

Diversity and distribution of the marine and estuarine shrimps (Dendrobranchiata, Stenopodidea and Caridea) from North and Northeast Brazil

PETRÔNIO ALVES COELHO¹; ALEXANDRE OLIVEIRA DE ALMEIDA^{2,3}; JESSER FIDELIS DE SOUZA-FILHO²; LUIS ERNESTO ARRUDA BEZERRA² & BRUNO WELTER GIRALDES²

¹*Departamento de Oceanografia e Programa de Pós-Graduação em Oceanografia. Universidade Federal de Pernambuco (Avenida da Arquitetura, S/N, 50740-550, Recife, Pernambuco, Brasil); E-Mail: petronio.coelho@pesquisador.cnpq.br*

²*Programa de Pós-Graduação em Oceanografia. Universidade Federal de Pernambuco.*

³*Departamento de Ciências Biológicas. Universidade Estadual de Santa Cruz (Rod. Ilhéus-Itabuna, km 16, 45662-000, Ilhéus, Bahia, Brasil)*

Abstract

The present study aimed to evaluate the current state of knowledge of marine and estuarine shrimp species from the suborder Dendrobranchiata and the infraorders Stenopodidea and Caridea, considering their diversity and distribution along the North and Northeast Brazilian coast (N/NE). The number of reported species rose from 124 to 169 since the Paulo S. Young's Catalogue of Crustacea of Brazil, put out in 1998, which means an increase of 36.3%. Pernambuco (89 species) and Bahia (68 species) are the states that present the highest shrimp diversity, accounting for 53% and 40.5% of the total species registered for the N/NE regions, respectively. On the other hand, the states of Sergipe (21 species) and Piauí (13 species) contributed with only 12.5% and 7.7% of the total species registered at the moment.

Key words: shrimp diversity, shrimp distribution, geographic distribution, North and Northeast Brazil, Crustacea, Decapoda

Resumo

O objetivo deste trabalho foi avaliar o estado atual do conhecimento a respeito da diversidade e distribuição de espécies de camarões marinhos e estuarinos pertencentes à subordem Dendrobranchiata e às infraordens Stenopodidea e Caridea, no Norte e Nordeste brasileiro (N/NE). O número de espécies aumentou de 124 para 169 desde a publicação do Catálogo de Crustáceos do Brasil (1998), representando um aumento de 36,3%. Os Estados que apresentam maior diversidade

de camarões são Pernambuco, com 89 espécies, e Bahia, com 68 espécies, que contam com respectivamente 53% e 40,5% do total de espécies registradas para as regiões N/NE. Em situação oposta encontram-se Sergipe, com um total de 21 e Piauí com 13 espécies, representando, respectivamente, cerca de 12,5% e 7,7% do total de espécies registradas no momento.

Palavras-chave: diversidade de camarões, distribuição de camarões, distribuição geográfica, Norte e Nordeste do Brasil, Crustacea, Decapoda

Introduction

Shrimps are included in two suborders of decapod crustaceans: Dendrobranchiata and Pleocyemata; the latter one is divided into two infraorders: Caridea and Stenopodidea (Martin and Davis, 2001).

The infraorder Caridea comprises the highest species diversity, followed by Dendrobranchiata and Stenopodidea. In Brazil, the infraorder Caridea has a large number of freshwater representatives, while Dendrobranchiata has only one freshwater species — the sergestoid *Acetes paraguayensis* Hansen — and the Stenopodidea is an exclusive marine group.

The more extensive works on the diversity and distribution of shrimps in the North and Northeast (N/NE) coast of Brazil were carried out by Coelho and Ramos (1972), where are cited 122 species, from which 28 are Dendrobranchiata, 3 Stenopodidea and 91 Caridea; and the Paulo S. Young's Catalogue of Crustacea of Brazil (1998), where are cited a total of 124 species, being 29 Dendrobranchiata (D'Incao, 1998), 3 Stenopodidea (Coelho and Ramos-Porto, 1998) and 92 carideans (Christoffersen, 1998; Ramos-Porto and Coelho, 1998).

The N/NE regions of Brazil were visited by oceanographic expeditions of great historical importance, such as the "Challenger" (1873–1876) and Branner-Agassiz, in the late 19th century. A significant part of the current knowledge about decapod distribution in the N/NE Brazil is the result of the twenty-two oceanographic expeditions carried out from the 1960's to the 1980's (Coelho *et al.*, 2004). More recently, in the 1990's, a large amount of crustaceans were collected during the activities of the Project "Recursos Vivos da Zona Econômica Exclusiva Brasileira" (REVIZEE) (Ramos-Porto *et al.*, 2000; Cabral *et al.*, 2000; Coelho-Filho, 2002; Silva *et al.*, 2002a, 2002b; Cardoso and Serejo, 2003; Ramos-Porto *et al.*, 2003; Komai, 2004; Cardoso and Young, 2005).

With the publication of data from the REVIZEE project and the registration of a number of new species, subspecies, and superfamilies in the last years, we consider this an opportune moment for the elaboration of an updated list of species, incorporating most recent information and attempting a comparison between these data and those in the Young's Catalogue (1998). Four new species records for the region are also presented, based on deposited material in the crustacean collection of the Departamento de

Oceanografia da Universidade Federal de Pernambuco (DOCEAN), Recife, Brazil, as well as an updated list of species distribution by state.

The present study aimed to evaluate the current state of knowledge of the diversity and distribution of marine and estuarine shrimp species from the three groups mentioned above in the Brazilian N/NE coast. This region is included in two zoogeographic Provinces: Guyanas province, which comprehends the states of Amapá, Pará and part of Maranhão in Brazil, and the Brazilian from Maranhão to Rio de Janeiro state (Coelho *et al.*, 1980).

Material and methods

The knowledge concerning shrimp species distribution in the N/NE Brazil comes from the specific literature (e. g. Smith, 1869; Bate, 1888; Pocock, 1890; Rathbun, 1900; Coelho and Ramos, 1972; D'Incao, 1995a; Christoffersen, 1998; Coelho and Ramos-Porto, 1998; D'Incao, 1998; Ramos-Porto and Coelho, 1998) and from deposited specimens in the crustacean collection at the DOCEAN. A data bank stores the whole acquired information including all the consulted references from the last decades to the present moment. A table was elaborated in order to include the studies that mentioned the species occurrence for the first time, as well as the species distribution by state.

The classification adopted in this communication follows the one proposed by Martin and Davis (2001). However, this classification differs, in some aspects, from the one in Catalogue of Crustacea of Brazil (Young, 1998). To make it viable to compare the numerical data from 1998 and the current, we adapted the classification of the catalogue to the proposal in Martin and Davis (2001).

The study area extends from the north of Amapá state (04°17'N; 51°32'W) to the south of Bahia state (18°19'S; 39°40'W) and towards the east to the São Pedro and São Paulo Archipelago (0°55'N; 29°20'W), which, along with the Rocas Atoll (3°45'S and 3°56'S; 33°37'W and 33°56'W), Seamounts of the North Chains (01°00'S and 04°00'S; 37°00'W and 39°00'W) and the Fernando de Noronha Archipelago (03°00'S and 4°30'S; 32°00'W and 37°00'W), were considered within a single category denominated oceanic islands and banks (Figure 1).

The abbreviations used were: States of North Region: Amapá (AP) and Pará (PA). States of Northeast Region: Maranhão (MA), Piauí (PI), Ceará (CE), Rio Grande do Norte (RN), Paraíba (PB), Pernambuco (PE), Alagoas (AL), Sergipe (SE), Bahia (BA) and oceanic islands and banks (IB).

Results

The list of registered species in the N/NE Brazil, including the species distribution by state, is shown in tables 1, 2 and 3.



FIGURE 1. Map of the study area. Abbreviations: Amapá (AP), Pará (PA), Maranhão (MA), Piauí (PI), Ceará (CE), Rio Grande do Norte (RN), Paraíba (PB), Pernambuco (PE), Alagoas (AL), Sergipe (SE), Bahia (BA).

The suborder Dendrobranchiata is represented by 2 superfamilies (Penaeoidea and Sergestoidea), 7 families and 49 species (Table 1). Penaeidae is the family with the highest number of species (17), followed by Sergestidae (14), Sicyoniidae (7), Solenoceridae (4), Benthescymidae (3), Aristeidae (2) and Luciferidae (2).

The infraorder Stenopodidea comprises only two families: Stenopodidae with 2 species and Spongicolidae, represented by 1 species (Table 2).

The infraorder Caridea comprises 11 superfamilies (Pasiphaeoidea, Oplophoroidea, Bresilioidea, Nematocarcinoidea, Psalidopodoidea, Palaemonoidea, Alpheoidea, Processoidea, Pandaloidea and Crangonoidea), 17 families and 117 species (Table 3).

Two superfamilies are remarkable for their high number of species. The superfamily Alpheoidea includes the families Alpheidae (38 species), Hippolytidae (14 species), Ogyrididae (2 species) and Barbouriidae (1 species). Among the Caridea, the superfamily Alpheoidea dominates in number of species (55), representing 32.5% of the total species of shrimps and 47% of the total caridean species. The superfamily Palaemonoidea, which includes the families Palaemonidae (21 species), Gnathophyllidae (1 species) and Anchistoididae (1 species), is the second most diversified group, with a total of 23 species.

TABLE 1. List of shrimp species (suborder Dendrobranchiata) and distribution for states from North and Northeast — Brazil. Abbreviations: Amapá (AP), Pará (PA), Maranhão (MA), Piauí (PI), Ceará (CE), Rio Grande do Norte (RN), Paraíba (PB), Pernambuco (PE), Alagoas (AL), Sergipe (SE), Bahia (BA), oceanic islands and banks (IB). (≡) = locality of the first record; (?) = further records.

Taxa	First Record	A	P	M	P	C	R	P	P	A	S	B	I
		P	A	A	I	E	N	B	E	L	E	A	B
Superfamily Penaeoidea													
Rafinesque													
Family Aristeidae Wood-Mason													
<i>Aristeus antillensis</i> A. Milne Edwards & Bouvier	Ramos-Porto <i>et al.</i> (2000)	-	£	£	-	-	-	-	-	-	-	-	-
<i>Aristaeopsis edwardsiana</i> (Johnson)	Ramos-Porto <i>et al.</i> (2000)	-	£	-	-	-	-	-	-	-	-	-	-
Family Benthescymidae Wood-Mason													
<i>Bentheogennema intermedia</i> (Bate)	Bate (1888)	-	-	-	-	-	-	-	£	-	-	-	-
<i>Benthescymus bartletti</i> Smith	Santos <i>et al.</i> (2002)	-	-	-	-	-	-	-	-	£	-	-	-
<i>Gennadas bouvieri</i> Kemp	Bate (1888)	-	-	-	-	-	-	-	£	-	-	-	-
Family Penaeidae Rafinesque													
<i>Artemesia longinaris</i> Bate	Bate (1888)	-	-	-	-	-	-	-	-	-	-	-	£
<i>Farfantepenaeus brasiliensis</i> (Latreille)	Moreira (1901)	?	-	?	-	?	?	?	£	?	?	?	-
<i>Farfantepenaeus notialis</i> (Pérez-Farfante)	Pérez-Farfante (1967)	?	?	£	-	-	-	-	-	-	-	-	-
<i>Farfantepenaeus paulensis</i> (Pérez-Farfante)	D’Incao (1995a), as <i>Penaeus paulensis</i>	-	-	-	-	-	-	-	-	-	-	-	£
<i>Farfantepenaeus subtilis</i> (Pérez-Farfante)	Fausto Filho (1966), as <i>Penaeus aztecus</i>	?	?	?	-	£	£	?	?	?	?	?	-
<i>Funchalia villosa</i> (Bouvier)	D’Incao (1999)	-	-	-	-	-	-	-	-	-	-	-	£
<i>Litopenaeus schmitti</i> (Burkenroad)	Rathbun (1900), as <i>Penaeus setiferus</i>	-	?	?	-	?	?	?	?	£	?	?	-
<i>Litopenaeus vannamei</i> (Boone)	Santos & Coelho (2002)	-	-	-	-	-	£	-	?	-	-	-	-
<i>Metapenaeopsis goodei</i> (Smith)	Rathbun (1900), as <i>Parapenaeus goodei</i>	?	?	?	?	?	?	?	?	£	-	?	-
<i>Metapenaeopsis hobbsi</i> Pérez-Farfante	Pérez-Farfante (1971)	-	-	-	-	-	?	-	£	-	-	-	-
<i>Metapenaeopsis martinella</i> Pérez-Farfante	Pérez-Farfante (1971)	?	?	£	?	£	£	£	£	?	-	-	-

to be continued.

TABLE 1 (continued).

Taxa	First Record	A	P	M	P	C	R	P	P	A	S	B	I	
		P	A	A	I	E	N	B	E	L	E	A	B	
<i>Parapenaeus politus</i> (Smith)	Ramos-Porto <i>et al.</i> (1987/89)	-	£	-	-	-	-	-	-	-	-	-	-	
<i>Penaeopsis serrata</i> Bate	Silva <i>et al.</i> (1998)	£	-	-	-	-	-	-	-	-	-	-	-	
<i>Penaeus monodon</i> Fabricius	Fausto Filho (1987)	-	-	£	-	-	-	-	?	?	?	-	-	
<i>Rimapenaeus constrictus</i> (Stimpson)	Pérez-Farfante (1971), as <i>Trachypenaeus constrictus</i>	?	?	?	-	?	-	?	?	?	?	£	-	
<i>Rimapenaeus similis</i> (Smith)	Coelho & Ramos (1972), as <i>T. similis</i>	£	£	-	-	-	-	-	-	-	-	?	-	
<i>Xiphopenaeus kroyeri</i> (Heller)	Smith (1869), as <i>X. Hartii</i>	?	?	?	-	?	?	?	?	?	?	£	-	
Family Sicyoniidae Ortmann														
<i>Sicyonia burkenroadi</i> Cobb	Coelho & Ramos (1972)	£	-	-	-	-	-	-	-	?	?	?	-	
<i>Sicyonia dorsalis</i> Kingsley	Fausto Filho (1966)	?	?	?	-	£	?	?	?	?	-	?	-	
<i>Sicyonia laevigata</i> Stimpson	Fausto Filho (1966)	?	?	?	?	£	£	?	?	?	-	?	-	
<i>Sicyonia olgae</i> Pérez-Farfante	D'Incao (1995b)	£	-	-	-	£	-	-	-	-	-	-	-	
<i>Sicyonia parri</i> (Burkenroad)	Coelho & Ramos (1972)	-	-	£	£	£	£	£	£	£	-	?	-	
<i>Sicyonia stimpsoni</i> Bouvier	Cutrim <i>et al.</i> (2001)	-	£	-	-	-	-	-	-	-	-	-	-	
<i>Sicyonia typica</i> (Boeck)	Fausto Filho (1966)	-	?	?	-	?	£	?	?	?	?	?	-	
Family Solenoceridae Wood-Mason														
<i>Hadropenaeus modestus</i> (Smith)	Bate (1888)	-	-	-	-	-	-	-	-	£	-	-	-	
<i>Mesopenaeus tropicalis</i> (Bouvier)	Pérez-Farfante (1977)	£	?	£	-	-	-	-	-	-	-	-	-	
<i>Solenocera atlantidis</i> Burkenroad	Fausto Filho (1968)	£	?	?	-	£	?	-	-	-	-	-	-	
<i>Solenocera geijskesi</i> Holthuis	Coelho & Ramos (1972)	£	£	£	-	?	-	-	-	-	-	-	-	
Superfamily Sergestoidea Dana														
Family Luciferidae De Haan														
<i>Lucifer faxoni</i> Borradaile	Bate (1888), as <i>L. typus</i>	?	?	?	?	?	?	?	?	£	?	?	?	£
<i>Lucifer typus</i> H. Milne Edwards	Bate (1888), as <i>L. reynaudii</i>	?	?	?	?	?	?	?	?	£	-	-	-	£

to be continued.

TABLE 1 (continued).

Taxa	First Record	A	P	M	P	C	R	P	P	A	S	B	I
		P	A	A	I	E	N	B	E	L	E	A	B
Family Sergestidae Dana													
<i>Acetes americanus americanus</i> Ortmann	Coelho & Ramos (1972)	-	£	£	-	?	-	?	?	£	-	?	-
<i>Acetes marinus</i> Omori	Omori (1975)	?	£	-	-	-	-	-	-	-	-	-	-
<i>Sergestes armatus</i> Krøyer	D'Incao (1995a)	-	-	-	-	-	-	-	-	-	-	-	£
<i>Sergestes arcticus</i> Krøyer	D'Incao (1995a)	-	-	-	-	-	-	-	£	£	£	-	£
<i>Sergestes edwardsii</i> Krøyer	Bate (1888), as <i>S. oculatus</i>	-	?	-	-	-	?	-	£	-	-	-	?
<i>Sergestes henseni</i> (Ortmann)	D'Incao (1995a)	-	-	-	-	-	-	-	-	-	-	-	£
<i>Sergia creber</i> (Burkenroad)	D'Incao (1995a)	-	-	-	-	-	-	-	-	-	-	-	£
<i>Sergia extenuatus</i> (Burkenroad)	D'Incao (1995a)	-	-	-	-	-	-	-	-	-	-	-	£
<i>Sergia grandis</i> (Sund)	D'Incao (1995a)	-	-	-	-	-	-	-	-	-	-	-	£
<i>Sergia potens</i> (Burkenroad)	D'Incao (1995a)	-	-	-	-	-	-	-	-	-	-	-	£
<i>Sergia prehensilis</i> (Bate)	Cardoso & Serejo (2003)	-	-	-	-	-	-	-	-	-	-	£	-
<i>Sergia regalis</i> (Gordon)	Cardoso & Serejo (2003)	-	-	-	-	-	-	-	-	-	-	£	-
<i>Sergia robustus</i> (Smith)	D'Incao (1995a)	-	-	-	-	-	-	-	-	-	-	-	£
<i>Sergia splendens</i> (Sund)	D'Incao (1995a)	-	-	-	-	-	-	-	-	-	-	-	£

TABLE 2. List of shrimp species (suborder Pleocyemata, infraorder Stenopodidea) and distribution for states from North and Northeast Brazil. Abbreviations: Amapá (AP), Pará (PA), Maranhão (MA), Piauí (PI), Ceará (CE), Rio Grande do Norte (RN), Paraíba (PB), Pernambuco (PE), Alagoas (AL), Sergipe (SE), Bahia (BA), oceanic islands and banks (IB). (≡) = locality of the first record; (?) = further records.

Taxa	First Record	A	P	M	P	C	R	P	P	A	S	B	I
		P	A	A	I	E	N	B	E	L	E	A	B
Family Spongicolidae Schram													
<i>Microprosthema semilaeve</i> (von Martens)	Pocock (1890), as <i>Stenopusculus spinosus</i>	-	-	-	-	-	-	-	?	-	-	?	£
Family Stenopodidae Claus													
<i>Stenopus hispidus</i> (Olivier)	Coelho (1966)	-	-	-	-	?	?	-	£	?	-	?	£
<i>Stenopus scutellatus</i> Rankin	Coelho (1966)	?	-	-	-	-	?	-	-	-	-	-	£

TABLE 3. List of shrimp species (suborder Pleocyemata, infraorder Caridea) and distribution for states from North and Northeast Brazil. Abbreviations: Amapá (AP), Pará (PA), Maranhão (MA), Piauí (PI), Ceará (CE), Rio Grande do Norte (RN), Paraíba (PB), Pernambuco (PE), Alagoas (AL), Sergipe (SE), Bahia (BA), oceanic islands and banks (IB). (≡) = locality of the first record; (?) = further records.

Taxa	First Record	A	P	M	P	C	R	P	P	A	S	B	I
		P	A	A	I	E	N	B	E	L	E	A	B
Superfamily Pasiphaeoidea													
Dana													
Family Pasiphaeidae Dana													
<i>Leptochela (Leptochela) bermudensis</i> Gurney	Coelho & Ramos-Porto (1980)	-	?	£	?	-	-	-	-	-	-	-	-
<i>Leptochela (Leptochela) serratorbita</i> Bate	Coelho & Ramos (1972)	£	£	£	£	£	?	?	£	-	-	-	-
<i>Leptochela (Proboloura) carinata</i> Ortmann	Ortmann (1893)	?	£	?	-	?	?	?	?	?	-	-	-
Superfamily Oplophoroidea													
Dana													
Family Oplophoridae Dana													
<i>Acanthephyra acutifrons</i> Bate	Cardoso & Young (2005)	-	-	-	-	-	-	-	-	-	-	£	-
<i>Acanthephyra eximia</i> Smith	Bate (1888), as <i>A. edwardsii</i>	?	?	-	-	-	-	?	-	£	?	?	-
<i>Ephyrina benedicti</i> Smith	Cardoso & Young (2005)	-	-	-	-	-	-	-	-	-	-	£	-
<i>Janicella spinicauda</i> (A. Milne Edwards)	Cardoso & Young (2005)	-	-	-	-	-	-	-	-	-	-	£	-
<i>Meningodora mollis</i> Smith	Bate (1888), as <i>Hymenodora mollis</i>	-	-	-	-	-	-	-	£	-	-	-	-
<i>Notostomus gibbosus</i> A. Milne Edwards	Bate (1888), as <i>N. brevirostris</i>	-	-	-	-	-	-	-	£	-	-	-	-
<i>Oplophorus gracilirostris</i> A. Milne Edwards	Ramos-Porto <i>et al</i> (2000)	£	?	-	-	-	-	-	-	-	-	£	-
<i>Oplophorus spinosus</i> (Brullé)	Cardoso & Young (2005)	-	-	-	-	-	-	-	-	-	-	£	-
Superfamily Bresilioidea													
Calman													
Family Disciadidae Rathbun													
<i>Discias atlanticus</i> Gurney	Ramos-Porto <i>et al.</i> (1996)	-	-	£	-	£	-	-	?	-	-	-	?
<i>Discias serratirostris</i> Lebour	Cardoso & Young (2004)	-	-	-	-	-	-	-	-	-	-	-	£

to be continued.

TABLE 3 (continued).

Taxa	First Record	A	P	M	P	C	R	P	P	A	S	B	I
		P	A	A	I	E	N	B	E	L	E	A	B
Superfamily													
Nematocarcinoidea Smith													
Family Nematocarcinidae													
Smith													
<i>Amphiplectus depressus</i>	Bate (1888)	-	-	-	-	-	-	-	-	£	-	-	-
Bate													
Family Rhynchocinetidae													
Ortmann													
<i>Rhynchocinetes rigens</i>	Gomes-Corrêa (1971)	-	-	-	-	-	-	-	-	£	-	-	?
Gordon													
Superfamily													
Psalidopodoidea Wood-													
Mason & Alcock													
Family Psalidopodidae													
Wood-Mason & Alcock													
<i>Psalidopus barbouri</i>	Ramos-Porto <i>et al.</i>	?	£	-	-	-	-	-	-	-	-	-	-
(2000)													
Superfamily													
Campylonotoidea Sollaud													
Family Campylonotidae													
Sollaud													
<i>Campylonotus capensis</i>	Bate (1888)	-	-	-	-	-	-	-	-	£	-	-	-
Bate													
Superfamily Palaemonoidea													
Rafinesque													
Family Anchistioididae													
Borradaile													
<i>Anchistioides antiguensis</i>	Coelho & Ramos (1972)	-	-	£	-	?	-	-	£	£	-	-	?
(Schmitt)													
Family Gnathophyllidae													
Dana													
<i>Gnathophyllum americanum</i>	Coelho & Ramos (1972),	-	-	-	-	-	?	-	-	-	-	£	-
Guérin-Meneville as <i>Gnathophyllum</i> sp													
Family Palaemonidae													
Rafinesque													
Subfamily Palaemoninae													
Rafinesque													

to be continued.

TABLE 3 (continued).

Taxa	First Record	A	P	M	P	C	R	P	P	A	S	B	I
		P	A	A	I	E	N	B	E	L	E	A	B
<i>Brachycarpus biunguiculatus</i> (Lucas)	Coelho (1967/69)	?	?	?	-	?	?	-	?	?	-	£	?
<i>Brachycarpus holthuisi</i> Fausto Filho	Fausto Filho (1966)	-	-	-	-	£	-	-	-	-	-	-	-
<i>Leander paulensis</i> Ortmann	Fausto Filho (1968)	-	-	?	-	£	-	?	?	-	-	?	?
<i>Leander tenuicornis</i> (Say)	Fausto Filho (1970)	-	-	?	?	£	?	?	?	?	-	?	?
<i>Nematopalaemon schmitti</i> (Holthuis)	Bullis Jr. & Thompson (1965), as <i>Palaemon (Nematopalaemon) schmitti</i>	£	?	?	-	-	?	?	?	?	?	-	-
<i>Palaemon northropi</i> (Hankin)	Rathbun (1900), as <i>P. brachylabis</i>	-	-	-	-	?	?	£	?	?	?	?	-
<i>Palaemon paivai</i> Fausto-Filho	Fausto Filho (1967b)	-	-	-	-	£	-	-	-	-	-	-	-
<i>Palaemon pandaliformis</i> (Stimpson)	Coelho (1963/64)	-	-	-	-	-	?	?	£	?	?	-	-
Subfamily Pontoniinae													
Kingsley													
<i>Lipkebe holthuisi</i> Chace	Coelho & Ramos (1972)	-	£	-	-	-	?	-	-	-	-	-	-
<i>Periclimenaeus ascidiarum</i> Holthuis	Coelho & Ramos (1972)	-	-	£	-	£	-	-	£	-	-	-	-
<i>Periclimenaeus bermudensis</i> (Armstrong)	Coelho & Ramos (1972)	-	-	£	-	£	?	-	?	£	-	-	-
<i>Periclimenaeus pearsei</i> (Schmitt)	Ramos-Porto & Coelho (1990)	-	-	£	-	-	-	-	-	-	-	-	-
<i>Periclimenaeus perlatus</i> (Boone)	Ramos-Porto & Coelho (1998)	-	-	-	-	-	-	£	£	-	-	-	-
<i>Periclimenes americanus</i> (Kingsley)	Coelho (1967/69)	?	?	?	?	£	?	?	?	?	-	-	?
<i>Periclimenes longicaudatus</i> (Stimpson)	Rathbun (1900), as <i>Urocaris longicaudata</i>	?	?	?	?	?	-	£	?	-	-	?	?
<i>Periclimenes yucatanicus</i> Ives	Ramos-Porto & Coelho (1990)	-	-	-	-	-	-	-	-	-	-	-	£
<i>Pontonia margarita</i> Smith	Coelho & Ramos (1972), as <i>Pontonia</i> sp	-	-	£	-	-	-	-	-	-	-	-	-
<i>Typton carneus</i> Holthuis	Ramos-Porto & Coelho (1998)	-	-	-	-	-	-	£	-	-	-	-	-

to be continued.

TABLE 3 (continued).

Taxa	First Record	A	P	M	P	C	R	P	P	A	S	B	I
		P	A	A	I	E	N	B	E	L	E	A	B
<i>Typton distinctus</i> Chace	Coelho & Ramos (1972), as <i>Typton</i> sp	-	-	-	-	-	-	-	£	-	-	-	-
<i>Typton prionurus</i> Holthuis	Bullis Jr. & Thompson (1965)	-	£	-	-	-	-	-	-	-	-	-	-
<i>Typton tortugae</i> McClendon	Ramos-Porto & Coelho (1990)	-	£	£	-	-	-	-	?	-	-	-	-
Superfamily Alpheoidea													
Rafinesque													
Family Alpheidae													
Rafinesque													
<i>Alpheus amblyonyx</i> Chace	Christoffersen (1979)	-	-	-	-	?	-	£	-	-	-	£	£
<i>Alpheus armatus</i> Rathbun	Coelho <i>et al.</i> (1990)	-	-	-	-	-	-	-	-	?	-	-	-
<i>Alpheus armillatus</i> Milne Edwards	Smith (1869)	-	-	-	-	?	?	?	?	£	-	?	?
<i>Alpheus belli</i> Coutière	Chace (1972)	-	-	-	-	-	-	-	-	-	-	-	£
<i>Alpheus bouvieri</i> A. Milne Edwards	Pocock (1890), as <i>A.</i> <i>edwardsii</i>	-	-	-	-	?	?	?	?	?	-	?	£
<i>Alpheus chacei</i> Carvacho	Christoffersen (1979), as <i>A. maxilliplanus</i>	-	-	-	-	-	-	£	?	-	£	-	-
<i>Alpheus cristulifrons</i> Rathbun	Pocock (1890), as <i>A.</i> <i>obesomanus</i>	-	-	-	-	-	?	?	?	?	-	-	£
<i>Alpheus cylindricus</i> Kingsley	Coelho & Ramos (1972)	-	-	£	-	-	-	?	?	?	-	?	-
<i>Alpheus estuariensis</i> Christoffersen	Rathbun (1900), as <i>A.</i> <i>heterochaelis</i>	-	-	?	-	?	?	£	?	?	?	?	-
<i>Alpheus floridanus</i> Kingsley	Crosnier & Forest (1966)	-	-	-	-	-	-	-	£	?	-	?	£
<i>Alpheus formosus</i> Gibbes	Pocock (1890), as <i>A.</i> <i>panamensis</i>	-	-	-	-	?	?	-	?	?	-	?	£
<i>Alpheus heterochaelis</i> Say	Ramos-Porto <i>et al.</i> (1978)	-	?	£	-	-	-	?	?	?	-	-	-
<i>Alpheus intrinsecus</i> Bate	Bate (1888)	-	-	-	-	?	?	-	?	?	-	£	-
<i>Alpheus macrocheles</i> (Hailstone)	Coelho & Ramos (1972)	?	?	£	-	?	?	-	£	-	-	-	-
<i>Alpheus normanni</i> Kingsley	Christoffersen (1979)	£	-	-	-	-	-	£	£	£	-	£	£
<i>Alpheus nuttingi</i> (Schmitt)	Rathbun (1900), as <i>A.</i> <i>heterochaelis</i>	-	-	-	-	?	?	?	?	£	-	?	-

to be continued.

TABLE 3 (continued).

Taxa	First Record	A	P	M	P	C	R	P	P	A	S	B	I
		P	A	A	I	E	N	B	E	L	E	A	B
<i>Alpheus paracrinitus</i> Miers	This paper (DOCEAN #8976)	-	-	-	-	-	-	-	£	-	-	-	-
<i>Alpheus pontederiae</i> Rochebrune	Rathbun (1900), as <i>A. heterochaelis</i>	-	?	?	-	-	-	£	-	?	-	-	-
<i>Alpheus simus</i> Guérin-Menèville	Christoffersen (1979), as <i>Thunor rathbunae</i>	-	-	-	-	-	-	-	-	-	-	£	-
<i>Alpheus websteri</i> Kingsley	Pocock (1890), as <i>A. ridleyi</i>	-	-	-	-	-	-	-	-	?	-	-	£
<i>Automate evermanni</i> Rathbun	Coelho & Ramos (1972), as <i>Automate</i> sp A	£	£	-	-	-	-	-	£	£	-	-	-
<i>Leptalpheus petronii</i> Ramos-Porto & Souza	Coelho <i>et al.</i> (2002)	-	-	-	-	-	-	-	£	-	-	-	-
<i>Metalpheus rostratipes</i> (Pocock)	Pocock (1890), as <i>A. rostratipes</i>	-	-	-	-	-	-	-	-	-	-	-	£
<i>Salmoneus ortmanni</i> (Rankin)	Coelho & Ramos (1972), as <i>Salmoneus</i> sp	-	-	-	-	-	-	-	£	-	£	?	-
<i>Synalpheus agelas</i> Pequegnat & Heard	This paper (DOCEAN #9213, #9214)	£	£	-	-	-	-	-	-	-	-	-	-
<i>Synalpheus androsi</i> Coutière	This paper (DOCEAN #9212)	-	-	-	-	-	-	-	-	-	-	£	-
<i>Synalpheus apioceros</i> Coutière	Bullis Jr. & Thompson (1965)	?	£	-	-	-	-	-	?	-	-	?	-
<i>Synalpheus brevicarpus</i> (Herrick)	Christoffersen (1979)	-	-	-	-	-	-	-	£	-	-	£	-
<i>Synalpheus brooksi</i> Coutière	Coutière (1909)	?	-	-	-	-	?	£	?	-	?	?	-
<i>Synalpheus curacaoensis</i> Schmitt	This paper (DOCEAN #9196)	-	£	-	-	-	-	-	-	-	-	-	-
<i>Synalpheus filidigitus</i> Armstrong	Bezerra & Coelho (in press)	-	-	-	-	£	-	-	-	-	-	-	-
<i>Synalpheus fritzmuelleri</i> Coutière	Bate (1888), as <i>Alpheus minus</i>	-	-	-	-	-	-	-	?	?	-	?	£
<i>Synalpheus hemphilli</i> Coutière	Christoffersen (1979)	-	-	-	-	?	-	-	-	-	-	£	-
<i>Synalpheus longicarpus</i> (Herrick)	Christoffersen (1979)	-	-	-	-	-	-	£	£	-	£	£	-
<i>Synalpheus minus</i> (Say)	Bate (1888)	-	-	-	-	?	-	-	?	?	-	£	£

to be continued.

TABLE 3 (continued).

Taxa	First Record	A	P	M	P	C	R	P	P	A	S	B	I
		P	A	A	I	E	N	B	E	L	E	A	B
<i>Synalpheus sanctithomae</i> Coutière	Christoffersen (1979)	-	-	-	-	?	-	-	£	?	-	£	£
<i>Synalpheus townsendi</i> Coutière	Christoffersen (1979)	-	-	-	-	-	-	-	£	£	-	£	£
<i>Thunor rathbunae</i> (Schmitt) Family Barbouriidae Christoffersen	Christoffersen (1979)	-	-	-	-	?	-	-	-	-	-	£	?
<i>Janicea antiguensis</i> (Chace) Family Hippolytidae Bate	Ramos-Porto & Coelho (1991/93)	-	-	-	-	-	-	-	-	-	-	-	£
<i>Exhippolysmata</i> <i>oplophoroides</i> (Holthuis)	Fausto Filho (1967a)	?	?	?	-	?	£	-	?	?	?	-	-
<i>Hippolyte obliquimanus</i> Dana	Coelho & Ramos (1972), as <i>Hyppolyte</i> sp	-	-	-	-	?	-	?	£	?	-	-	-
<i>Latreutes fucorum</i> (Fabricius)	Coelho & Ramos (1972)	-	-	-	-	-	-	?	£	£	-	£	-
<i>Latreutes parvulus</i> (Stimpson)	Fausto Filho (1970)	-	-	-	-	£	?	?	?	?	-	?	-
<i>Lysmata amboinensis</i> (De Man)	Holthuis <i>et al.</i> (1980)	-	-	-	-	-	-	-	-	-	-	-	£
<i>Lysmata intermedia</i> (Kingsley)	Ramos-Porto <i>et al.</i> (1994/95)	-	-	-	-	-	-	-	£	-	-	-	-
<i>Lysmata moorei</i> (Rathbun)	Ramos-Porto & Coelho (1991/93)	-	-	-	-	-	-	£	-	-	-	-	-
<i>Lysmata rathbunae</i> Chace	Ramos-Porto & Coelho (1991/93)	-	-	-	-	-	-	-	?	£	-	-	-
<i>Lysmata wurdemanni</i> (Gibbes)	Rathbun (1900), as <i>Hippolysmata</i> <i>wurdemanni</i>	-	-	-	-	?	-	£	?	-	-	-	-
<i>Merguia rhizophorae</i> (Rathbun)	Rathbun (1900), as <i>Hippolysmata</i> <i>rhizophorae</i>	-	-	-	-	?	?	£	?	?	-	-	-
<i>Thor dobkini</i> Chace	Fausto Filho (1970), as <i>T.</i> <i>floridanus</i>	?	?	-	-	£	-	?	?	?	-	-	-
<i>Tozeuma carolinense</i> Kingsley	Coelho (1967/69)	-	-	?	-	-	-	-	£	-	-	?	-

to be continued.

TABLE 3 (continued).

Taxa	First Record	A	P	M	P	C	R	P	P	A	S	B	I
		P	A	A	I	E	N	B	E	L	E	A	B
<i>Tozeuma serratum</i> A. Milne Edwards	Coelho & Ramos (1972), as <i>Tozeuma</i> sp	£	-	-	-	-	£	-	-	-	-	-	-
<i>Trachycaris restrictus</i> (A. Milne Edwards)	Coelho & Ramos (1972)	?	-	-	-	£	-	£	£	-	-	£	£
Family Ogyrididae Hay & Shore													
<i>Ogyrides alphaerostris</i> (Kingsley)	Ortmann (1893)	?	£	-	-	-	-	-	?	?	-	-	-
<i>Ogyrides hayi</i> Williams	Ramos-Porto (1980)	-	-	-	-	-	-	-	£	-	-	-	-
Superfamily Processoidea Ortmann													
Family Processidae Ortmann													
<i>Ambidexter symmetricus</i> Manning & Chace	Coelho & Ramos (1972), as <i>Ambidexter</i> sp	-	-	-	-	-	-	-	£	-	-	-	-
<i>Processa bermudensis</i> (Rankin)	Christoffersen (1979)	-	?	?	?	?	?	-	?	?	-	£	-
<i>Processa brasiliensis</i> Christoffersen	Christoffersen (1979)	-	-	-	?	?	?	-	£	-	-	£	£
<i>Processa fimbriata</i> Manning & Chace	Richardson (1904)	-	-	-	-	?	?	£	?	-	-	?	?
<i>Processa guyanae</i> Holthuis	Fausto Filho (1975)	?	-	-	-	£	?	?	-	-	-	-	-
<i>Processa hemphilli</i> Manning & Chace	Ramos-Porto & Santos (1996)	-	£	-	-	-	-	-	-	-	-	-	-
<i>Processa vicina</i> Manning & Chace	Ramos-Porto & Santos (1996)	£	£	£	-	-	-	-	£	-	-	-	£
Superfamily Pandaloidea Haworth													
Family Pandalidae Haworth													
<i>Heterocarpus ensifer</i> A. Milne Edwards	Bullis Jr. & Thompson (1965)	?	£	?	-	-	-	?	-	-	-	?	-
<i>Heterocarpus oryx</i> A. Milne Edwards	Pequegnat (1970)	?	?	-	-	-	£	-	?	-	?	-	-
<i>Plesionika acanthonotus</i> (Smith)	Bate (1888), as <i>Nothocaris geniculatus</i>	?	?	?	-	-	-	-	-	£	-	-	-
<i>Plesionika edwardsii</i> (Brandt)	Cabral <i>et al.</i> (2000)	-	-	-	-	-	-	-	£	-	-	?	-

to be continued.

TABLE 3 (continued).

Taxa	First Record	A	P	M	P	C	R	P	P	A	S	B	I
		P	A	A	I	E	N	B	E	L	E	A	B
<i>Plesionika ensis</i> (A. Milne Edwards)	Bate (1888), as <i>P. uniproduceta</i> (in part)	?	?	?	-	-	-	?	-	£	-	-	-
<i>Plesionika martia</i> (A. Milne Edwards)	Bate (1888), as <i>P. uniproduceta</i> (in part)	?	?	?	-	-	-	-	-	£	-	-	-
<i>Plesionika miles</i> A. Milne Edwards	Coelho & Ramos (1972), as <i>Parapandalus miles</i>	-	-	-	-	-	-	-	-	£	-	-	-
Superfamily Crangonoidea													
Haworth													
Family Glyphocrangonidae													
Smith													
<i>Glyphocrangon aculeata</i> A. Milne Edwards	Bate (1888)	-	-	-	-	-	-	-	-	£	-	-	-
<i>Glyphocrangon alispina</i> Chace	Ramos-Porto <i>et al.</i> (2003)	£	-	-	-	-	-	-	-	-	-	-	-
<i>Glyphocrangon aurantiaca</i> Holthuis	Komai (2004)	-	-	-	-	-	-	-	-	-	-	£	-
<i>Glyphocrangon longirostris</i> (Smith)	Komai (2004)	-	-	-	-	-	-	-	-	-	-	£	-
<i>Glyphocrangon neglecta</i> Faxon	Ramos-Porto <i>et al.</i> (2000)	£	-	-	-	-	-	-	-	-	-	-	-
<i>Glyphocrangon nobilis</i> A. Milne Edwards	Komai (2004)	-	-	-	-	-	-	-	-	-	-	£	-
<i>Glyphocrangon sculpta</i> (Smith)	Komai (2004)	-	-	-	-	-	-	-	-	-	-	£	-
<i>Glyphocrangon spinicauda</i> A. Milne Edwards	Holthuis (1971)	?	£	?	-	-	-	-	-	-	-	-	-

The other superfamilies are represented by a low number of species. Oplophoroidea, Crangonoidea, Processoidea and Pandaloidea are all represented by a single family each: Oplophoridae (8 species), Glyphocrangonidae (8 species), Processidae (7 species) and Pandalidae (7 species), respectively. Pasiphaeoidea comprises 3 species in the family Pasiphaeidae, while the Bresilioidea comprises 2 species in the family Disciadidae. Finally, the Nematocarcinoidea includes 2 families, Nematocarcinidae (1 species) and Rhynchocinetidae (1 species); Psalidopodoidea and Campylonotoidea are both represented by a single family each, Psalidopodidae (1 species) and Campylonotidae (1 species), respectively.

Nowadays, the states that accounts for a higher shrimp diversity are Pernambuco (89 species) and Bahia (68 species), representing 53% and 40.5% of the total registered

species in the N/NE Brazil, respectively. The states with the lowest diversity are Sergipe (21 species) and Piauí (13 species), representing about 12.5% and 7.7% of the total registered species at the moment. The number of species per state is represented in Figure 2.

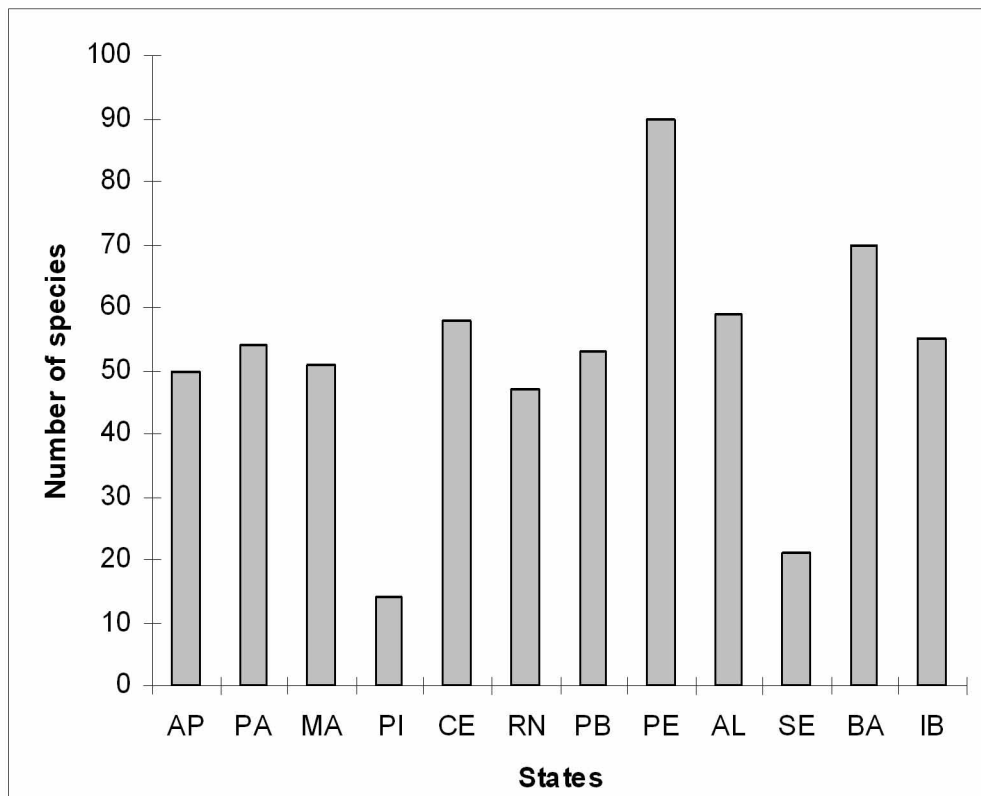


FIGURE 2. Distribution of shrimp species (Dendrobranchiata, Stenopodidea and Caridea) in each N/NE Brazil states. Abbreviations: Amapá (AP), Pará (PA), Maranhão (MA), Piauí (PI), Ceará (CE), Rio Grande do Norte (RN), Paraíba (PB), Pernambuco (PE), Alagoas (AL), Sergipe (SE), Bahia (BA), oceanic islands and banks (IB).

Discussion

Concerning the occurrence of shrimp superfamilies in the N/NE Brazil, significant changes in the fauna composition were not observed between the years of 1998 (Christoffersen, 1998; Coelho and Ramos-Porto, 1998; D’Incao, 1998 and Ramos-Porto and Coelho, 1998) and 2005.

From the 36 shrimp species of the suborder Dendrobranchiata cited for Brazil in 1998, 29 species had marked occurrence in the N/NE Brazil. The current number of species rose to 49 (Figure 3, Table 1), being the fauna which most increased in number of occurrences

during this period (68%). All the known families of Dendrobranchiata are found in the N/NE—Brazil.

There were no changes in the number of species of Stenopodidea cited for the N/NE Brazil between 1998 and 2005 (Figure 3, Table 2).

As for caridean shrimps, 109 species from Brazil were registered in 1998 (Christoffersen, 1998; Ramos-Porto and Coelho, 1998), 92 of which occurred in N/NE Brazil. The present study records the occurrence of 117 species of that infraorder, an increase of 27.2% in the number of species (Figure 3, Table 3). The family Alpheidae is the one with the highest diversity among those investigated in this study, showing an increase from 32 to 38 (12.8%) in the number of species. Another fact that should be pointed out is the occurrence of the families Barbouriidae and Psalidopodidae, having the first one been omitted by Christoffersen (1998) despite the fact that the occurrence of *Janicea antiguensis* (Chace) in Fernando de Noronha is known since the study of Ramos-Porto and Coelho (1991/93), and the later registered for the first time by Ramos-Porto *et al.* (2000).

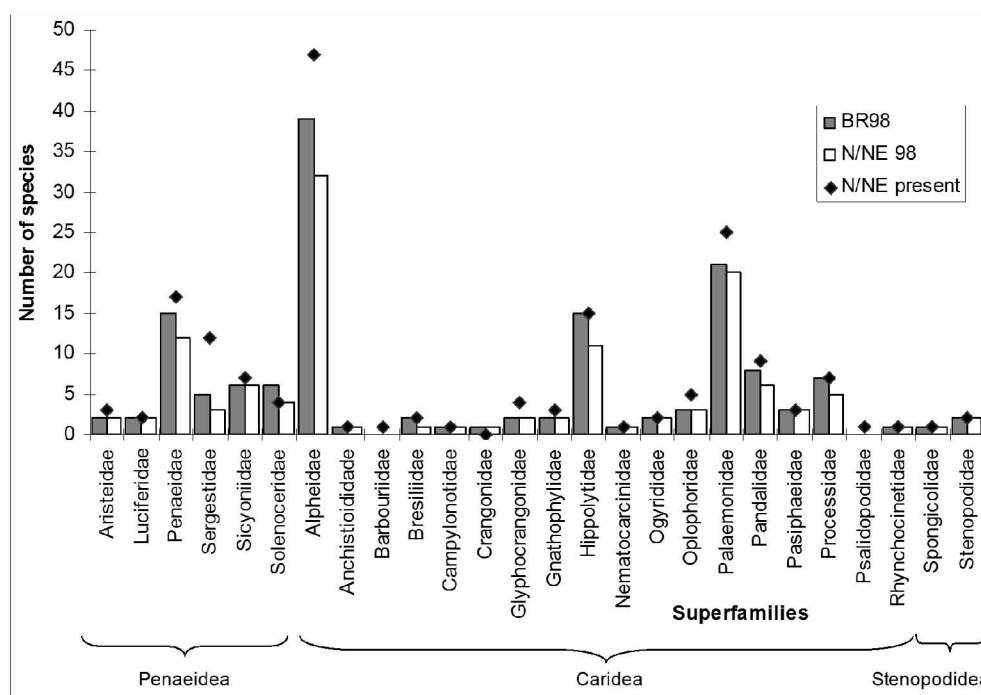


FIGURE 3. Number of species in each shrimp family found in marine and estuarine environments, in Brazil in 1998, North and Northeast in 1998 and North and Northeast recorded up to the present.

A total of 148 shrimp species were cited for Brazil in 1998. At that time, 124 species were reported from the N/NE Brazil. In the present study, the occurrence of 169 species was registered, which means an increase of 36.3% since 1998. Such considerable increase in the number of species can be associated to the collections carried out during the REVIZEE project (Ramos-Porto *et al.*, 2000; Cabral *et al.*, 2000; Coelho-Filho, 2002;

Silva *et al.*, 2002a, 2002b; Cardoso and Serejo, 2003; Ramos-Porto *et al.*, 2003; Komai, 2004; Cardoso and Young, 2005).

The results presented in this study are similar to those obtained by Campos *et al.* (2003) that reported 150 shrimp species in the Caribbean coast of Colombia: an area that, despite the diversity in coastal habitats, has a much shorter extension than the region investigated in the present work. This could imply that the shrimp fauna of the N/NE Brazil is still poorly known. On the other hand, Boschi (2000), studying the distribution of decapod crustaceans in the American marine zoogeographic provinces, observed 130 shrimp species from the mouth of the Orinoco River (Venezuela, 08° 56'N; 60° 47'W) to Cabo Frio (Brazil, 22°53'S; 42°02'W) which comprehends the Brazilian zoogeographic province (according to Boschi, 2000), an area more extensive than N/NE Brazil, but less representative, once 169 shrimp species were registered in the present article.

Considering the Brazilian states, Pernambuco has the best known shrimp fauna among those that comprise the studied regions, followed by Bahia and Alagoas. On the other hand, the low shrimp diversity in the states of Sergipe and Piauí may be associated, in part, to the scarcity of faunal inventories in their coasts (Figure 2).

Acknowledgements

P. A. Coelho would like to thank CNPq for a research productivity scholarship during the period of study. J. F. Souza-Filho and B. W. Giralde were supported by a master's scholarship (CNPq). L. E. A. Bezerra thanks PROPESQ/UFPE for the concession of a PhD scholarship. A. O. Almeida thanks FAPESB (Fundação de Amparo à Pesquisa do Estado da Bahia), for the concession of a research productivity scholarship (PP3). The authors also thank the associate editor Dr. Joseph W. Goy and the anonymous reviewers for the valuable critics and suggestions which improved the manuscript.

References

- Bate, C.S. (1888) Report on the Crustacea Macrura collected by H. M. S. "Challenger" during the years 1873–76. *Report on the Scientific Results of the Voyage of H. M. S. "Challenger"*, *Zoology*, 24, 1–942.
- Bezerra, L.E.A. & Coelho, P. A. (2006) Crustáceos decápodos associados à esponjas coletadas no Parque Estadual Marinho "Pedra da Risca do Meio", Ceará, Brasil. *Revista Brasileira de Zoologia*, in press.
- Boschi, E.E. (2000) Species of decapod crustaceans and their distribution in the American marine zoogeographic provinces. *Revista de Investigación y Desarrollo Pesquero*, 13, 7–136.
- Bullis Jr, H.R. & Thompson, J.R. (1965) Collections by the exploratory fishing vessels Oregon, Silver Bay, Combat, and Pelican made during 1956–1960 in the southwestern North Atlantic. *U. S. Fish and Wildlife Service, Special Scientific Report-Fisheries, Washington*, 510, 1–130.
- Cabral, E., Ramos-Porto, M., Santos, M.C.F., Acioli, F.D., Torres, M.F.A. & Viana, G.F.S. (2000)

- Shrimps collected in the Northeast of Brazil during the REVIZEE Program (Decapoda, Caridea). *Nauplius*, 8 (2), 245–248.
- Campos, N.H., Lemaitre, R. & Navas, G.R. (2003) La fauna de crustáceos decápodos de la costa Caribe colombiana: un aporte al conocimiento de la biodiversidad en Colombia. In: Motañez Gómez, G. (Ed.) *El Mundo marino en Colombia: Investigación y Desarrollo de territorios olvidados*. Red de estudios del mundo marino REMAR, Universidad Nacional de Colombia, Bogotá. p. 174–184.
- Cardoso, I.A. & Serejo, C.S. (2003) Sergestidae (Crustacea, Dendrobranchiata) from the southwestern Atlantic, collected by the Revizee program. *Boletim do Museu Nacional, Nova Série Zoologia*, 512, 1–15.
- Cardoso, I.A. & Young, P.S. (2004) Taxonomia da Infraordem Caridea (Alpheidae excluída) no Atol das Rocas, Brasil. *Proceedings of the XXV Congresso Brasileiro de Zoologia*, 61.
- Cardoso, I.A. & Young, P. (2005) Deep-sea Ophiophoridae (Crustacea Caridea) from the southwestern Brazil. *Zootaxa*, 1031, 1–76.
- Chace, F.A. (1972) The Shrimps of the Smithsonian-Bredin Caribbean Expeditions, with a Summary of the West Indian Shallow-water Species (Crustacea: Decapoda: Natantia). *Smithsonian Contributions to Zoology*, 98, 1–179.
- Christoffersen, M.L. (1979) Decapod Crustacea: Alpheoidea. Campagne de la Calypso au large des côtes atlantiques de l'Amérique du Sud (1961–1962). I. 36, *Annales de l'Institut Océanographique, Monaco, Suppl.*, 55, 297–377.
- Christoffersen, M.L. (1998) Malacostraca. Eucarida. Crangonoidea and Alpheoidea (except Glyphocrangonidae and Crangonidae). In: Young, P.S. (Ed.), *Catalogue of Crustacea of Brazil*. Museu Nacional, Rio de Janeiro, 351–372.
- Coelho, P.A. (1963/64) Algumas observações sobre a biologia e a ecologia dos camarões *Palaemon northropi* e *P. pandaliformis* no estado de Pernambuco (Decapoda, Palaemonidae). *Trabalhos do Instituto Oceanográfico da Universidade do Recife*, 5/6, 69–72.
- Coelho, P.A. (1966) Alguns crustáceos decápodos novos para Pernambuco e estados vizinhos na Coleção Carcinológica do Instituto Oceanográfico da Universidade Federal de Pernambuco. Segunda lista. *Ciência e Cultura*, 18 (2), 139–140.
- Coelho, P.A. (1967/69) A distribuição dos crustáceos decápodos reptantes do Norte do Brasil. *Trabalhos Oceanográficos da Universidade Federal de Pernambuco*, 9/11, 223–238.
- Coelho, P.A. & Ramos, M.A. (1972) A constituição e a distribuição da fauna de decápodos do litoral leste da América do Sul entre as latitudes de 5°N e 39°S. *Trabalhos Oceanográficos da Universidade Federal de Pernambuco*, 13, 133–236.
- Coelho, P.A. & Ramos-Porto, M. (1980) Crustáceos decápodos da costa do Maranhão, Brasil. *Boletim do Instituto Oceanográfico*, 29 (2), 135–138.
- Coelho, P.A. & Ramos-Porto M. (1998) Malacostraca. Eucarida. Stenopodidea. In: Young, P.S. (Ed.) *Catalogue of Crustacea of Brazil*. Museu Nacional, Rio de Janeiro, pp. 323–324.
- Coelho, P.A., Ramos-Porto, M. & Koenig, M.L. (1980) Biogeografia e bionomia dos crustáceos do litoral equatorial brasileiro. *Trabalhos Oceanográficos da Universidade Federal de Pernambuco*, 15, 7–138.
- Coelho, P.A., Ramos-Porto, M. & Melo, G.A.S. (1990) Crustáceos decápodos do estado de Alagoas. *Anais da Sociedade Nordestina de Zoologia*, 3 (3), 21–34.
- Coelho, P.A., Santos, M.A.C., Torres, M.F.A., Monteiro, B.R. & Almeida, V.A.K. (2002) Reino Animalia: Filo (ou Subfilo) Crustacea no Estado de Pernambuco. In: Tabarelli, M. & Silva, J.M.C. (Ed.) *Diagnóstico da biodiversidade de Pernambuco*. Recife, 2, 429–482.
- Coelho, P.A., Tenório, D.O., Ramos-Porto, M. & Mello, R.L.S. (2004) A fauna bêntica do Estado de Pernambuco. In: Eskinazi-Leça, E., Neumann-Leitão, S. & Costa, M.F. (Eds). *Oceanografia: um cenário tropical*. Recife, Bagaço, 477–527.
- Coelho Filho, P.A. (2002) Crustáceos decápodos, isópodos e estomatópodos da plataforma conti-

- mental externa e bancos oceânicos do nordeste do Brasil (programa REVIZEE—NE III). Ph.D. thesis. Instituto Oceanográfico, Universidade de São Paulo. 166 pp.
- Coutière, H. (1909) The american species of the snapping shrimps of the genus *Synalpheus*. *Proceedings of the United States Natural Museum*, 36, 1–93.
- Crosnier, A. & Forest, J. (1966) Crustacés décapodes: Alpheidae. Campagnes de la Calypso dans le Golfe de Guinée et aux Iles Principe, São Tomé et Annobon (1956), et campagne aux Iles du Cap Vert (1959). Résultats Scientifiques des Campagnes de la "Calypso". *Annales de l'Institut Océanographique, Monaco*, 44, 199–314.
- Cutrim, R.S.F., Silva, K.C.A. & Cintra, I.H.A. (2001) Composição dos recursos pesqueiros capturados na área da "lixreira", Pará, Brasil. *Boletim Técnico Científico do CEPNOR*, 1 (1), 59–76.
- D'Incao, F. (1995a) Taxonomia, padrões distribucionais e ecológicos dos Dendrobranchiata (Crustacea: Decapoda) do Brasil e Atlântico Ocidental. Ph.D. Thesis, Departamento de Zoologia, Universidade Federal do Paraná, 365 pp.
- D'Incao, F. (1995b) The Brazilian rock shrimp of the genus *Sicyonia* (Decapoda: Sicyonidae). *Nauplius*, 3, 101–125.
- D'Incao, F. (1998) Malacostraca. Eucarida. Dendrobranchiata. In: Young, P.S. (Ed.), *Catalogue of Crustacea of Brazil*. Museu Nacional, Rio de Janeiro, pp. 311–321.
- D'Incao, F. (1999) The western atlantic shrimps of the genus *Funchalia* (Decapoda, Penaeidae). In: Schram, F.R. & von Vaupel Klein, J.C. (Ed.), *Crustaceans and the biodiversity crisis*. Leiden, 1, 345–355.
- Fausto Filho, J. (1966) Primeira contribuição ao inventário dos crustáceos decápodos marinhos do Nordeste Brasileiro. *Arquivos da Estação de Biologia Marinha da Universidade Federal do Ceará*, 6 (1), 31–37.
- Fausto Filho, J. (1967a) Segunda contribuição ao inventário dos crustáceos decápodos marinhos do Nordeste Brasileiro. *Arquivos da Estação de Biologia Marinha da Universidade Federal do Ceará*, 7 (1), 11–14.
- Fausto Filho, J. (1967b) *Palaemon (Palaemon) paivai*, nova espécie de crustáceo do Brasil (Decapoda, Palaemonidae). *Arquivos da Estação de Biologia Marinha da Universidade Federal do Ceará*, 7 (1), 19–22.
- Fausto Filho, J. (1968) Terceira contribuição ao inventário dos crustáceos decápodos marinhos do Nordeste Brasileiro. *Arquivos de Ciências do Mar*, 8 (1), 43–45.
- Fausto Filho, J. (1970) Quarta contribuição ao inventário dos crustáceos decápodos marinhos do Nordeste Brasileiro. *Arquivos de Ciências do Mar*, 10 (1), 55–60.
- Fausto Filho, J. (1975) Quinta contribuição ao inventário dos crustáceos decápodos marinhos do Nordeste Brasileiro. *Arquivos de Ciências do Mar*, 14 (1), 1–35.
- Fausto Filho, J. (1987) Registro de captura de *Penaeus monodon* Fabricius no litoral do estado do Maranhão, Brasil (Crustacea: Penaeidae). *Arquivos de Ciências do Mar*, 26, 81–82.
- Gomes-Corrêa, M.M. (1971) Sobre a ocorrência de *Rhynchocinetes rigens* Gordon no litoral Brasileiro. *Arquivos do Museu Nacional*, 54, 105–107.
- Holthuis, L.B. (1971) The atlantic shrimps of the deep-sea genus *Glyphocrangon* A. Milne Edwards, 1881. *Bulletin of Marine Science*, 21 (1), 267–373.
- Holthuis, L.B., Edwards, A.J. & Lubbock, H.R. (1980) The decapod and stomatopod Crustacea of St. Paul's Rocks. *Zoologische Mededelingen*, 56 (3), 27–51.
- Komai, T. (2004) Deep-sea shrimps of the genus *Glyphocrangon* A. Milne-Edwards (Crustacea, Decapoda, Caridea, Glyphocrangonidae) from off southeastern coast of Brazil collected during the Revizee program. *Arquivos do Museu Nacional*, 62 (1), 31–44.
- Martin, J.W. & Davis, G.E. (2001) An updated classification of the recent Crustacea. *Natural History Museum of Los Angeles County, Science Series*, 39, 1–124.
- Moreira, C. (1901) Contribuições para o conhecimento da fauna brasileira. Crustaceos do Brasil. *Archivos do Museu Nacional*, 11, 1–151.

- Omori, M. (1975) The systematics, biogeography, and fishery of epipelagic shrimp of the genus *Acetes* (Crustacea, Decapoda, Sergestidae). *Bulletin of the Ocean Research Institute, University of Tokyo*, 7, 1–89.
- Ortmann, A.E. (1893) Decapoden und Schizopoden der Plankton-Expedition. Part 2Gb in Ergebnisse der in dem Atlantischen Ocean von Mitte Juli Bis Anfang November 1889. *Ausgeführten Plankton-Expedition der Humboldt-Stiftung*, 120 pp.
- Pequegnat, L.H. (1970) Deep-sea caridean shrimps with descriptions of six new species. Texas A & M University Oceanographic Studies. I. *Contribution on the Biology of the Gulf of Mexico*, 4, 59–123.
- Pérez-Farfante, I. (1967) A new species and two new subspecies of shrimp of the genus *Penaeus* from the western Atlantic. *Proceedings of the Biological Society of Washington*, 80 (1), 53–100.
- Pérez-Farfante, I. (1971) Western atlantic shrimps of the genus *Metapenaeopsis* (Crustacea, Decapoda, Penaeidae), with descriptions of three new species. *Smithsonian Contributions to Zoology*, 79, 1–37.
- Pérez-Farfante, I. (1977) American solenocerid shrimps of the genera *Hymenopenaeus*, *Haliporoides*, *Pleoticus*, *Hadropenaeus* new genus, and *Mesopenaeus* new genus. *Fishery Bulletin*, 75 (2), 261–346.
- Pocock, R.L. (1890) Notes on the zoology of Fernando Noronha. *Journal of the Linnean Society of London, Zoology*, 20, 506–526.
- Ramos-Porto, M. (1980) Estudo ecológico da região de Itamaracá, Pernambuco, Brasil. VII. Crustáceos Decápodos Natantes. *Trabalhos Oceanográficos da Universidade Federal de Pernambuco*, 15, 277–309.
- Ramos-Porto, M., Carvalho, P.V.V.D.B.C. & Botter-Carvalho, M.L. (1994/95) Registro de *Lysmata intermedia* (Kingsley, 1878) (Decapoda, Hippolytidae) no litoral Pernambucano. *Trabalhos Oceanográficos da Universidade Federal de Pernambuco*, 23, 107–112.
- Ramos-Porto, M. & Coelho, P.A. (1990) Sinopse dos crustáceos decápodos brasileiros (Família Palaemonidae). *Anais da Sociedade Nordestina de Zoologia*, 3, 93–111.
- Ramos-Porto, M. & Coelho, P.A. (1991/93) Sinopse dos crustáceos decápodos brasileiros (família Hippolytidae). *Trabalhos Oceanográficos da Universidade Federal de Pernambuco*, 22, 181–189.
- Ramos-Porto, M. & Coelho, P.A. (1998) Malacostraca. Eucarida. Caridea (Alpheoidea excluded). In: Young, P.S. (Ed.) *Catalogue of Crustacea of Brazil*. Museu Nacional, Rio de Janeiro, 325–350.
- Ramos-Porto, M., Coelho, P.A. & Souza, S.T. (1987/89) Sinopse dos crustáceos decápodos brasileiros (famílias Penaeidae, Solenoceridae, Sicyoniidae). *Trabalhos Oceanográficos da Universidade Federal de Pernambuco*, 20, 219–234.
- Ramos-Porto, M., Ferreira-Correia, M.M. & Sousa, N.R. (1978) Levantamento da fauna aquática da ilha de São Luís (Estado do Maranhão, Brasil). II. Crustacea. *Boletim do Laboratório de Hidrobiologia*, 2(1), 77–88.
- Ramos-Porto, M., Muniz, A.P.M., Silva, K.C.A., Cintra, I.H.A., Viana, G.F.S. (2003) Camarões da Subordem Pleocyemata Burkenroad, 1963 capturados durante pescarias experimentais para o Programa REVIZEE/NORTE (Crustacea, Decapoda). *Boletim Técnico Científico do CEPNOR*, 3 (1), 77–106.
- Ramos-Porto, M. & Santos, C.A. (1996) Distribuição dos camarões do gênero *Processa* Leach, 1815 (Crustacea-Processidea), em águas do litoral brasileiro. *Proceedings of XXI Congresso Brasileiro de Zoologia*, 63.
- Ramos-Porto, M., Silva, K.C.A., Viana, G.F.S. & Cintra, I.H.A. (2000) Camarões de profundidade coletados no Norte do Brasil (Crustacea: Penaeoidea e Caridea). *Trabalhos Oceanográficos da Universidade Federal de Pernambuco*, 28 (1), 71–85.

- Ramos-Porto, M., Torres, M.F.A & Viana, G.F.S. (1996) Crustáceos decápodos coletados durante as Expedições Nordeste III e Pavasas I (Penaeidea e Caridea). *Trabalhos Oceanográficos da Universidade Federal de Pernambuco*, 24, 211–227.
- Rathbun, M.J. (1900) The decapod and stomatopod Crustacea. I. Results of the Branner-Agassiz Expedition to Brazil. *Proceedings of the Washington Academy of Sciences*, 2, 133–156.
- Richardson, H. (1904) Contributions to the Natural History of the Isopoda. *Proceedings of the United States Natural Museum*, 27 (1350), 1–89.
- Santos, M.C.F. & Coelho, P.A. (2002) Espécies exóticas de camarões peneídeos (*Penaeus monodon* Fabricius, 1798 e *Litopenaeus vannamei* Boone, 1931) nos ambientes estuarino e marinho do Nordeste do Brasil. *Boletim Técnico Científico do CEPENE*, 10 (1), 207–222.
- Santos, M.C.F., Ramos-Porto, M., Torres, M.F.A., Viana, G.F.S., Acioli, F.D., Cabral, E. (2002) Ocorrência de *Benthescymus bartletti* Smith, 1888 em águas do nordeste brasileiro (Crustacea: Decapoda: Penaeoidea: Benthescymidae). *Proceedings of the II Congresso Brasileiro Sobre Crustáceos*, 41.
- Silva, K.C.A., Muniz, A.P.M., Ramos-Porto, M., Viana, G.F.S. & Cintra, I.H.A. (2002a) Camarões da superfamília Penaeoidea Rafinesque, 1815, capturados durante pescarias experimentais para o programa REVIZEE/Norte (Crustacea:Decapoda). *Boletim Técnico Científico do CEPNOR*, 2 (1), 9–40.
- Silva, K.C.A., Ramos-Porto, M. & Cintra, I.H. (1998) Ocorrência de espécies da família Penaeidae em águas da costa Norte do Brasil. *Boletim Técnico Científico do CEPENE*, 6, 9–15.
- Silva, K.C.A., Ramos-Porto, M., Cintra, I.H.A., Muniz, A.P.M. & Silva, M.C.N. (2002b) Crustáceos capturados durante o programa REVIZEE na costa Norte Brasileira. *Boletim Técnico Científico do CEPNOR*, 2 (1), 97–108.
- Smith, S.I. (1869) Notice of the Crustacea collected by Prof. C. F. Hartt on the coast of Brazil in 1867. *Transactions of the Connecticut Academy of Arts and Sciences*, 2, 1–41.
- Young, P.S. (Ed.). 1998. *Catalogue of Crustacea of Brazil*, Museu Nacional, Rio de Janeiro, 717pp.