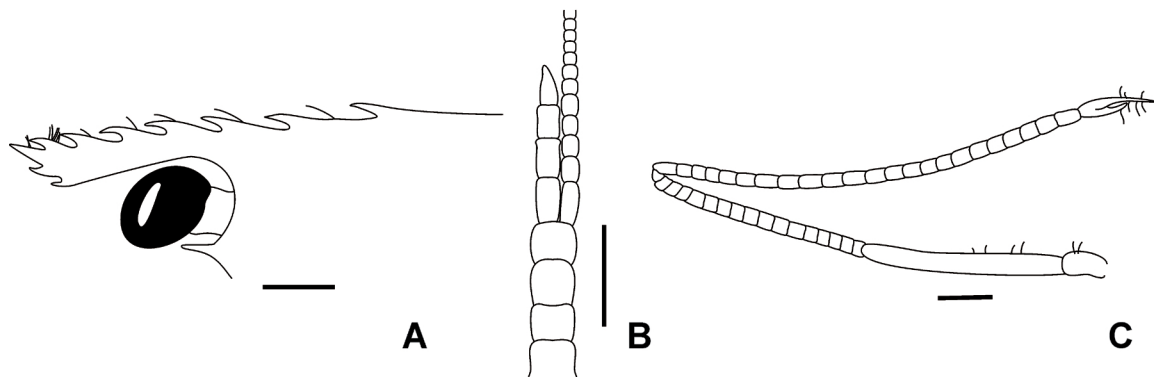


Figure 4. *Lysmata cf. intermedia* (Kingsley, 1978). **A**, Anterior region, lateral view; **B**, right accessory branch of outer antennular flagellum; **C**, right second pereiopod. Scale bars = 0.5 mm.

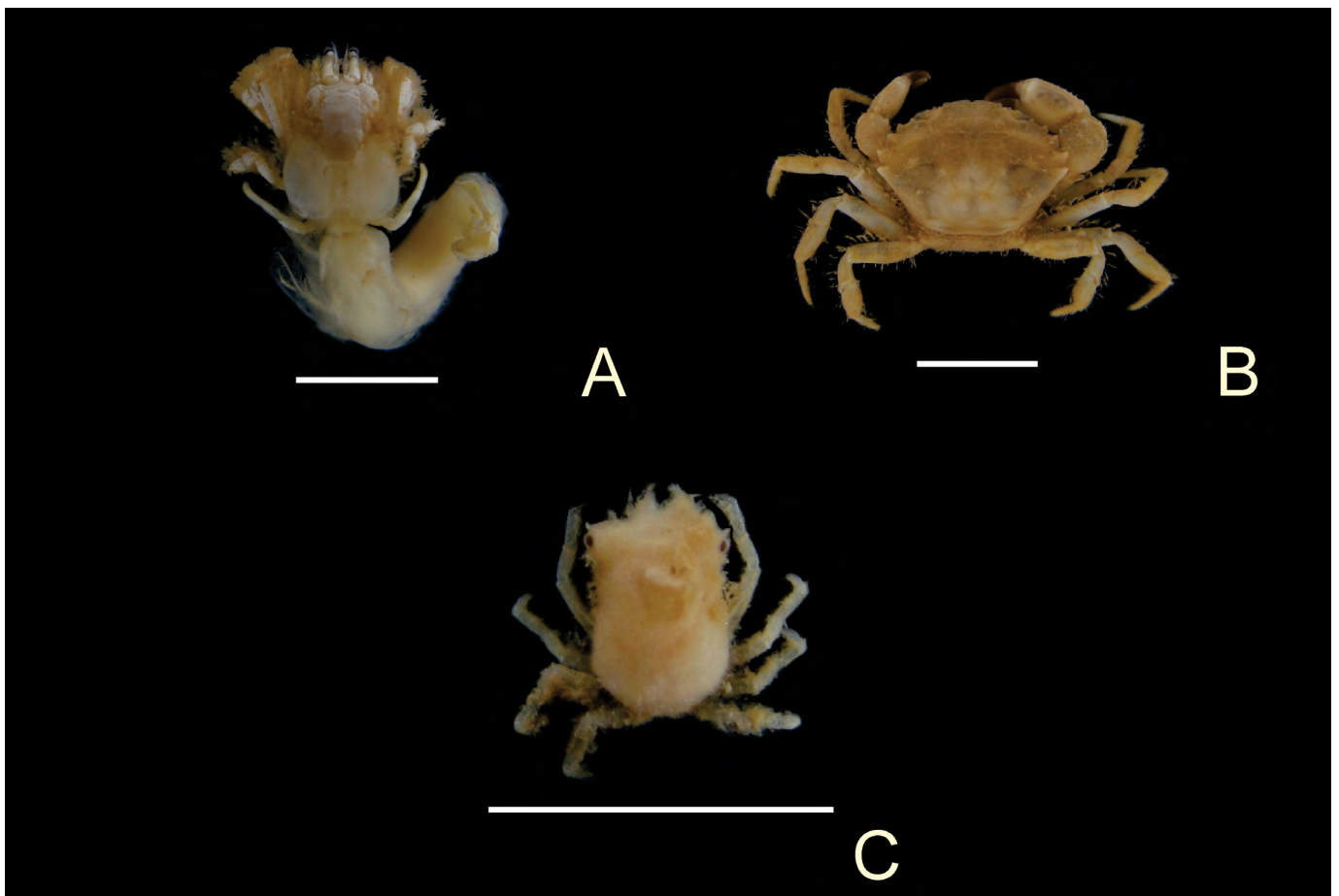


Figure 5. Dorsal view: **A**, *Paguristes tortugae* Schmitt, 1933; **B**, *Macrocoeloma laevigatum* (Stimpson, 1860); **C**, *Pilumnoides coelhoi* Guinot & Macpherson, 1987. Scale bars = 5.0 mm.

by Udekem d'Acoz (2000): the presence of the rostrum with seven dorsal teeth: three in postrostral position and four in rostral position; two ventral teeth close to rostrum tip (Figure 4A); antennular peduncle with stylocerite overreaching outer border of basal segment; accessory branch of outer antennular flagellum with four articles (Figure 4B); and second pereiopod with merus subdivided in 17 segments (Figure 4C). However, the carpus of second pereiopod is subdivided in 23 segments (Figure 4C), agrees with the description provided by Almeida et al. (2007) and Santos et al.

(2012). This variation found in morphology of carpus in the second pereiopod indicates that *L. cf. intermedia* is a species complex (Almeida et al. 2007; Anker et al. 2009; Santos et al. 2012).

Infraorder Anomura MacLeay, 1838
Superfamily Paguroidea Latreille, 1802
Family Diogenidae Ortmann, 1892

Paguristes tortugae Schmitt, 1933 (Figure 5A)

Material examined: 1 male (2.7 mm CSL) – CARCINO 109; Aracaju, continental shelf (11°04'05" S, 037°05'43"

W); coll. G.L. Hirose; 07.VI.2014.

Distribution: Western Atlantic – North Carolina, Florida, Gulf of Mexico, Central America, Antilles, Surinam and Brazil (Fernando de Noronha, Atol das Rocas, Pará, Ceará, Pernambuco, Sergipe, Bahia, Rio de Janeiro, São Paulo and Santa Catarina) (Coelho and Ramos-Porto 1987; Rieger and Giraldo 1997; Melo 1999; Coelho Filho 2006; Coelho et al. 2007; this study).

Remarks: The specimens examined were collected on sand bottom, in 30 m depth, obtained along with biogenic substrates mainly composed of an unidentified bryozoan, at a salinity of 39.

Infraorder Brachyura Linnaeus, 1758
Superfamily Majoidea Samouelle, 1819
Family Majidae Samouelle, 1819

Macrocoeloma laevigatum (Stimpson, 1860) (Figure 5B)

Material examined: 1 male (2.3 mm CW) – CARCINO 108; Aracaju, continental shelf (11°03'46" S, 036°59'58" W); coll. G.L. Hirose; 31.III.2014.

Distribution: Western Atlantic – Florida, West Indies to Brazil (from Pará to Bahia) (Barreto et al. 1993; Melo 1996; Serejo et al. 2006; Almeida et al. 2007; Coelho et al. 2008; this study).

Remarks: The specimens examined were collected on sand bottom, in 30 m depth, obtained along with biogenic substrates mainly composed of an unidentified bryozoan, at a salinity of 40.

Superfamily Pseudozioidea Alcock, 1898
Family Pilumnoididae Guinot & Macpherson, 1987

Pilumnoides coelhoi Guinot & Macpherson, 1987 (Figure 5C)

Material examined: 4 females – MZUSP 32910; Size range: $7.30 \leq CW \leq 8.40$ mm; Aracaju, continental shelf (11°03'46" S, 036°59'58" W); coll. G.L. Hirose; 03.VII.2014 and 1 male, 12 females and 1 juvenile – CARCINO 044; Size range: $1.05 \leq CW \leq 8.00$ mm; Aracaju, continental shelf (11°04'25" S, 037°04'20" W and 11°07'39" S, 037°02'42" W); coll. G.L. Hirose; 11.VIII.2014.

Distribution: Western Atlantic – Brazil (Paraíba, Sergipe to Santa Catarina) (Melo 1996; Serejo et al. 2006; Coelho et al. 2008; this study).

Remarks: The specimens examined were collected on sand bottom, at 30 m depth, obtained along with biogenic substrates mainly composed of an unidentified bryozoan, at a salinity of 37.

DISCUSSION

The richness of decapod crustaceans from the coast of Sergipe was uncertain until the pioneering study conducted by Coelho et al. (1983). This research, which aimed to evaluate the decapod fauna of the state recorded

about 40 species and was subsequently expanded by Coelho et al. (2004), which added 11 new species. More recently, other eight species were recorded in this region by the studies of Hirose (2012), Rosa and Almeida (2012), Rosa (2013, 2014) and Sousa et al. (2014). In this study, we expanded the knowledge of this fauna in the state of Sergipe with the recording of seven additional decapod species.

The new records of decapod crustaceans from the coast of Sergipe fill a knowledge gap in the geographical distribution of these species, which were previously known from states adjacent to Sergipe (Alagoas and Bahia). It is noteworthy that among decapod crustaceans recorded by this study, some have cryptic habits, such as *L. cf. intermedia* (Udekem d'Acoz 2000; Almeida et al. 2007; Santos et al. 2012) and/or live typically in association with others invertebrates (e.g., *A. buckupi*) (Almeida et al. 2013), making it important to use alternative sampling techniques. In addition, there is a need to increase sampling efforts in consolidated substrates, because some of these species, such as *L. bahia* (Rhyne & Lin 2006) and *L. cf. intermedia* (Udekem d'Acoz 2000; Almeida et al. 2007), commonly occupy crevices and refuges in these type of substrates.

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