

Occurrence of the family Pinnotheridae De Haan (Crustacea, Decapoda, Brachyura) on the coast of Ceará State, Brazil

Luis Ernesto A. Bezerra ¹; Alexandre O. de Almeida ^{1, 2} & Petrônio A. Coelho ^{1, 3}

¹ Programa de Pós-Graduação em Oceanografia, Departamento de Oceanografia, Universidade Federal de Pernambuco. Avenida da Arquitetura, Cidade Universitária, 50670-901 Recife, Pernambuco, Brasil. E-mail: luiseab@gmail.com

² Universidade Estadual de Santa Cruz, Departamento de Ciências Biológicas. Rodovia Ilhéus-Itabuna, km 16, 45662-000 Ilhéus, Bahia, Brasil. E-mail: aalmeida@uesc.br

³ Bolsista de produtividade do CNPq. E-mail: petronio.coelho@pesquisador.cnpq.br

ABSTRACT. This study reports the occurrence of *Austinixa bragantina* Coelho, 2005; *A. leptodactyla* (Coelho, 1997) and *Zaops ostreum* (Say, 1817) for the State of Ceará, Northeast Brazil. These records represent the first account of the family Pinnotheridae de Haan, 1883 for the coast of Ceará. *A. bragantina* was collected on May and June 1995 at Futuro Beach, municipality of Fortaleza (3°42'S, 38°27'W). This species was previously known only for the type locality, Canela Island, Bragança, Pará, Brazil. *A. leptodactyla* was collected on November 2004 at Baleia Beach, municipality of Itapipoca (3°08'S, 39°27'W) and *Z. ostreum* was obtained from the oyster *Crassostrea rhizophorae* Guilding, 1828, collected on November 2005 at the Jaguaribe River estuary, municipality of Fortim (4°24'S, 37°46'W). Biogeographic considerations regarding the three species and an updated list of all known Brazilian pinnotherid species along with their geographic distribution are also provided.

KEY WORDS. *Austinixa*; geographic range; new records; *Zaops*.

RESUMO. Ocorrência da família Pinnotheridae De Haan (Crustacea, Decapoda, Brachyura) no litoral do Ceará, Brasil. Este trabalho reporta a ocorrência de *Austinixa bragantina* Coelho, 2005; *A. leptodactyla* (Coelho, 1997) e *Zaops ostreum* (Say, 1817) para o litoral do Estado do Ceará, sendo estes os primeiros registros de representantes da família Pinnotheridae De Haan, 1883 para a costa cearense. *A. bragantina* foi coletada em maio e junho de 1995, na praia do Futuro, município de Fortaleza (3°42'S, 38°27'W). Esta espécie era conhecida, até o momento, apenas de sua localidade tipo, Ilha Canela, município de Bragança, Pará. *A. leptodactyla* foi coletada em novembro de 2004, na praia da Baleia, município de Itapipoca (3°08'S, 39°27'W) e *Z. ostreum* foi obtido a partir do exame de ostras da espécie *Crassostrea rhizophorae* Guilding, 1828, coletadas em novembro de 2005 no estuário do Rio Jaguaribe, município de Fortim (4°24'S, 37°46'W). São apresentadas considerações biogeográficas sobre as três espécies assim como uma lista atualizada de todos os pinnoterídeos do litoral brasileiro e sua distribuição geográfica.

PALAVRAS-CHAVE. *Austinixa*; distribuição geográfica; novas ocorrências; *Zaops*.

Pea crabs of the family Pinnotheridae are a group of small marine and estuarine crabs. Adults can be found free-living or in association with other invertebrates, such as bivalve mollusks, ascidians, worm tubes, callianassid burrows and on or in echinoderms (WILLIAMS 1984).

The pinnotherid group is still poorly known in Brazil. However, over the last years, some studies (listed below) have been published about the taxonomy and systematic aspects, as well as new records of this group for the Brazilian coast.

MARTINS & D'INCAO (1996) revised the pinnotherid from Santa Catarina and Rio Grande do Sul, Brazil, and found 12 species, where *Clypeasterophilus stebbingi* Rathbun, 1918, *Pinnotheres garthi* Fenucci, 1975 and *Pinnixa brevipollex* Rathbun, 1898, were recorded in Brazil for the first time.

COELHO (1996a) described *Alarconia guinotae* Coelho, 1996 from Pará to Paraná, Brazil, and recorded *Pinnixa floridana* Rathbun, 1918 for the first time in Brazilian coast (COELHO 1996b). Still COELHO (1997) revised the genus *Pinnixa* White, 1846 in Brazil, and described three new species, *Pinnixa gracilipes* Coelho, 1997, *P. latissima* Coelho, 1997 and *P. leptodactyla* Coelho, 1997. The author observed that the records of *P. cristata* Rathbun, 1900 in Brazil were, in fact, *P. aidae* Righi, 1967.

HEARD & MANNING (1997) created the genus *Austinixa* to support eight species previously assigned as *Pinnixa*, among them, *P. aidae*. CAMPOS (1999) included the austral species *Pinnotheres garthi* and *P. politus* (Smith, 1869) within the genus *Calyptraeotheres* Campos, 1990.

MELO & BOEHS (2004) rediscovered the so far unrecorded

Pinnaxodes tomentosus Ortmann, 1894, which was only known for the type locality which, according to ORTMANN (1894), is "Bresilien". This species was transferred to the genus *Holothuriophilus* Nauck, 1880.

COELHO (2005) described *Austinixa bragantina* from Pará, Brazil, and stated that *P. leptodactyla* should be referred as *A. leptodactyla* following the HEARD & MANNING (1997) proposal.

Finally, HARRISON & HANLEY (2005), based on discrete morphological and morphometric characters, and mitochondrial DNA sequence data, synonymized *A. aidae* (Righi, 1967) and *A. hardyi* Heard & Manning, 1997. So, *A. aidae* range was extended to Tobago, West Indies.

The most recent lists of the Brazilian pinnotherid species were provided by MELO (1996, 1998), where are cited 14 species for the coast of Brazil. The present contribution makes three new records of pea crabs from Ceará State, Brazil, with biogeographic considerations regarding the three species and also provides an updated list of all pinnotherid crabs known for the Brazilian coast.

MATERIAL AND METHODS

Austinixa bragantina was collected with corer on the intertidal zone of Futuro Beach, municipality of Fortaleza, on May and June 1995. *A. leptodactyla* was obtained by handling on the intertidal zone of Baleia Beach, municipality of Itapipoca, during the activities of the project "Zoneamento Ecológico e Econômico (ZEE) da Zona Costeira do Estado do Ceará", carried out by Instituto de Ciências do Mar (LABOMAR) of Universidade Federal do Ceará, and Superintendência Estadual do Meio Ambiente (SEMACE), on November 2004. *Zaops ostreum* was observed within the valves of the oyster *Crassostrea rhizophorae* Guilding, 1828 collected at Jaguaribe River estuary, municipality of Fortim, on November 2005.

The crabs were fixed in 70% ethanol and deposited in the carcinological collection of LABOMAR. Specimens were identified following MELO (1996) and COELHO (1997, 2005). Material of *A. bragantina* was compared with the holotype deposited in the carcinological collection of Departamento de Oceanografia da Universidade Federal de Pernambuco (DOCEAN#13411). Abbreviations: (CL) carapace length and (CW) carapace width.

A list of valid pinnotherid species reported for Brazilian waters, including geographic and bathymetric distribution, is provided in the Appendix.

RESULTS

Pinnothereliinae Alcock, 1900

Austinixa bragantina Coelho, 2005

Fig 1

Material examined. BRAZIL, Ceará: Fortaleza (Futuro Beach, 03°42'S, 28°27'W), 1 male (CL X CW = 1.9 X 3.4 mm), 7.V.1995, (LABOMAR#703), D.O. Monteiro, C.A. Rocha and W. Franklin

Júnior leg.; 1 male (CL X CW = 1.4 X 3.6 mm), 12.VI.1995 (LABOMAR#704), the same collectors.

Geographic distribution. Western Atlantic, Brazil: Pará (COELHO 2005) and Ceará (present article).

Habitat. Sandy beach. Type material was found in estuarine region, associated with the burrowing callianassid *Lepidophtalmus siriboia* Felder & Rodrigues, 1993 and *Callichirus major* (Say, 1818) (COELHO 2005).

Remarks. The specimens were found unidentified in the carcinological collection of LABOMAR. Details beyond locality and kind of substratum were not available to the authors. However, is known that on the collection site there were callianassid burrows.

Austinixa leptodactyla (Coelho, 1997)

Fig 2

Pinnixa leptodactyla Coelho, 1997: 178, fig 5.

Material examined. BRAZIL, Ceará: Itapipoca (Baleia Beach, 3°08'S, 39°27'W), 1 male (CL X CW = 2.3 X 6.6 mm), 15.XI.2004, (LABOMAR#705), H. Matthews-Cascon leg.

Geographic distribution. Western Atlantic, Brazil: Pará, Rio Grande do Norte, Pernambuco and Sergipe (COELHO 1997), Ceará (present article).

Habitat. Sandy beach. Previously recorded from muddy bottoms of estuarine regions associated with worm tubes and callianassid burrows. From intertidal zone up to 39 meters. Also collected in association with *A. aidae* and *Pinnixa sayana* Stimpson, 1860 (COELHO 1997).

Pinnotherinae De Haan, 1833

Zaops ostreum (Say, 1817)

Figs 3 and 4

Pinnotheres ostreum Say, 1817: 67, pl. 4, fig. 5.

Pinnotheres depressum Say, 1817: 68.

Zaops depressa Rathbun, 1900: 590.

Pinnotheres depressus Rathbun, 1918: 79, pl. 17, figs 1-2.

Zaops ostreum Manning, 1993: 528, figs 4-5.

Material examined. BRAZIL, Ceará: Fortim (Jaguaribe River estuary, 4°24'S, 37°46'W), 1 male (CL X CW = 3.9 X 3.1 mm) and 2 females (CL X CW = 6.7 X 7.5 mm; 6.5 X 7.6 mm), XI.2005, (LABOMAR#706), R. F. Vasconcelos leg.

Geographic distribution. Western Atlantic, from Massachusetts to southern Florida, Gulf of Mexico, Antilles and Brazil: Ceará (present article); Rio Grande do Norte (SANKARANKUTTY & FERREIRA 2001); Pernambuco (COELHO & RAMOS 1972); Bahia and Rio de Janeiro (MARTINS & D'INCAO 1996); São Paulo (DALL'OCCHO *et al.* 2004); and Santa Catarina (KLEIN *et al.* 2001).

Habitat. Commensal in oysters (*Crassostrea rhizophorae*) and bivalves of the genera *Anomia* Linnaeus, 1758, *Mytilus* Linnaeus, 1758 and *Pecten* Muller, 1776. Occasionally in polychaete tubes, mainly *Chaetopterus variopedatus* (Renier, 1804)

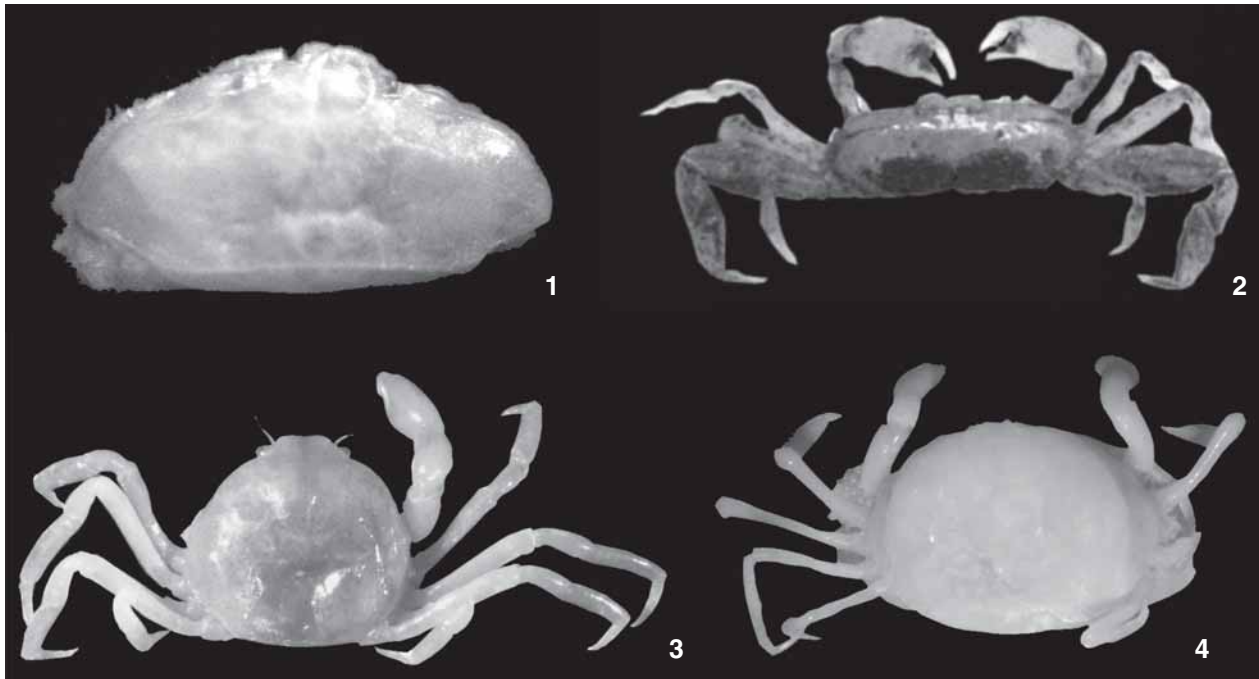


Figure 1-4. Pinnotherid crabs from Ceará, Brazil. (1) *Austinixa bragantina* male, CW = 3.6 mm, LABOMAR#704; (2) *Austinixa leptodactyla* male, CW = 6.6 mm, LABOMAR#705; (3) *Zaops ostreum*, male, CW = 3.1 mm, LABOMAR#706 (4) *Z. ostreum*, female, CW = 7.6 mm, LABOMAR#706.

(MELO 1996). On the Gulf of Mexico can be found associated with *Crassostrea virginica* (Gmelin, 1791), *C. rhizophorae*, *Anomia simplex* Orbigny, 1842, *Mytilus edulis* (Orbigny, 1846) and *Pecten* sp. (POWERS 1977).

Remarks. WILLIAMS (1965), COELHO & RAMOS (1972), POWERS (1977), WILLIAMS (1984), MARTINS & D'INCAO (1996), MELO (1996, 1998) and SPIVAK (1997) pointed out Santa Catarina State as the southern limit to *Z. ostreum*, but these authors did not analyzed material from this State. The only contribution knows to mention specimens collected from Santa Catarina is KLEIN *et al.* (2001), that have been obtained *Z. ostreum* from banks of *Euvola zizac* (Linnaeus, 1758).

DISCUSSION

The task of assigning a species to a zoogeographic province is not as readily done, particularly as species and localities that are not well studied continue to provide new information to distribution data bases (RAZ-GUZMAN *et al.* 2004). This seems to be the case of the pinnotherid from the northern South America.

The northern South America has been divided by several authors in zoogeographic provinces (*e.g.* DANA 1853, BALECH 1951, COELHO 1969, COELHO & RAMOS 1972, BRIGGS 1974, COELHO *et al.* 1978, BOSCHI 2000). In the present article, we adopted the classification proposal by COELHO & RAMOS (1972), which divided the region in two provinces: Guianas and Brazilian. The former extends from the Orinoco River delta, Venezuela, to

Maranhão State, Brazil, and is characterized, mainly, by muddy and sandy bottoms and by the influence of major equatorial rivers (*e.g.* Orinoco, Amazon and Tocantins Rivers). The latter extends from Maranhão to Rio de Janeiro State, Brazil, being characterized, in a major part, by calcareous algae bottom and the river discharge does not present an important influence for coastal habitats (COELHO 1969, COELHO & RAMOS 1972).

COELHO (2005) described *Austinixa bragantina* from Pará State, Brazil, and supposed that this species belongs to the Guianas zoogeographic province. However, the present record extends the geographic range to Ceará State (Fig. 5), which is included in the Brazilian zoogeographic province. *A. leptodactyla* has also been recorded to both Guianas and Brazilian provinces (Fig. 5).

COELHO & RAMOS (1972) and COELHO *et al.* (1978, 1980) studying the geographic distribution of stomatopod, isopod and decapod crustaceans in Brazil, Uruguay and Argentina, stated that some species are found, mainly, in the Northeast Brazil with some of them extending to the north, as far as Guianas, and to the south, rarely reaching Uruguay or Argentina, being considered species of the Brazilian zoogeographic province.

Our results show that *A. bragantina* and *A. leptodactyla* are found in Guianas and Brazilian zoogeographic provinces, as other pinnotherid species. *Alarconia guinotae* and *Pinnixa gracilipes* for example, are represented in Guianas and Brazilian provinces, with the southern limit reaching the Paulista province (COELHO 1996a, 1997).

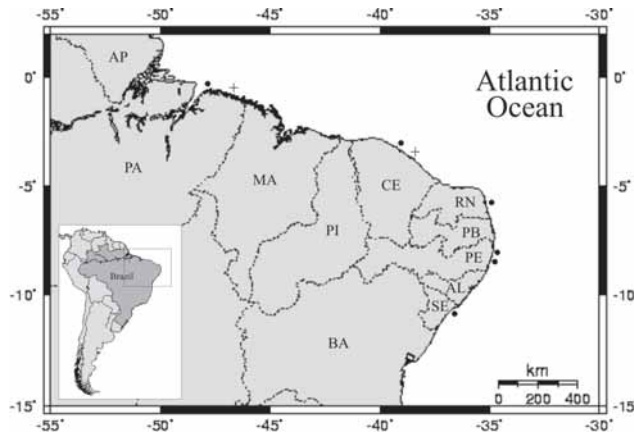


Figure 5. Geographic range of *Austinixa bragantina* (+) and *A. leptodactyla* (●).

Thus, we suggest that *A. bragantina* and *A. leptodactyla* are species from the Brazilian province with the northern limit in the Guianas province. Further collections will certainly amplify the distribution of these species in Western Atlantic.

Geographic distribution of *Zaops ostreum* seems to be disrupted with a northern group occurring from Massachusetts to Antilles, including the Gulf of Mexico, and the southern group now occurring from Ceará to Santa Catarina (Fig. 6).

Although some decapod species are common to the Caribbean and Brazilian provinces and absent to the Guianas province due the muddy bottoms and low sea water salinity, we believe that *Z. ostreum* has a continuous distribution along Western Atlantic temperate and tropical provinces. Other pinnotherid that present similar range from Massachusetts to southern Brazil or Argentina are *Pinnixa chaetoptera* Stimpson, 1860, *P. sayana* and *Tumidotheres maculatus* (Say, 1818).

The huge gap in the *Z. ostreum* distribution in the northern of South America is probably due the lack of collections in this region. It is important to keep in mind that the geographic range of this species could be influenced by the environmental factors and also by the host distribution.

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Figure 6. Geographic range of *Zaops ostreum*.

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Appendix. List and distribution of valid Brazilian Pinnotheroidea species

Pinnotheroidea De Haan, 1883

Pinnotheridae De Haan, 1883

Pinnothereliinae Alcock, 1900

- Alarconia guinotae* Coelho, 1996: Western Atlantic, Brazil: Pará, Alagoas, São Paulo and Paraná; intertidal to 25 m.
- Austinixa aidaae* (Righi, 1967): Western Atlantic, Tobago, Brazil: from Amapá to Rio Grande do Sul; intertidal to 32 m.
Species referred as *Pinnixa aidaae* Righi, 1967 in MELO (1996, 1998).
- Austinixa bragantina* Coelho, 2005: Western Atlantic, Brazil: Pará and Ceará; intertidal.
- Austinixa leptodactyla* (Coelho, 1997): Western Atlantic, Brazil: Pará, Ceará, Rio Grande do Norte, Pernambuco and Sergipe; intertidal to 39 m.
- Austinixa patagoniensis* (Rathbun, 1918): Western Atlantic, Brazil: from Rio de Janeiro to Rio Grande do Sul and Argentina: Rio Negro; intertidal. Species referred as *Pinnixa patagoniensis* Rathbun, 1918 in MELO (1996, 1998, 1999).
- Holothuriophilus tomentosus* (Ortmann, 1894): Western Atlantic, Brazil: Santa Catarina. No information on bathymetric distribution available. Species referred as *Pinnaxodes tomentosus* Ortmann, 1894, in MELO (1996, 1998).
- Pinnixa brevipollex* Rathbun, 1898: Western Atlantic, Brazil: from Rio de Janeiro to Rio Grande do Sul and Argentina: Rio Negro; intertidal to 130 m. Previously recorded to Brazil as *Pinnixa rapax* Bouvier, 1917 (RIGHI 1967, COELHO & RAMOS, 1972, MELO 1996, 1998, 1999).
- Pinnixa chaetoptera* Stimpson, 1860: Western Atlantic, from Massachusetts to North Carolina, Florida, Gulf of Mexico and Brazil: from Pernambuco to Rio Grande do Sul; intertidal to 60 m.
- Pinnixa floridana* Rathbun, 1918: Western Atlantic, North Carolina, Florida and Brazil: Maranhão and Pernambuco; intertidal to 21 m.
- Pinnixa gracilipes* Coelho, 1997: Western Atlantic, Brazil: Pará, Pernambuco and São Paulo; intertidal to 25 m.
- Pinnixa latissima* Coelho, 1997: Western Atlantic, Brazil: Pernambuco and Bahia; no information on bathymetric distribution available.
- Pinnixa sayana* Stimpson, 1860: Western Atlantic, from Massachusetts to Brazil: from Amapá to Rio Grande do Sul; intertidal to 80 m.

Pinnotherinae De Haan, 1833

- Calyptraeotheres garthi* (Fenucci, 1975): Western Atlantic, Brazil: Rio Grande do Sul and Argentina: Gulf of San Matias; 24 m.
- Clypeasterophilus stebbingi* (Rathbun, 1918): Western Atlantic, Florida and Brazil: São Paulo and Santa Catarina; no information on bathymetric distribution available.
- Dissodactylus crinitichelis* Moreira, 1901: Western Atlantic, from North Carolina to Brazil: from Pará to Rio Grande do Sul and Argentina: Río de la Plata; intertidal to 52 m.
- Fabia insularis* Melo, 1971: Western Atlantic, Brazil: from Rio de Janeiro to Rio Grande do Sul and Argentina: Mar del Plata; shallow waters to 30 m. Species revalidated by MARTINS & D'INCAO (1996).
- Fabia sebastianensis* Rodrigues da Costa, 1970: Western Atlantic, Brazil: from Rio de Janeiro to Rio Grande do Sul and Argentina: Mar del Plata; no information on bathymetric distribution available.
- Parapinnixa bouvieri* Rathbun, 1918: Western Atlantic, from North Carolina to Brazil: Amapá; 5 to 75 m.
- Parapinnixa hendersoni* Rathbun, 1918: Western Atlantic, from Florida to Brazil: from Maranhão to Paraná; 40 to 60 m.
- Pinnotheres emiliai* Melo, 1971: Western Atlantic, Brazil: from Rio de Janeiro to Rio Grande do Sul and Argentina: Mar del Plata; 5 to 25 m. Species referred as *Fabia emiliai* (Melo, 1971) in MELO (1996, 1998) and revalidated by MARTINS & D'INCAO (1996).
- Tumidotheres maculatus* (Say, 1818): Western Atlantic, from Massachusetts to Brazil: from Alagoas to Santa Catarina and Uruguay to Argentina; intertidal to 50 m.
- Zaops ostreum* (Say, 1817): Western Atlantic, from Massachusetts to southern Florida, Gulf of Mexico, Antilles and Brazil: from Ceará to Santa Catarina; intertidal.