

Endemic macrobenthic fauna on the Brazilian reef ecosystems

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Abstract. Knowledge of the biodiversity of Brazilian reef ecosystems has expanded in recent years with the description of several new species. Brazil is considered an important province because has the only true reefs in the South Atlantic. This study identified the endemism of macrobenthic species of the Brazilian reefs. Two reef areas on the northeastern coast, mentioned by Laborel, were included in this study. The reef coast is approximately 600 km long and extends from the state of Rio Grande do Norte (approximately 6°S) to the mouth of the São Francisco River, on the southern border of Alagoas (approximately 10°30'S), and consists of many coral and sandstone reefs in the offshore zone and near the shoreline, where the platform top remains exposed during low tides. The second area is located on the central coast of Bahia (approximately 12°35'S), with coral and sandstone reefs; and extends to the Abrolhos region (approximately 18°10'S), with fringing reefs, isolated columns and offshore banks. Four offshore sites within the EEZ were also included in this review. This study was based on the macrobenthic diversity existing on the northeastern coast, represented by Porifera with 447spp, Cnidaria Scleractinia 16spp, Bryozoa 146spp and Echinodermata 51spp. Of these, 145 species are endemic to Brazilian reefs, including Porifera with 83spp (18%), Cnidaria Scleractinia 8spp (50%), Bryozoa 46spp (31.50%), and Echinodermata 8spp (2.93%). The results reflect the recent increase in studies of the local marine biodiversity, and identified a large number of endemic species among the macrobenthic fauna of the Brazilian reefs.

Key words: Biodiversity, Brazilian coast, Coral reefs, Sandstone reefs, Invertebrate

Introduction

Knowledge of the biodiversity of the Brazilian reef ecosystems has expanded in recent years, with a substantial increase from the 1990s, with the description of several new species of macrobenthic invertebrates (Brasil 2011). Based on various sources of information, the Brazilian coast is considered an important province because it has the only true reefs in the South Atlantic (Veron 1995).

Information on sponges was published in the Catalogue of Brazilian Porifera, which includes all the literature up to 2010 (Muricy et al. 2010). This catalogue lists 443 species for the Brazilian coast, with 16 species in class Hexactinellida, another 47 species in Calcarea, and 380 species in Demospongiae with 327 are marines. Recently, a new species *Mycale (Mycale) alagoana* was described from the Alagoas (Cedro et al. 2011) and from north-east Brazil three new species of *Strongylacidon* (Menegola et al. 2011).

Studies of Cnidaria on the Brazilian reefs were initiated by Laborel (1965), who identified the corals and characterized their distribution on the northeastern coast (Laborel 1969a, b, 1970). The description of reef areas on the Brazilian coast (Castro and Pires 2001), identified 15 species of scleractinians, where 7 species have their southern limit of distribution in Abrolhos (BA), and also a new species of *Madracis* was recently described (Neves and Johnsson 2009). The reef ecosystems and coral species distributions have been characterized for Alagoas (Correia 2011) and Pernambuco (Neves et al. 2002). Extensive information is available on the cnidarians on the coast of Bahia and the Abrolhos reefs (Leão 1986, Hetzel and Castro 1994, Castro et al. 2006). The cnidarian

fauna has been described for other off-shore reef sites in the Exclusive Economic Zone (EEZ), including Rocas Atoll (Echeverria et al. 1997), the Fernando de Noronha Archipelago (Pires et al. 1992, Amaral et al. 2009), Saint Pedro and Saint Paulo Archipelago (Amaral et al. 2000), and Manuel Luiz Parcel (Amaral et al. 2007). On Brazilian reefs, three endemic species of *Mussismilia* occur, which constitute a monophyletic clade (Pires et al. 1999, Nunes et al. 2008).

The characterization of Bryozoa on the Brazilian coast was initially carried out by Ernst Marcus, who reported 230 species, 51 of which were newly described (Marcus 1955, Marcus and Marcus 1962). In the last decades of the 20th century, few publications on bryozoans on the Brazilian coast appeared (Rocha and d'Hondt 1999). In the present century, additional researchers have produced some lists for bryozoans in the shallow waters of Bahia (Kelmo et al. 2004), and on the continental shelf and slope of southern and southeastern Brazil (Haddad et al. 2004). Some new species and occurrences for the Brazilian coast have been reported (Winston and Migotto 2005, Reverter Gil and Fernández-Pulpeiro 2007, Vieira et al. 2007). The recent literature on Brazilian bryozoans includes 346 species, with 271 spp Cheilostomata, 42spp Ctenostomata and 33spp Cyclostomata (Vieira et al. 2008). Newly published records of bryozoans include four new species of *Beania* (Vieira et al. 2010a), a new cheilostome *Marcusadorea* with two combinations (Vieira et al. 2010b), a new genus and species of Cribrilinidae, and 17 other species new to the Exclusive Economic Zone (EEZ) (Vieira et al. 2010c).

A review of the diversity of the phylum Echinodermata from the western Atlantic (Hendler *et al.* 1995) gave some citations for the Brazilian coast. The distribution and ecology of echinoderms were reviewed by Tommasi (1999), who reported 339 species for the Brazilian coast, comprising Crinoidea with 10% of the species, Echinoidea 12.85%, Asteroidea 25.7%, Ophiuroidea 28.57%, and Holothuroidea 17.85% (Hadel *et al.* 1999). Some papers for the Brazilian northeastern coast listed, for Bahia 71 extant and 6 fossil species (Alves and Cerqueira 2000, Magalhães *et al.* 2005, Manso 2004, Manso *et al.* 2008), for Paraíba 32 species on phytal, rubble and sand (Gondim *et al.* 2008), for Pernambuco 35 species from different substrates (Lima and Fernandes 2009), and for Alagoas 50 species from shallow waters (Miranda *et al.* 2012). Other studies have found Ophiuroidea associated with the octocoral *Carijoa riisei* from Pernambuco (Neves *et al.* 2007), and 16 new records from the Maceió reefs, Alagoas (Lima *et al.* 2011).

This study aimed to identify the endemic macrobenthic species on the reef ecosystems along the Brazilian northeastern coast.

Study Area

Three reef areas on the northeastern coast were included in this study. These areas represent the main reef ecosystems on the Brazilian coast (Fig. 1).

The Reef Coast area extends over approximately 600 km, from the state of Rio Grande do Norte (6°S) to the São Francisco River in south coast from the state of Alagoas (10°30'S). The reefs consist of fringing coral reefs and sandstone reefs that form parallel lines along the coast, which differ in certain geomorphological and ecological aspects (Correia and Sovierzoski 2009, Correia 2011).

The Bahia coast is a second area, located between 12° and 18°S. The inshore reefs are adjacent to or within a few kilometers of the coast, and consist of coral and sandstone reefs, including shallow banks from 5-10 m depth. The offshore reefs (<5 km) have variable dimensions, formed by coral knolls, patches, banks, and isolated coral pinnacles at various depths down to 50 m, mainly in the Abrolhos region (Leão *et al.* 2010).

The third area consists of four offshore sites included in the Brazilian Exclusive Economic Zone (EEZ). The Manuel Luiz Parcel (00°46'S - 44°15'W) is 179 km north of São Luís Island (state of Maranhão), which is the northern limit of the Brazilian reefs and is the reef bank nearest the Amazon River (Amaral *et al.* 2007). The Rocas Atoll is considered unique in the South Equatorial Atlantic (03°51'S - 33°49'W), it lies 266 km from the city of Natal (state of Rio Grande do Norte), with the reef structure composed mainly of coralline algae, foraminifera and molluscs (Vermetidae) (Gherardi and Bosence 2005, Soares *et al.* 2011). The Fernando de Noronha Archipelago

is formed by 21 islands and islets of volcanic origin (03°56'S - 32°25'W), and has only coralline communities on its rocky shores, with some platforms in subtidal areas, which are formed mainly by calcareous algae (Melobesioidea) and molluscs (Vermetidae) (Pires *et al.* 1992, Amaral *et al.* 2009). Saint Peter and Saint Paul Archipelago lies 960 km off the northeast coast of Brazil (00°55'N - 29°22'W), which is an anomalous and remote group of plutonic rocks, consisting of 10 small and 5 larger islets that total 15 km² in area, where the largest islet is 50 by 150 m, that is up to 23 m above sea level and separated by channels from other islets (Amaral *et al.* 2000).

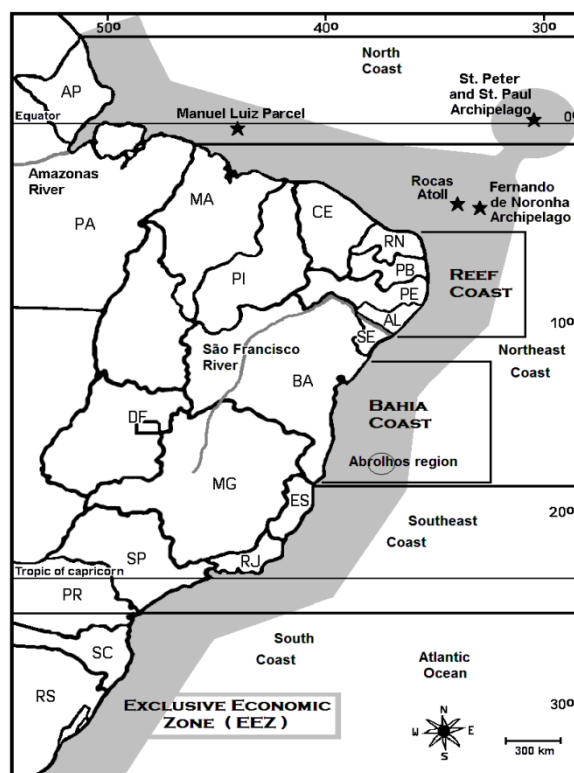


Figure 1: Map of Brazilian coast with reefs areas. States of Brazil: AP–Amapá, PA–Pará, MA–Maranhão, PI–Piauí, CE–Ceará, RN–Rio Grande do Norte, PB–Paraíba, PE–Pernambuco, AL–Alagoas, SE–Sergipe, BA–Bahia, ES–Espírito Santo, RJ–Rio de Janeiro, SP–São Paulo, PR–Paraná, SC–Santa Catarina, RS–Rio Grande do Sul, MG–Minas Gerais, DF–Distrito Federal (Brasília).

Material and Methods

The list of endemic species from Brazilian reef ecosystems was compiled based on the literature mentioned above. The data were obtained from specific catalogues, papers and checklists published in scientific journals. The list of endemic species was organized according to the accepted species and occurrence sites, as confirmed in publicly accessible databases (WoRMS and ITIS).

The results are summarized in four tables for each phylum, with species distributions in the two most important reef ecosystems, the Reef Coast and Bahia Coast, offshore sites in the Exclusive Economic Zone (EEZ), and in the states of the Brazilian coast.

Results

For the phylum Porifera, 447 species have been recorded from the Brazilian coast, among these, 83 are endemic to Brazilian reefs. These are represented by the Calcarea with 7 families and 13 species, and Demospongiae with 25 families and 70 species. These results demonstrate that Brazilian reefs are an important area for endemic sponges, because the numbers represent 18.57% of the total species from the entire Brazilian coast (Table 1).

The phylum Cnidaria is represented on the Brazilian coast by a relatively small number of corals, with only 16 species in the order Scleractina. However, the proportion of endemic species is high, because are 8 species that are equivalent to 50% of coral records for the Brazilian reef ecosystems (Table 2).

For the phylum Bryozoa, 364 species have been reported from the Brazilian, with 146 species from the northeastern coast. These include 46 endemic species, or 31.50% of bryozoans known from the Brazilian reefs. Groups of bryozoans from these ecosystems include Cheilostomata with 23 families and 39 species, Stenolaemata represented by 3 families and 4 species, and Ctenostomata with 3 families and one species of each (Table 3).

The phylum Echinodermata has a relatively small number of living species compared with other marine invertebrate groups. Based on this review, the Brazilian coast harbors a total of 273 living species in the five classes, including 8 endemic species (2.93%) to the Brazilian reefs. Ophiuroidea presents the most species and is the largest group of echinoderms on the Brazilian coast, with four species endemic to the reef ecosystems. Holothuroidea is also an important group, represented by three endemic species for the Brazilian reefs. One species of class Echinoidea is recorded only from the Bahia coast (Table 4).

Discussion

The sponges from the Brazilian coast are a highly diverse group, which includes 83 endemic species for the reef ecosystems. However, this number likely represents less than 20% of the sponge fauna occurring in Brazilian reefs, because the northeastern ecoregion has an important tropical character, as is already indicated by the large numbers of species that are in need of revision, and new studies are needed to increase our knowledge of reef sponges (Muricy et al. 2010, Cedro et al. 2011).

The Brazilian reefs have a relatively large number of endemic scleractinian corals. The influence of estuarine water that reduces salinities during the dry season (Laborel 1970, Castro and Pires 2001, Nunes et al. 2008), may explain the greater concentrations of these species on the reef coast (Neves et al. 2002, Correia 2011) and the Bahia coast (Castro et al. 2006, Leão et al. 2010).

In the last 10 years, increased bryozoan studies along the Brazilian coast have resulted in descriptions

of many new species, with 46 endemic species now known in the reef ecosystems. A relatively small number of species is involved compared to some parts of the world where bryozoans are dominant, suggesting that much has yet to be learned about this fauna (Vieira et al. 2008, 2010c).

The number of endemic species of Echinodermata (8 spp) is relatively low, particularly compared with the other invertebrate groups analyzed. However, the taxonomic validity of some of these endemic species of echinoderms is questionable, and several others listed have been recorded with subspecies for the Brazilian coast. This demonstrates the need for further studies including morphological and molecular analyses, to correctly define the valid species and their geographical distributions (Miranda et al. 2012).

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TAXA	DISTRIBUTION			
	Reef Coast	Bahia Coast	Sites offshore	States of Brazil
Phylum Porifera				
Class Calcarea				
<i>Amphorus synapta</i> (Schmidt in Haeckel, 1872)		X		BA, RJ
<i>Clathrina aurea</i> Klautau, Boury-Esnault, Borojevic & Thorpe, 1991	X		FNA	RN, PE, RJ, SP, EEZ
<i>Grantessa anisactina</i> Borojevic & Peixinho, 1976	X			PB, EEZ
<i>Grantia kempfi</i> Borojevic & Peixinho, 1976	X	X		AP, RN, PE, AL, BA
<i>Guancha tetela</i> Borojevic & Peixinho, 1976		X		BA
<i>Leucandra crassior</i> Ridley, 1881	X			PE, ES, EEZ
<i>Leucandra serrata</i> Azevedo & Klautau, 2007	X			RN, RJ, EEZ
<i>Leucascus roseus</i> Lana, Rossi, Cavalcanti, Hajdu & Klautau, 2007	X			RN, SP, EEZ
<i>Leucetta potiguar</i> Lana, Cavalcanti, Cardoso, Muricy & Klautau, 2009	X			CE, RN, EEZ
<i>Leucilla sacculata</i> (Carter, 1890)			FNA	PE, EEZ
<i>Praleucilla sphaerica</i> Lana, Cavalcanti, Cardoso, Muricy & Klautau, 2009	X			RN, EEZ
<i>Sycettusa flamma</i> (Poléjaeff, 1883)		X		AM, BA, EEZ
<i>Sycon frustulosum</i> Borojevic & Peixinho, 1976	X			PE
Class Demospongiae				
<i>Acanthotetilla rocasensis</i> Peixinho, Fernandez, Oliveira, Caires & Hajdu 2007			ROA	RN, EEZ
<i>Acanthotetilla walteri</i> Peixinho, Fernandez, Oliveira, Caires & Hajdu 2007		X		BA
<i>Acarus radovani</i> (Boury-Esnault, 1973)	X		ROA, FNA	RN, PE, RJ, EEZ
<i>Alectona mesoatlantica</i> Vacelet, 1999			ROA, SPPA	RN, EEZ
<i>Aplysina alcornis</i> Pinheiro, Hajdu & Custodio, 2007		X		BA
<i>Aplysina cristagallus</i> Pinheiro, Hajdu & Custodio, 2007		X		BA
<i>Aplysina lactuca</i> Pinheiro, Hajdu & Custodio, 2007		X		CE, RN, BA
<i>Aplysina lingua</i> Pinheiro, Hajdu & Custodio, 2007		X		BA
<i>Aplysina muricyana</i> Pinheiro, Hajdu & Custodio, 2007			ROA	CE, RN, EEZ
<i>Aplysina orthoreticulata</i> Pinheiro, Hajdu & Custodio, 2007		X		BA
<i>Aplysina pergamentacea</i> Pinheiro, Hajdu & Custodio, 2007	X			PE
<i>Aplysina pseudolacunosa</i> Pinheiro, Hajdu & Custodio, 2007	X	X		CE, PE, BA, ES
<i>Aplysina solangeae</i> Pinheiro, Hajdu & Custodio, 2007		X		CE, BA
<i>Axinella echidnaea</i> Ridley, 1884		X		BA

<i>Biemna microacanthosigma</i> Mothes, Hajdu, Lerner & van Soest 2004	X			AP, AL
<i>Callyspongia (Callyspongia) laboreli</i> Hechtel, 1983		X		BA
<i>Callyspongia (Toxochalina) pseudotoxa</i> Muricy & Ribeiro, 1999		X		BA
<i>Clathria (Clathria) calypso</i> Boury-Esnault, 1973		X		BA, EEZ
<i>Clathria (Thalysias) basiarenacea</i> (Boury-Esnault, 1973)			FNA	PE, EEZ
<i>Clathria (Wilsonella) nigra</i> (Boury-Esnault, 1973)	X			PE, EEZ
<i>Conulum tylotum</i> (Boury-Esnault, 1973)	X			PE, EEZ
<i>Craniella carteri</i> Sollas, 1886		X		BA
<i>Craniella cortica</i> (Boury-Esnault, 1973)	X			PE, EEZ
<i>Craniella quirimure</i> Peixinho, Cosme & Hajdu 2005		X		BA
<i>Dysmanthus meandroides</i> van Soest & Hajdu, 2000			FNA	PE, SP, EZZ
<i>Dysidea robusta</i> Vilanova & Muricy, 2001		X		BA, RJ
<i>Echinodictyum dendroides</i> Hechtel, 1983	X			CE, RN, PE, AL, EEZ
<i>Erylus corneus</i> Boury-Esnault, 1973	X			PB, SEE
<i>Forcepia (Forcepia) tribalis</i> (Boury-Esnault, 1973)		X		BA
<i>Geodia glariosa</i> (Sollas, 1886)	X	X		RN, PE, BA, ES, SP
<i>Geodia tylastra</i> Boury-Esnault, 1973	X			PE, SEE
<i>Holoxea violacea</i> Boury-Esnault, 1973			ROA	RN, EEZ
<i>Ircinia pauciarenaria</i> Boury-Esnault, 1973			ROA	RN, PE, EEZ
<i>Lissodendoryx (Anamodoryx) Recife</i> (Boury-Esnault, 1973)	X			PB, PE
<i>Mycale alagoana</i> Cedro, Hajdu & Correia 2011	X			AL
<i>Mycale (Mycale) quadripartita</i> Boury-Esnault, 1973		X		BA, EEZ
<i>Oceanapia nodulosa</i> (Hechtel, 1983)	X			AL
<i>Penares anisoxia</i> Boury-Esnault, 1973	X			AL, EEZ
<i>Penares chelotropa</i> Boury-Esnault, 1973	X			PB, EEZ
<i>Phorbas ramosus</i> (Hechtel, 1983)		X		BA
<i>Plakortis insularis</i> Moraes & Muricy, 2003			FNA	RN, PE, EZZ
<i>Plakortis microrhabdifer</i> Moraes & Muricy, 2003			ROA	RN, EEZ
<i>Psammocinia compacta</i> (Poléjaeff, 1884)		X		RN, BA, EEZ
<i>Psammoclema porosum</i> (Poléjaeff, 1984)		X		BA
<i>Ptilocaulis bistyla</i> (Hechtel, 1983)	X		FNA	PE, EZZ
<i>Ptilocaulis brasiliensis</i> (Hechtel, 1983)	X			PE
<i>Ptilocaulis fosteri</i> (Hechtel, 1983)	X			PE
<i>Rhabdastrella fibrosa</i> Hechtel, 1983	X			PE, EEZ
<i>Rhabdastrella virgula</i> Boury-Esnault, 1973	X			PB, EEZ
<i>Scalarispongia cincta</i> (Boury-Esnault, 1973)	X			PE, EEZ
<i>Scolopes moseleyi</i> , Sollas, 1888	X	X		PE, BA
<i>Sigmaxinella cearense</i> Salani, Lotufo & Hajdu, 2006	X			CE, RN
<i>Spheciospongia symbiotica</i> Hechtel, 1983	X			PE
<i>Spongia (Spongia) ditelliformis</i> Hyatt, 1877			FNA	PE, EEZ
<i>Spongia (Spongia) lobosa</i> Poléjaeff, 1884		X		BA
<i>Stelletta anasteria</i> Esteves & Muricy, 2005		X		BA
<i>Stelletta soteropolitana</i> Cosme & Peixinho, 2007		X		BA
<i>Strongylacidon chelospinata</i> Fernandez, Peixinho, Pinheiro & Menegola, 2011			FNA	PE, EEZ
<i>Strongylacidon oxychaetum</i> Fernandez, Peixinho, Pinheiro & Menegola, 2011		X		BA
<i>Strongylacidon solangeae</i> Fernandez, Peixinho, Pinheiro & Menegola, 2011		X		BA
<i>Tethya beatrizae</i> Ribeiro & Muricy, 2011	X			EEZ
<i>Tethya brasiliana</i> Ribeiro & Muricy, 2004		X		BA
<i>Tethya cyanae</i> Ribeiro & Muricy, 2004		X		BA
<i>Tethya ignis</i> Ribeiro & Muricy, 2004		X		BA
<i>Tethya rubra</i> Ribeiro & Muricy, 2004	X	X		PE, BA
<i>Tethya solangeae</i> Ribeiro & Muricy, 2011	X			PE
<i>Thorect atlantica</i> Santos, Silva, Bonifácio, Esteves, Pinheiro & Muricy, 2010	X			RN, EEZ
<i>Xestospongiae grayi</i> (Hechtel, 1983)			FNA	PE, EZZ

Table 1: Distribution of the Endemic Porifera on the Brazilian reefs ecosystems. ROA - Rocas Atoll, FNA - Fernando de Noronha Archipelago, SPPA - Saint Peter and Saint Paul Archipelago.

TAXA	DISTRIBUTION			
	Reef Coast	Bahia Coast	Sites offshore	States of Brazil
Phylum Cnidaria / Class Anthozoa				
Ordem Scleractinia				
<i>Astrangia brasiliensis</i> Vaughan, 1906	X	X		AL, BA
<i>Favia graviora</i> Verrill, 1868	X	X	MLP, ROA, FNA	MA, RN, PB, PE, AL, BA, ES
<i>Favia leptophilla</i> Verrill, 1868				RN, PB, PE, AL, BA, ES
<i>Madracis fragilis</i> Neves & Johnsson, 2009		X		BA
<i>Mussismilia brasiliensis</i> (Verrill, 1868)	X	X		BA
<i>Mussismilia hartii</i> (Verrill, 1868)	X	X		RN, PB, PE, AL, BA,
<i>Mussismilia hispida</i> (Verrill, 1901)	X	X	MLP, SPPA	MA, RN, PB, PE, AL, BA, RJ, SP
<i>Siderastrea stellata</i> Verrill, 1868	X	X	MLP, SPPA	MA, RN, PB, PE, AL, BA, RJ, SP

Table 2: Distribution of the Endemic Cnidaria Scleractinia on the Brazilian reefs ecosystems. MLP - Manuel Luiz Parcel, ROA - Rocas Atoll, FNA - Fernando de Noronha Archipelago, SPPA - Saint Peter and Saint Paul Archipelago.

TAXA	DISTRIBUTION			
	Reef Coast	Bahia Coast	Sites offshore	States of Brazil
Phylum Bryozoa				
Class Gymnolaemata				
Order Ctenostomata				
<i>Amathia brasiliensis</i> Busk, 1886		X	FNA	BA, EEZ
<i>Arachnoidella evelinae</i> (Marcus, 1937)	X			AL, SP, PR
<i>Mimosella firmata</i> Marcus, 1938	X			AL, PE, SP
Order Cheilostomata				
<i>Allantocallopora cassidaeforma</i> d'Hondt & Schopf, 1984	X			PE, EEZ
<i>Antopora parva</i> (Canu & Bassler, 1928)	X	X		AL, BA, EEZ
<i>Aplousina errans</i> Canu & Bassler, 1928		X		BA, EEZ
<i>Beania correiae</i> Vieira, Migotto & Winston 2010	X			AL
<i>Celleporaria atlantica</i> (Busk, 1884)		X		BA, ES, SP
<i>Celleporaria carvalhoi</i> (Marcus, 1939)		X		BA, ES, SP
<i>Celleporaria imbellis</i> (Busk, 1881)		X		BA
<i>Celleporaria schubarti</i> (Marcus, 1939)	X	X		PE, BA
<i>Columnella brasiliensis</i> (Busk, 1884)	X			AL, EEZ
<i>Columnella gracilis</i> (Busk, 1884)	X			AL, EEZ
<i>Cornucopina navicularis</i> (Busk, 1884)				AL, EEZ
<i>Cuneiforma asymetrica</i> d'Hondt & Schopf, 1984	X			PE, EEZ
<i>Cupuladria monotrema</i> (Busk, 1884)	X			PE, BA, SE, RJ, EEZ
<i>Domosclerus auriculatus</i> (d'Hondt & Schopf, 1984)	X			PE, EEZ
<i>Domosclerus corrugatus</i> (Busk, 1884)	X			AL, EEZ
<i>Dubiocellaria biaviculata</i> d'Hondt & Schopf, 1984	X			PE, EEZ
<i>Euginoma biseriata</i> d'Hondt 1981	X			PE, EEZ
<i>Euginoma reticulata angulata</i> d'Hondt & Schopf, 1984	X			PE, EEZ
<i>Farciminaria biseriata</i> Waters, 1888	X			AL, EEZ
<i>Gemelliporidra ornatissima</i> Canu & Bassler, 1928		X		BA, EEZ
<i>Hippaliosina imperfecta</i> (Canu & Bassler, 1928)		X	ROA	BA, ES EEZ
<i>Hippothoa brasiliensis</i> Morris, 1980	X			AL, PE
<i>Metrarabdotos tuberosum</i> Canu & Bassler, 1928	X			PB, EEZ
<i>Metrarabdotos unguiculatum</i> Canu & Bassler, 1928		X		BA, ES, EEZ
<i>Mollia elongata</i> Canu & Bassler, 1928		X		BA, ES, RJ, EEZ
<i>Pseudosclerodanus reticulatus</i> (Busk, 1884)	X			PE, EEZ
<i>Rogicka scopae</i> (Canu & Bassler, 1928)		X		BA, SP, EEZ
<i>Schizoporella trimorpha</i> Canu & Bassler, 1928		X		BA, EEZ
<i>Scrupocellaria drachi</i> Marcus, 1955	X			PE, ES
<i>Scrupocellaria micheli</i> Marcus, 1955	X			PE, ES
<i>Semidendrobeatia versicolor</i> (Busk, 1884)	X			PE, ES
<i>Setosellina elegantula</i> d'Hondt & Schopf, 1984	X			PE, EEZ
<i>Setosellina goesi</i> Silen, 1942	X	X		PE, BA, EEZ
<i>Smittipora tuberculata</i> (Canu & Bassler, 1928)	X	X		PB, BA, RJ, EEZ
<i>Steginoporella evelinae</i> Marcus, 1949			FNA	ES, RJ
<i>Stylopoma aurantiacum</i> Canu & Bassler, 1928	X			PE, EEZ
<i>Talivittaticella axiomorpha</i> Gordon & d'Hondt, 1985	X			PE, EEZ
<i>Utinga castanea</i> (Busk, 1884)	X	X		AL, BA, ES, EEZ
<i>Vasignyella ovicellata</i> Vieira, Gordon & Correia 2007	X			AL
Class Stenolaemata				
<i>Cigclisula arborescens</i> (Canu & Bassler, 1928a)		X		BA, RJ, SP, EEZ
<i>Crisia ficulnea</i> Buge, 1979	X	X	SPPA	PE, BA, SE, ES
<i>Crisia pseudosolena</i> (Marcus, 1937)	X			PE, RJ, SP, PR
<i>Nevianipora floridana</i> (Orburn, 1940)		X		BA, SP

Table 3: Distribution of the Endemic Bryozoa on the Brazilian reefs ecosystems. ROA - Rocas Atoll, FNA - Fernando de Noronha Archipelago, SPPA - Saint Peter and Saint Paul Archipelago.

TAXA	DISTRIBUTION			
	Reef Coast	Bahia Coast	Sites offshore	States of Brazil
Phylum Echinodermata				
Class Echinoidea				
<i>Cassidulus infidus</i> Loven, 1874		X		BA, EEZ
Classe Holothuroidea				
<i>Lissothuria braziliensis</i> (Théel, 1886)	X	X		AL, BA
<i>Ocnus braziliensis</i> (Verrill, 1868)	X	X		AL, PE, BA
<i>Ocnus suspectus</i> (Ludwig, 1874)	X			AL
Class Ophiuroidea				
<i>Amphiura kinbergi</i> Ljungman, 1872	X	X		AL, BA, SP, EEZ
<i>Ophiactis Brasiliensis</i> Manso, 1988	X	X		AL, BA, PE, RJ, EEZ
<i>Ophiocnida loveni</i> Ljungman, 1866	X	X		AL, RJ, EEZ
<i>Ophiophragnus luetkeni</i> (Ljungman, 1871)		X		BA, EEZ

Table 4: Distribution of the Endemic Echinodermata on the Brazilian reefs ecosystems.