

The Brachyura and Anomura fauna (Decapoda; Crustacea) in the Arvoredo Marine Biological Reserve on the southern brazilian coast

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(With 1 figure)

Abstract

Eight species of Brachyura and two species of Anomura were registered for the first time on the Santa Catarina coast, in the waters around the Arvoredo Marine Biological Reserve. The animals were collected by scuba divers, between 3 and 22 meters depth, from September 2001 to February 2003. A total of 31 decapod species were collected, and most of the new occurrences had already been registered in the adjacent northern waters.

Keywords: Arvoredo Island, Decapoda, occurrence, Santa Catarina, SCUBA dive.

A fauna de Brachyura e Anomura (Decapoda; Crustacea) na Reserva Biológica Marinha do Arvoredo, costa sul brasileira

Resumo

Oito espécies de Brachyura e duas espécies de Anomura foram registradas pela primeira vez na costa de Santa Catarina, em águas no entorno da Reserva Biológica Marinha do Arvoredo. Os animais foram coletados por meio de mergulho autônomo, entre 3 e 22 metros de profundidade, de setembro 2001 a fevereiro de 2003. Um total de 31 espécies de Decapoda foram coletadas e a maioria das novas ocorrências já haviam sido registradas em águas adjacentes ao norte da Reserva.

Palavras-chave: Ilha do Arvoredo, Decapoda, ocorrência, Santa Catarina, SCUBA.

1. Introduction

The review of Lana et al. (1996) showed that benthic crustaceans were poorly studied on the Santa Catarina coast. A complex current, wind and water mass interaction improves the transport of organisms from tropical, subtropical or even subantarctic areas to the southern coast (Borzone et al., 1999). The species diversity in the Arvoredo Archipelago is the result of the occurrence of tropical and subtropical fauna and recent works have been quantifying these species. Among the ten species of sponges that occurred in the area, four were registered for the first time on the Brazilian coast (Lerner, 1996). In addition, seventeen mollusk species were registered for the first time on the Santa Catarina coast (Wiggers and Magalhaes, 2003). The unique coralline red algal bed (Corallinaceae, Rhodophyta) of the Brazilian southern coast occurs in the main island, where 5 non articulated coralline algae species were registered for the first time in southern waters (Horta, 2000).

There is no scientific report about the crustaceans of the Arvoredo Biological Marine Reserve (Reserva Biológica Marinha do Arvoredo, RBMA) (27° 17' 7" S

and 48° 25' 30" W). However, fishermen and divers usually find shrimps, crabs and lobsters which are illegally captured in the area.

The present work aims to survey the fauna of Brachyura and Anomura in the Arvoredo Biological Marine Reserve. The management plan of the marine reserve has been established after our samplings. It would be possible from now on to follow the changes in the species richness after the improvement of the new activities in the area.

2. Material and Methods

The studied area is close to the Subtropical Convergence (33-38° S), where the Brazilian Current flowing to the south reaches the Malvinas Current, which flows to the north. The South Atlantic Central Water (SACW) is formed in the area of the Convergence and circulates in the South Atlantic Ocean (Silveira et al., 2001). In the Arvoredo Archipelago area the SACW occurs at 20 m depth and the Tropical Shelf Water dominates the surface waters (Chludinski and Bonetti, 2002).

Crustaceans were surveyed from September 2001 to February 2003 at 5 different sites around the Arvoredo Island (Figure 1). Most of the sampling was conducted in the Rancho Norte site, over the coralline algal bed. The animals were collected from 3 to 22 m depth through scuba diving, in fifteen different expeditions. Water temperature and salinity were also recorded. The crustaceans were sought by two divers over the sand, under rocks, inside crevices, inside and over the rhodoliths (free-living forms of non-geniculate coralline red algae), in the middle of macroalgae, and collected and maintained in seawater aquariums. Only three individuals of each species were allowed to be captured by the local environmental agency (IBAMA). The animals were anesthetized with 2% magnesium chloride, fixed with 70% ethyl alcohol, identified and had their range distribution described according to Gomes-Correa (1999), Martins and D'Incao (1996), Melo (1996, 1999a, 1999b), Veloso (1999) and Young (1998). The specimens were deposited in the Departamento de Ecologia e Zoologia Collection of Crustacea of the Universidade Federal de Santa Catarina (LCP/UFSC 001, 002, 003, 004, 005, 008, 009, 010, 011, 013, 014, 015, 016, 017, 018, 019, 020, 021, 022, 023, 024, 025, 026, 027, 028, 029, 030, 031, 032, 033, 034, 035, 036).

3. Results and Discussion

Salinity and temperature data varied from 30 to 36.5‰ and 16.5 to 23 °C, characterizing the presence of Tropical Water and South Atlantic Central Water or Subtropical Water (Emilson, 1959).

A total of thirty one species were collected in the area (Table 1), being 2 Paguridae, 2 Diogenidae and 2 Porcellanidae (Anomura) and most of the Brachyura were Majidae and Xanthidae. Five species of Majidae, one Goneplacidae, one Dromiidae, one Pinnotheridae, one Paguridae and one Diogenidae, comprising 10 spe-

cies, were registered for the first time on the Santa Catarina coast, in the waters around the Arvoredo Marine Biological Reserve (Table 1).

According to the crustacean biogeographic division of South America, Arvoredo Island is located in the Paulista Province (Coelho et al., 1980). Eight species had been previously registered up to São Paulo (Melo, 1996), in the Paulista Province and one in Espírito Santo, which is in the Brazilian Zoogeographic Province (Coelho, op. cit.) and now have their distribution expanded to Santa Catarina. *Paguristes robustus* Forest and Saint Laurent, 1967, was previously recorded in the Argentinean Province; this occurrence should be related to the influence of the cold waters in the area.

Costa (1968) apud Palácio (1982), working with Brachyura, showed a faunistic change between the Abrolhos Archipelago and Cape Frio and another change between São Paulo and Santa Catarina. Patterns of marine species distributions are influenced and limited by frontiers that are very difficult to detect (Melo, 1985). The new occurrence of these species in the Arvoredo area, close to septentrional limit of the tropical fauna of the Paulista Province and the northern limit of the Argentinean Province was already expected with the increase of the samplings.

Marine invertebrate surveys along the Brazilian coast are mainly conducted from otter trawls of fishing boats, oceanographic vessels or snorkeling. Eighty six Brachyuran species and twenty seven Anomuran species have already been compiled by Melo (1996 and 1999) on the Santa Catarina coast and could be found around Arvoredo Island. However, scuba sampling efforts improve the capture of hidden animals in crevices or under rocks. Some species, including some of the new records (Table 2), were collected associated to the rhodoliths. The presence of the rhodoliths was the main force to the structure of the benthic macrofauna community in the algal bed of the

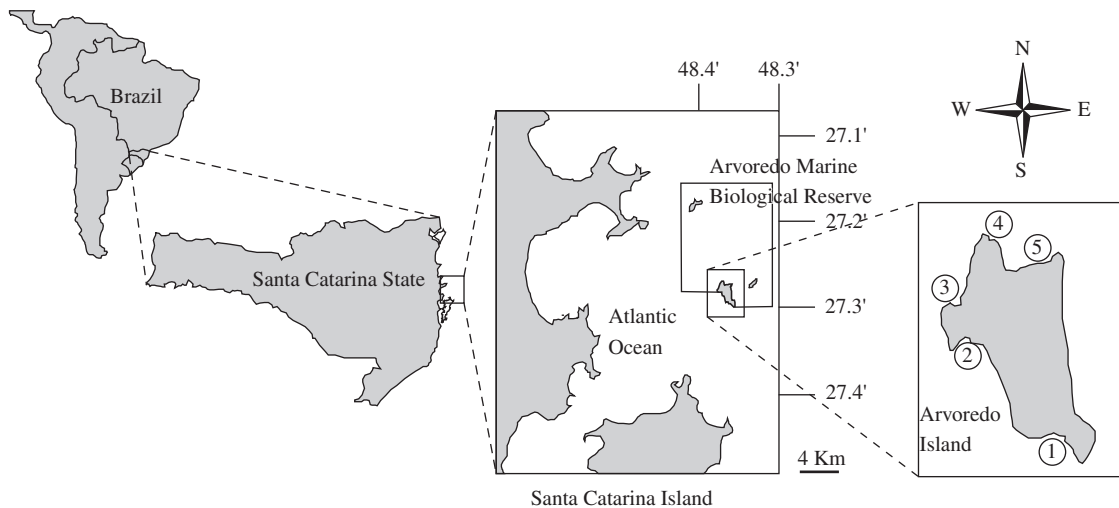


Figure 1. Study area showing the position of the Arvoredo Marine Biological Reserve and the sampling stations: 1) Baía do Farol; 2) Saco do Capim; 3) Rancho Norte; 4) Ponta do Letreiro; and 5) Saco d'Água.

Table 1. Decapods registered in the area of Arvoredo Island (27° 17' 7" S and 48° 25' 30" W), new occurrences in Santa Catarina and previous distribution along the Brazilian coast.

Infraorder and Family	Species	New record	Previous distribution	
ANOMURA				
Diogenidae	<i>Calcinus tibicen</i> (Herbst, 1791)	x	Fernando de Noronha and Ceará to São Paulo	
	<i>Dardanus arrosor insignis</i> (de Saussure, 1858)		Rio de Janeiro to Rio Grande do Sul	
Paguridae	<i>Paguristes robustus</i> Forest and Saint Laurent, 1967	x	Rio Grande do Sul to Argentina	
	<i>Rhodochirus rosaceus</i> (A. Milne Edwards and Bouvier, 1893)		São Paulo to Rio Grande do Sul	
Porcellanidae	<i>Minyocerus angustus</i> (Dana, 1852)		Pará to Santa Catarina	
	<i>Porcellana sayana</i> (Leach, 1820)		Amapá to Rio Grande do Sul	
BRACHYURA				
Calappidae	<i>Calappa gallus</i> (Herbst, 1803)		Alagoas to Rio Grande do Sul	
	<i>Hepatus pudibundus</i> Herbst, 1785		Amapá to Rio Grande do Sul	
Dromiidae	<i>Hypoconcha parasitica</i> (Linnaeus, 1763)	x	Maranhão to São Paulo	
Goneplacidae	<i>Neopilumnoplax americana</i> (Rathbun, 1898)	x	Espírito Santo	
Grapsidae	<i>Pachygrapsus transversus</i> (Gibbes, 1850)		Ilha de Trindade and Ceará to Rio Grande do Sul	
Majidae	<i>Epiatus bituberculatus</i> H. Milne Edwards, 1834	x	Ceará to São Paulo	
	<i>Macrocoeloma camptocerum</i> (Stimpson, 1871)	x	Fernando de Noronha and Piauí to São Paulo	
	<i>Mithraculus forceps</i> (A. Milne Edwards, 1875)	x	Fernando de Noronha, Atol das Rocas and Maranhão to São Paulo	
	<i>Mithrax hispidus</i> (Herbst, 1790)		Pará to Santa Catarina	
	<i>Mithrax tortugae</i> Rathbun, 1920		Espírito Santo to Santa Catarina	
	<i>Pelia rotunda</i> (A. Milne Edwards, 1875)		Pará to Rio Grande do Sul	
	<i>Pitho lherminieri</i> (Schramm, 1867)	x	Fernando de Noronha and Pará to São Paulo	
	<i>Podochela algicola</i> Stebbing, 1914	x	Maranhão to São Paulo	
	<i>Stenorhynchus seticornis</i> (Herbst, 1788)		Amapá to Rio Grande do Sul	
	Parthenopidae	<i>Heterocrypta tommasii</i> Rodrigues da Costa, 1959		Ceará to Rio Grande do Sul
	Pinnotheridae	<i>Tumidothores maculatus</i> (Say, 1818)	x	Alagoas to São Paulo
	Portunidae	<i>Cronius ruber</i> (Lamarck, 1818)		Amapá to Rio Grande do Sul
	Xanthidae	<i>Cataleptodius floridanus</i> Gibbes, 1850		Atol das Rocas, Fernando de Noronha and Ceará to Rio Grande do Sul
		<i>Eurypanopeus abbreviatus</i> (Stimpson, 1860)		Ceará to Rio Grande do Sul
<i>Hexapanopeus paulensis</i> Rathbun, 1930			Pará to Santa Catarina	
<i>Hexapanopeus schmitti</i> Rathbun, 1930			Ceará to Santa Catarina	
<i>Menippe nodifrons</i> Stimpson, 1859			Maranhão to Santa Catarina	
<i>Pilumnus diomedae</i> Rathbun, 1894			Amapá to Rio Grande do Sul	
<i>Pilumnus reticulatus</i> Stimpson, 1860			Pará to Rio Grande do Sul	
<i>Pilumnus spinosissimus</i> Rathbun, 1898			Rio Grande do Norte to Santa Catarina	
Total			10	

Arvoredo Island (Blankensteyn et al., 2003). We could not find other studies in the literature where only scuba-diving was used to sample crustaceans along the Brazilian coast. Crabs were in general very hard to find, especially dur-

ing the day. Most of the time, after 50 minutes searching, we returned on board with two or three different species. There was almost one new record of decapod species in the area per dive (10 new records in 15 dives).

Table 2. Location of the occurrence on the Arvoredo Island and ecological remarks on the new records of Anomura and Brachyura on the Santa Catarina coast.

Species	Site	Habitat and ecological remarks
<i>Calcinus tibicen</i>	Baía do Farol and Saco d'Água.	Over rhodoliths and rocks, easily observed
<i>Paguristes robustus</i>	Saco do Capim and Rancho Norte	Over the rocks and sand, associated to the rhodoliths
<i>Epialtus bituberculatus</i>	Baía do Farol and Rancho Norte	Associated to the macroalgae
<i>Mithraculus forceps</i>	Baía do Farol, Rancho Norte, Saco do Capim and Saco d'Água	Very common inside the rhodoliths
<i>Pitho lherminieri</i>	Rancho Norte	Over, under and inside the rhodoliths
<i>Podochela algicola</i>	Baía do Farol	Associated to the macroalgae
<i>Neopilumnoplax americana</i>	Rancho Norte	Over the sand, under the rocks
<i>Macrocoeloma camptocerum</i>	Baía do Farol	Associated to the macroalgae
<i>Hypoconcha parasitica</i>	Rancho Norte	Moving during the night attached to a single valve of the bivalve <i>Chione pubera</i> Bory Saint-Vicent, 1827
<i>Tumidotheres maculatus</i>	Baía do Farol	Associated to the macroalgae

Calappa gallus Herbst, 1803, was collected only during the night sample in the coralline red algae bed. Its carapace was completely encrusted with the coralline algae and the animals were moving fast over the rhodoliths. *Calappa philargius* Linnaeus, 1758, had also shown night activity along the eastern coast of Thailand and this behavior would prevent the algal encrustation (Becker and Wahl, 1996). However, epibiontic encrustation is also considered a positive interaction, like crab camouflage (Coutress et al., 1970 apud Becker and Wahl, 1996; Maldonado and Uriz, 1992). The pagurids *Rhodochirus rosaceus* A. Milne Edwards and Bouvier, 1893 and *Dardanus arrosor* Saussure, 1858, were freely moving during the day over the rhodoliths but only the shells inhabited by *R. rosaceus* had coralline algal encrustation.

Porcellana sayana Leach, 1820, has a symbiotic relationship with pagurids (Melo, 1999) and this species was registered on the shells inhabited by *Dardanus arrosor insignis*, and not in the abdomen as expected. *Stenorhynchus seticornis* Herbst, 1788, was easily observed, moving and jumping slowly under the rocks. *Mithraculus forceps* A. Milne Edwards, 1875, and *Mithrax tortugae* Rathbun, 1920, were very common inside the rhodoliths.

Scuba diving proved to be a very good option to sample the sea bottom without destruction of the whole environment and to search for animals hidden in microhabitats. Thus, amending the previous scarce sampling along the Santa Catarina coast, ten new records for the area have now been added, with the expansion of the distribution of these species.

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