

Millepora alcicornis (CNIDARIA: HYDROZOA) AS
SUBSTRATE FOR BENTHIC FAUNA

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More than half of the world's species live inside or on other organisms, where they find conditions favorable to their growth (TOWNSEND et al., 2006) and the majority of hard substrata, including the coralline ones, are colonized by perforating and fouling organisms (ZUSCHIN et al., 2001). The living corals create a variety of habitats for a large number of species, giving support for sedentary organisms and food or shelter for mobile ones (REED; MIKKELSEN, 1987; DÍAZ-CASTAÑEDA; ALMEDA-JAUREGUI, 1999).

Many taxonomic groups are found associated with corals, including non-colonial organisms such as Crustacea, Mollusca, Polychaeta and Sipuncula, and colonial ones such as Porifera. Each colony forms a community whose members live in a close relationship, though to establish the limits between the diverse types of interactions is not always easy (DAJOZ, 2005). The purpose of this study is to test the hypothesis that the diversity and density of the macrofauna associated with live colonies of *Millepora alcicornis* is correlated with the volume of the colony in the "Área de Proteção Estadual dos Recifes de Coral (RN)" in Northeastern Brazil.

The study area (Maracajaú Reef) is located 5 km from the beach, being 9 km in length and 2 km in width, with depths that vary from 1 to 4 meters at low tide (FEITOSA et al., 2002). The waters of the area are warm (average 28°C) and calm during most the year (MMA, 2003). The samples were collected in July and November of 2004 and February of 2005, when 26 reefs where *Millepora alcicornis* colonies had been located were marked with buoys, by snorkeling. Later, by SCUBA diving, one colony of each reef was chosen randomly and samples were collected from it. The colonies were placed in plastic bags to prevent the loss of the vagile fauna and then extracted from the substratum with the aid of hammer and chisel. Later, the samples were fixed in 4% formalin solution for 24 hours. Each colony was examined, in the laboratory, for

removal of the vagile epifauna. In order to measure the colonies' respective volumes, they were placed in containers with a known volume of water. The colonies were carefully broken up, with hammer and chisel, and the animals carefully removed to prevent damage. The organisms found were preserved in 70% alcohol before sorting and identification. The macrofauna was analyzed with the use of Shannon-Weaver's diversity (H'), Pielou's equitability (J) and Margalef's species richness indices, using the Primer 5 (Windows 5.2.4.) program. The density (ind./cm³), the number of individuals (n) and the number of species (s) were compared to the size of the colonies and the epifauna was compared with the infauna, by means of Spearman's correlation coefficient (r), using the Statistical program (Windows 5.0).

Ninety-five (95) non-colonial species and 1,234 organisms were found in association with *Millepora alcicornis*. Collected colonies had a volume that varied from 130 to 3146 cm³ (863 ± 647 cm³) and a density that varied from 0.01 to 0.27 ind./cm³ (0.07 ± 0.06 ind./cm³). The individuals (n) and species (s) numbers correlated significantly with the colony volume (p<0.01) (R= 0.56 and 0.52, respectively), the correlation being considered moderate. The animals of the epifauna were more abundant than those of the infauna in both number of individuals and number of species, representing 74% and 72% of the total, respectively. The relation between the number of individuals of the epifauna and those of the infauna was not statistically significant (p> 0.05).

The animals found in this study belonged to six taxa (Crustacea, Echinodermata, Mollusca, Nemertea, Polychaeta and Sipuncula).

The non-colonial organisms found in association with *Millepora alcicornis* belonged mainly to the taxon Crustacea that occurred in 93% of the samples, followed by Polychaeta (76%), Mollusca (69%), Sipuncula (42%), Echinodermata (38%) and Nemertea (7%).

Eighty-six colonies belonging to 26 species of 3 taxa (Cnidaria, Porifera and Tunicata) were found in association with *Millepora alcicornis*. Tunicata was represented by the largest number of colonies, followed by Porifera and Cnidaria. Porifera presented the largest number of species, followed by Cnidaria and Tunicata.

The spatial distribution of the macrofauna in the *Millepora alcicornis* showed three distinct regions: base, body and extremities. The basal region, next to the substratum, presented the majority of the individuals found in association with *M. alcicornis*. Some individuals of the vagile fauna such as shrimps and ophiuroids, had been found in small crevices and cracks. On the other hand, only barnacles were observed at the extremities of the colonies.

The ecological relationships between corals and associated organisms are hard to establish, due mainly to the absence of previous studies and the difficulty involved in making observations of the living organisms. However, it was possible to observe that some organisms, such as ovigerous females of Caridea and Isopoda and young individuals of Polyplacophora, use *Millepora alcicornis* as shelter. The greater part of the fauna found in association with *Millepora alcicornis* were located at the base of the coral. Ayal and Safriel (1982) considered the hypothesis that the great diversity of species found in coral reefs is related to predation, as their presence in a protected environment, such as the basal coral region, would allow the development of young forms that would later colonize other regions of the reef and serve as food for other animals.

The contact of boring organisms with the coralline substratum occurs, probably, through the larvae (MCCLOSKEY, 1970), which penetrate the coral (HUTCHINGS, 1986). However, Cantera et al. (2003) considered that species of ramified corals exert a control over the distribution and abundance of the endolithic fauna, where the living corals function as a barrier to the larval settling (MACGEACHY; STEARN, 1976). The settling of these larvae might be facilitated by the presence of injuries provoked in the coral by predation (WITMAN, 1988; ZUBIA; PEYROT-CLAUSADE, 2001). In *Millepora alcicornis*, the nematocyst cells in the epidermis can constitute a barrier to the larval settling. Young (1986) observed that nearly all the colonies of *Millepora* spp. from the reefs of Picãozinho (PB, Brazil) had suffered intense scraping by fish. These injuries caused by predation could promote the entrance of the larvae in the coral skeleton. However, in this present study, no predation by fish was observed.

MacGeachy and Stearn (1976) comment that the control of the infauna can also be achieved by the epifauna, the growth of the fouling organisms of which can block the openings of infauna and avoid the

larval settling. However, in this study, there was no significant correlation between the infauna and epifauna values. There was, on the other hand, a significant correlation (although moderate) between fauna and the colony's volume, indicating that the number of individuals and species of the associated organisms increase with the size of the colony.

McCloskey (1970), with *Oculina arbuscula*, MacGeachy and Stearn (1976), with *Montastrea annularis*, and Tsuchiya et al., (1986), with *Favona frondifera*, showed that the oldest corals possess proportionally larger numbers of holes from sponges, clams, sea worms and sipunculids. However, Austin et al. (1980) have shown that the individual density for coral diminishes with the increase of the size of the colony in *Pocillopora damicornis*.

Finally, there was a significant correlation between the diversity and density of the fauna and the colony's volume, indicating that the number of individuals and species of the associated organisms increase with the size of the colony.

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