

Chapter 7

Soft-bottom polychaetes of the Abrolhos Bank

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SUMMARY

- A total of 90 species belonging to 37 families of polychaetes was collected during the Abrolhos RAP survey. The most speciose families were Terebellidae, Spionidae, Orbiniidae, Nereididae and Lumbrineridae.
- This survey added 86 new species records for the Abrolhos Bank.
- 39 sites were sampled, with a mean of 6.2 species per site. This is a very low mean value when compared to that of other comparable soft-bottom surveys. The richest site (21 species, RAP Site 21) was located in the outer part of Paredes Reefs, one of the most southern and coastal sites within the RAP survey area.
- No endemic species for the Abrolhos Bank were found; nevertheless three species (*Scoloplos agrestis*, *Neopseudocapitella brasiliensis* and *Palola brasiliensis*) previously recorded as restricted to nearby areas in Sergipe, Espírito Santo and Rio de Janeiro States, were found for the first time since their original descriptions.
- The species collected were mainly cosmopolitan or shared with the Caribbean Biogeographical Province. However, the cosmopolitan status probably reflects the unresolved taxonomy within some families.
- Many of the most diverse sites were located in areas subjected to recent human disturbances, such as intense fishing effort and sediment input by coastal erosion caused by deforestation. These sites are not within implemented marine protected areas and their resident fauna may be at risk, owing to the low density of populations.

INTRODUCTION

Coral reefs are considered one of the most diverse ecosystems in the marine realm, at least for those organisms directly associated with reef-building species. The adjacent soft-bottom fauna is strongly influenced by reef erosion, which controls the pattern of sedimentation and input of organic matter (see Leão *et al. this volume*). Documenting the diversity of these nearby soft-bottoms contributes to a better understanding of ecological processes and the overall biodiversity of coral reefs and associated ecosystems.

Although the Abrolhos Bank is well documented as a unique ecosystem in the South Atlantic with a mixture of coral reefs, calcareous algae and soft-sediments (Castro 1994), its polychaete fauna is almost unknown. Knowledge of Brazilian coastal polychaetes is primarily based on several surveys from the southern coast, where soft-sediments dominate the continental shelf (Lana 1996). The Abrolhos Region is of great interest for analyzing biogeographical pat-

terns because it is located near the boundary of two biogeographic units (the Caribbean and the Paulista sub-provinces, *sensu* Palácio 1982).

Previous knowledge of soft-bottom polychaete biodiversity from the Abrolhos Bank was restricted to scattered samples provided by a few oceanographic surveys. Many historical expeditions, such as those of the *Challenger* and the *Eugenie*, collected material along the Brazilian coast but did not mention precise localities, except for those situated near important cities and harbors (*e.g.*, Rio de Janeiro, Recife). The only surveys that referred to specimens collected at the Abrolhos Bank were conducted by Augener (1931) on the *Meteor* expedition, and by Rullier and Amoureux (1979) on the 1966 *Calypso* expedition. Samples were also collected and deposited in taxonomic collections by several researchers, but for the most part these consisted of coral reef-associated polychaetes from hard bottoms. As a result of this limited collecting effort, only 22 polychaete species, including those from both hard and soft bottoms, had been recorded so far for the entire Abrolhos Bank.

METHODS

Six soft-bottom samples were obtained at each RAP Site surveyed (total of 39 sites), using cylindrical corers of 100 mm diameter. Collected material was sieved in a 0.5 mm mesh and fixed in 10% formalin. Collections were preserved in 70% ethanol and sorted in the laboratory. All samples were collected together with samples used for sediment analyses (Leão *et al.* *this volume*).

Identifications at the family and generic levels were performed according to taxonomic criteria adopted by Beesley *et al.* (2000) and Fauchald (1977). Species identification was performed using an optical microscope. Specimens are deposited in the Polychaete Collection of the Polychaete Laboratory, Department of Zoology, Federal University of Rio de Janeiro (IBUFRJ).

RESULTS

A total of 90 species of polychaetes belonging to 37 families were found during the RAP survey (Appendix 1). The most diverse families were Terebellidae (7 spp.), Spionidae (7 spp.), Orbiniidae (6 spp.), Lumbrineridae (6 spp.) and Nereididae (6 spp.). Table 1 shows the 10 richest RAP Sites. The mean number of species per site was 6.2, a very low number when compared to several soft-bottom surveys from other tropical areas (Alongi 1990).

One characteristic of tropical areas is their high proportion of locally rare species. The Abrolhos region conforms to this pattern, with 64 of the total 90 species identified during this survey occurring at only one or two sites. Only one species, the trichobranchid *Terebellides anguicomus*, was found at more than 10 sites, and only 9 species at more than 5 sites.

Table 1. Ten richest RAP sites for polychaetes.

RAP Site	Location	Number of species
21	Paredes Reefs	21
6	Coroa Vermelha Reef	19
14	Itacolomis Reefs	17
43	Paredes	15
20	Paredes Reefs	12
27	Caladas Falsas	12
1	Nova Viçosa Reef	11
36	Paredes Reefs	10
35	Abrolhos Channel	9
37	Paredes Reefs	8

Table 2. Geographic subunits and corresponding RAP sites.

Subunit	Location	RAP Sites
A	Coroa Vermelha	1, 6, 22
B	Popa Verde	3, 4, 5
C	Abrolhos Channel	26, 29, 35
D	Abrolhos Island	30, 31, 33, 34
E	Paredes Reef	19, 23, 44, 45
F	Timbebas	38, 39, 40, 41
G	Itacolomis	11, 12, 14, 15, 17, 18

For spatial analysis, data from some sites located close to each other were clustered, *a priori*, into 7 geographical subunits, listed in Table 2. The richest subunits were E (37 spp.) and A (31 spp.) at Paredes and Coroa Vermelha Reefs, respectively. The outer part of Paredes is under the strong influence of the Brazilian Current, which attains its highest velocity along the Brazilian coast (Arz 1996) and probably does not contribute to deposition of terrigenous sediments. Thus, bottoms are composed mainly of carbonatic sediments originating from reef erosion (Theilen and Figueiredo 1996). Coroa Vermelha, located in the southern part of the surveyed area, is also one of the most coastal of the Abrolhos reefs. Subunits C and F, both located in a Marine Protected Area (Abrolhos Marine National Park) contained relatively few species (19 spp. each). Of the five richest sites, four were composed of bottoms with dense banks of seagrass (*Halophylla* sp.), indicating that these soft-bottom environments provide a great variety of micro-habitats that function as shelter for soft-bottom faunas (Edgar 1990).

Eighteen of the species recorded from the Abrolhos Bank prior to this survey were not found during this expedition (Table 3), as they are mainly associated with hard bottoms. A zoogeographic analysis of Abrolhos polychaetes is presented

Table 3. Species previously recorded from the Abrolhos Bank but not found during the RAP survey.

<i>Arabella iricolor</i> (Montagu, 1804)
<i>Chaetosyllis</i> sp.
<i>Cirratulus</i> cf. <i>africanus</i> Gravier, 1906
<i>Eunice cariboea</i> Grube, 1856
<i>Eunice filamentosa</i> Grube, 1856
<i>Eunice fucata</i> Ehlers, 1887
<i>Haplosyllis spongicola</i> (Grube, 1855)
<i>Harmothoe ernesti</i> Augener, 1931
<i>Hydroides parvus</i> (Treadwell, 1901)
<i>Hypsicomus elegans</i> (Webster, 1884)
<i>Notomastus latericeus</i> Sars, 1851
<i>Oenone fulgida</i> Savigny, 1818
<i>Pista cristata</i> (Müller, 1776)
<i>Platynereis magalhaensis</i> Kinberg, 1866
<i>Polyophthalmus pictus</i> (Dujardin, 1879)
<i>Typosyllis armillaris</i> (Müller, 1776)
<i>Typosyllis hyalina</i> (Grube, 1863)
<i>Typosyllis variegata</i> (Grube, 1860)

Table 4. Zoogeographic analysis of Abrolhos polychaetes.

Distribution	Percent of species
Cosmopolitan	24 %
Tropical Western Atlantic	19 %
Eastern & Western Atlantic	16 %
Circumtropical	12 %
Atlantic & Pacific American coasts	11 %
Caribbean & Northwestern Atlantic	9 %
Southwestern Atlantic	4 %
Paulista Sub-province	3 %
Pacific	2 %

in Table 4. Each category in this table is mutually exclusive (*i.e.*, each species can occur in only one category).

DISCUSSION

The number of new species occurrences for the Bank (86) is extremely high, but many of these species already were recorded from southern and northern areas of the Bank, and therefore were expected to occur in the general survey area. Some species, such as *Sigambra grubei*, *Aglaophamus juvenalis*, *Ninoe brasiliensis*, *Magelona posterolongata* and *Magelona variolamellata*, were known only from southern Brazil, south of Cabo Frio, an area that forms the boundary between two

biogeographical sub-provinces (Paulista and Caribbean, *sensu* Palácio 1982). Some species were known only from their original descriptions. For example, *Neopseudocapitella brasiliensis* was described as a new genus and species from only three specimens from the northern coast of Bahia. During the present survey, 19 specimens were collected, mainly at the southernmost RAP Sites (1, 6, 21, 27). The known distribution of *Scoloplos agrestis*, described from the coast of Sergipe State, similarly was extended southward. This species was found scattered throughout the RAP survey area. *Palola brasiliensis*, recently described from southern Brazil, also had its geographical distribution extended to the Abrolhos Bank.

Spirobranchus giganteus and *Eurythoe complanata*, despite being typical of hard-bottom environments, were found in some soft-bottom samples. Their likely origin is nearby reefs that deposited them in the sediment through erosion. Several samples identified only to the generic level, as well as several species identified provisionally, are likely to represent new taxa. Species in this category include *Pista* sp., *Amaena* cf. *acraensis*, *Prionospio* cf. *steenstrupi*, *Cheatozone* sp. and *Therochaeta* sp.

A swarming event of the nereidid *Platynereis dumerilii* (Audouin and Milne-Edwards, 1833) was recorded during a night dive on February 23, at Siriba Island (RAP Site 31). This event is linked to the phenomenon known as epitoky, in which benthic adults transform to gamete-carrying individuals capable of swimming upward through the water column. This behavior insures synchronization of mass spawning activity. Masses of swimming specimens of *Platynereis dumerilii* have been recorded during summer months in several places, normally showing lunar periodicity and swarming during the dark phase of the moon (Petibone 1963). In the Abrolhos Archipelago, this event was recorded at least 7 times in all seasons (January, February, March, August, September and December) but at different intensities depending on the lunar phase. This species was not included as part of the RAP inventory (Appendix 1) because it does not occur on soft-bottoms. It is usually found in rocky crevices or among algae, sponges, ascidians and corals.

The high number of rare species (*i.e.*, those that occurred in only one or two sites) and analysis of a species-sampling effort curve indicate that a greater sampling effort would be necessary to obtain an accurate estimation of polychaete diversity of the Bank. Nevertheless, despite this limited collecting effort, the number of species known from the Abrolhos Bank has increased from 22 to 108. The richest sites were located mainly in areas that are influenced by human activities (see Leão 1995), such as Coroa Vermelha, Paredes and Itacolomis Reefs. The input of terrigenous sediment due to coastal erosion and deforestation can change community composition, as many polychaetes show a high preference for specific sediment types (Alongi and Christoffersen 1992). Furthermore, these same sites are situated near coastal cities exposed to increasing fishing pressure. This is a likely source of disturbance to benthic communities, particularly when shrimp-dredging gear is used (Engel and Kvitek 1998).

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