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SIPUNCULA ASSOCIATED WITH BRANCHING FIRE CORAL *(MILLEPORA ALCICORNIS)* IN A MARINE PROTECTED AREA IN NORTHEASTERN BRAZIL

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Key words: Sipuncula, Calcified hydroids, associated macrofauna, SCUBA, fire coral.

ABSTRACT

Most hard substrata, such as corals, are colonized by burrowing or encrusting organisms. Sipunculid worms are commonly observed burrowing in calcareous substrata, especially in coral skeletons or dead sections of living corals. The objective of the present study was to identify and quantify species of sipunculid worms associated with beds of branching fire coral *(Millepora alcicornis)* in a marine protected area of Rio Grande do Norte, Brazil. The selected colonies were wrapped in plastic bags to avoid loss of associated fauna and then detached from the substratum with a hammer and chisel. Samples were fixed in 4% formalin during 24 hours. In the laboratory each colony was carefully fragmented the sipunculids were removed without causing damage to their structure. The specimens retreated were preserved in 70% alcohol. A total of 38 specimens were found from 11 colonies. The sipunculids belonged to 4 species and 3 families and the density ranged from 1 to 17 individuals/dm^3. Sipunculid worms contribute actively to the erosion in organisms with calcareous skeletons making them brittle.

INTRODUCTION

More than half the animal species in the world live inside or attached to the surface of other organisms in order to secure a substratum and/or source of nourishment (Townsend *et al*., 2006). Most hard substrata, such as corals, are colonized by burrowing or encrusting organisms (Zuschin *et al*., 2001). The live coral offer a rich variety of habitats for countless species, both sedentary and mobile (Díaz-Castañeda & Almeda-Jauregui, 1999; Reed & Mikkelsen, 1987).

Sipunculid worms are commonly observed burrowing in calcareous substrata, especially in coral skeletons or dead sections of living corals (Risk & MacGeachy, 1978). Many genera and species have been identified, but although burrowing sipunculids are known to contribute to the erosion of coral reefs by undermining their supportive structures (Rice & Macintyre, 1982), little data is available regarding their actual role in bioerosion (Kleemann, 2001).

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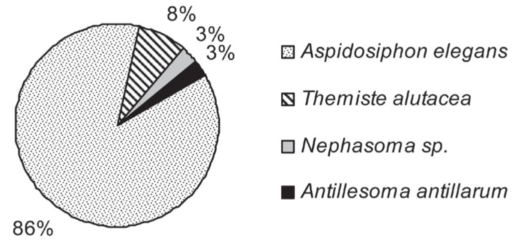

Figure 1:
Sipunculid worm species and number of specimens retreated from colonies of branching fire coral (Millepora alcicornis) *from a marine protected area off Rio Grande do Norte, Brazil.*

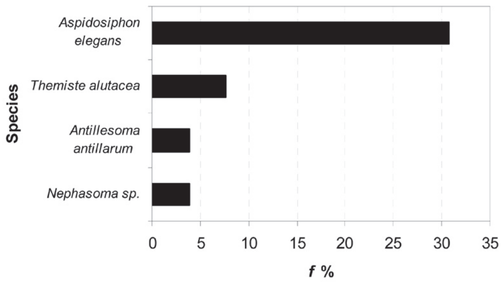

Figure 2:
Relative frequency of sipunculid worm species retreated from colonies of branching fire coral (Millepora alcicornis) *from a marine protected area off Rio Grande do Norte, Brazil.*

The burrowing mechanism of coral reef-associated sipunculids has not been completely clarified (Hutchings, 1986) but appears to involve chemical dissolution and mechanical abrasion (Kleemann, 2001).

The objective of the present study was to identify and quantify species of sipunculid worms associated with beds of branching fire coral *(Millepora alcicornis)* in a marine protected area of Rio Grande do Norte, Brazil *(Área de Proteção Ambiental Estadual dos Recifes de Coral)*.

MATERIALS AND METHODS

The protected area includes a number of banks *(do Cação, Maracajaú, Rio do Fogo and Cioba)* and channels, along with other structures not yet fully mapped (MMA, 2003).

Samples for the present study were collected from the bank of *Maracajaú*, at 5 km off a coastal community by the same name and at approximately 60 km from Natal, capital of Rio Grande do Norte, Northeast Brazil. The reefs in this location cover an area of 9 x 2 km^2. The depth is 1-4 m at low tide (Feitosa *et al*., 2002). The water is warm (average temperature: 28º C), shallow and clear most of the year (MMA, 2003).

Samplings were performed in July and November, 2004, and in February, 2005. Outcroppings with beds of branching fire coral were georeferenced and marked out with buoys by skin divers. Subsequently scuba divers chose one random coral colony on each outcropping establishing a total of 26 sampling locations.

The selected colonies were wrapped in plastic bags to avoid loss of associated fauna and then detached from the substratum with a hammer and chisel. Samples were fixed in 4% formalin during 24 hours.

In the laboratory each colony was carefully fragmented using a hammer and chisel and the sipunculid worms were removed with tweezers and spatulas without causing damage to their structure. The specimens retreated were preserved in 70% alcohol for subsequent triage and identification.

RESULTS AND DISCUSSION

A total of 38 specimens were retreated from 11 colonies. The sipunculids belonged to 4 species and 3 families (Table 1). The density ranged from 1 to 17 individuals/dm^3.

The sipunculid worms were identified as infauna. The most abundant and frequent species observed was

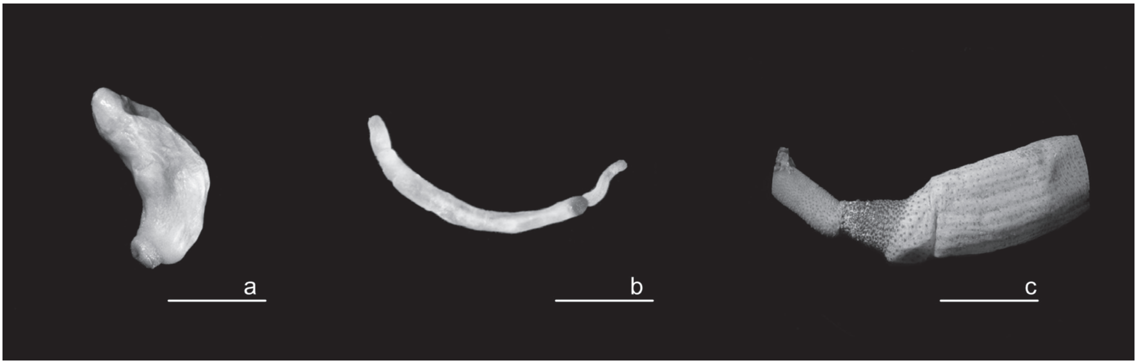

Figure 3:
Sipunculid worm species retreated from colonies of branching fire coral (Millepora alcicornis) *from a marine protected area off Rio Grande do Norte, Brazil. a.* Themiste alutacea *(scale = 0.3 cm); b.* Aspidosiphon elegans *(scale = 1 cm); c. A*ntillesoma antillarum *(scale = 0.75 cm).*

Aspidosiphon elegans (86% of retreated specimens) (Figures 1-3b). The other species observed were *Themiste alutacea* (Figures 1-3a), *Nephasoma* sp. (Figures 1 and 2) and *Antillesoma antillarum* (Figures 1-3c).

According to Rice, 1976 the sipunculid worms were found at the bottom and inside the calcareous skeleton of the coral colonies and should therefore are considered important members of the local burrowing fauna. The five genera most commonly associated with burrowing in calcareous structures *(Aspidosiphon, Cloeosiphon, Lithacrosiphon, Paraspidosiphon and Phascolosoma)* were represented by the species *(Aspidosiphon elegans* and *Antillesoma antillarum [Phascolosoma antillarum]).*

The most abundant species in our study *(Aspidosiphon elegans)* has also been reported to be very abundant in dead sections of live *Porites* sp. (Rice, 1970) and in colonies of *Acropora* sp. and *Porites* sp. (Rice & Macintyre, 1982). Burrowing activity of *Aspidosiphon elegans* was also reported by McCloskey (1970), Risk & MacGeachy (1978), Hutchings (1986), Tsuchiya and coworkers (1986), Pichon (1995), Moreno-Forero *et al*. (1998) and Tribollet *et al*. (2002), but no information on abundance was provided.

Based on the present findings and on previous studies describing the same species from different regions, it would seem that sipunculid worms do not associate with an exclusive host coral species but

Table 1:
Absolute abundance (N) of sipunculid worm species retreated from colonies of branching fire coral (Millepora alcicornis) *from a marine protected area off Rio Grande do Norte, Brazil.*

Families	Species	N
Aspidosiphonidae	*Aspidosiphon elegans*	33
Golfingiidae	*Themiste alutacea*	3
	Nephasoma sp.	1
Phascolosomatidae	*Antillesoma antillarum*	1

attribute more importance to the substratum (coral skeleton) when choosing a habitat.

Importantly, by associating with organisms with calcareous skeletons sipunculid worms contribute actively to the erosion of such structures making them brittle (Rice & Macintyre, 1982). However, although no conclusive estimates are available regarding the size of the impact of sipunculid worms on the bioerosive processes of coral reefs (Rice, 1969, 1976), some authors believe it to be of minor importance (Risk & MacGeachy, 1978).

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