

## DO GIANT BARNACLES CONTRIBUTE TO DEEP-WATER BIOGENIC REEF FORMATION IN MALTESE WATERS?

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### Abstract

Deep-sea ROV surveys in the west Malta Graben allowed re-evaluation of previous work on the association of the giant barnacle, *Pachylasma giganteum*, with cold-water corals and other habitat-forming species, and this species' contribution to formation of biogenic structures. While only a minor contributor to habitat architecture when anthozoans and other large sessile species are dominant, *P. giganteum* may become a habitat-former in the absence of competing species.

**Keywords:** *Deep sea ecology, Zoobenthos, Sicily Channel*

**Introduction:** Previous research [1] suggested that the giant barnacle *Pachylasma giganteum* contributes significantly to the overall architecture of cold-water coral (CWC) habitats south of Malta. This species had been found covering up to 25% of the available space in localised patches, forming distinct aggregations with little intermingling of scleractinians and barnacles. Here we examine in more detail the contribution of these barnacles to biogenic formations along the west Malta Graben.

**Methods:** Video footage from the west Malta Graben was collected at depths down to 1000 m in June-July of 2015 and 2016, using a remotely operated vehicle (ROV) as part of the 'LIFE BaHAR for N2K' ("Benthic Habitat Research for Marine Natura 2000 Site Designation", <http://lifebahar.org.mt/>) project. Information on *P. giganteum* formations, including density and interaction with other habitat-forming species, was extracted from this footage.

**Results & Discussion:** *P. giganteum* was recorded from over 80% of the ROV dives that surveyed hard substrata in the west Malta Graben, showing it is a widespread species. A total of over 4600 individuals of this species were collectively recorded from areas with both high and low CWC densities (Fig. 1). The surveys covered a total area of 0.052 km<sup>2</sup>, with hard bottom substrata covering approximately 0.04 km<sup>2</sup> of this. Other barnacles of the suborder Balanomorpha were also present, but only at exceedingly low abundances (<0.32% of all barnacles encountered).

Where CWC density was high, *P. giganteum* tended to occur as small, isolated aggregations (<30 individuals) with overall low density; barnacles in these clusters accounted for approximately 18.5% of the total recorded abundance of *P. giganteum*. Such clusters were usually observed on raised ridges or on erect dead branches of corals. This could be due to direct competition for space with the anthozoans, or because the CWC frameworks reduce water movement allowing more sedimentation and thus restricting barnacles to 'elevated' positions. However, a limited number of *P. giganteum* (≈3.5% of the total number of individuals of this species) were recorded from areas characterised by low CWC density where other habitat-forming species such as sponges were present, implying some interspecific competition.

The highest *P. giganteum* densities were recorded from areas where other habitat-forming species were absent or sparse; around 78% of all the *P. giganteum* individuals were present in these areas. In such circumstances, the barnacles were attached directly to the hard substratum and generally occurred in clusters that covered large parts of the bottom; however, the barnacles did not form raised structures.

The present results suggest that the contribution of *P. giganteum* to CWC habitat architecture is relatively minor compared to that of the anthozoans. However, *P. giganteum* can be an important habitat-former on hard substrata that are not dominated by CWCs. Still, there is no evidence that the barnacles accrete to form raised formations.

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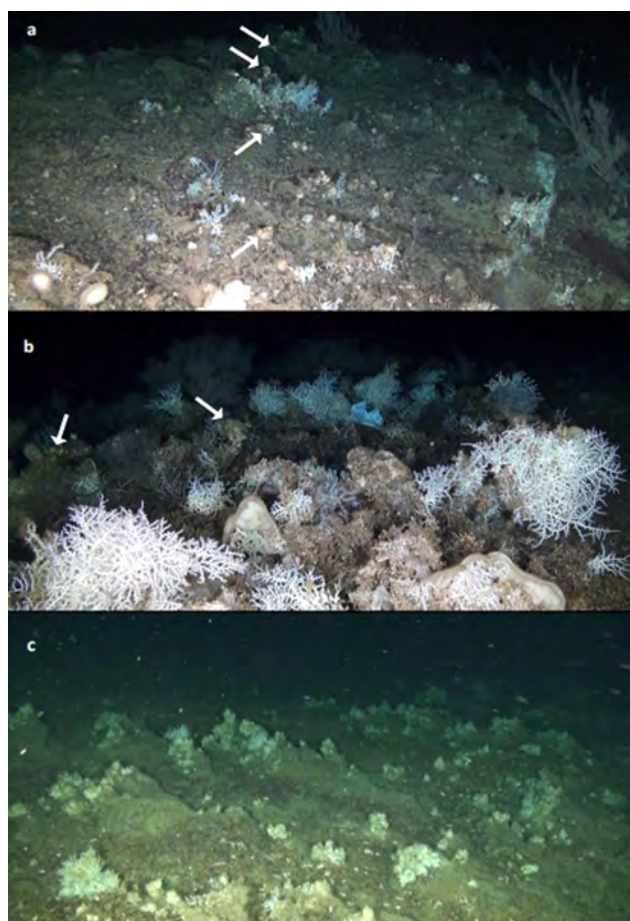


Fig. 1. (a) Low barnacle abundance in low coral density cold-water coral habitat; (b) Low barnacle abundance in high coral density cold-water coral habitat; (c) High barnacle abundance on a hard bottom substratum. Arrows in (a) and (b) indicate barnacle clusters. West Malta Graben; depth ca. 600m.

### References

1 - Angeletti, L., Montagna, P., Schembri, P.J., & Taviani, M. (2011). Giant sessile barnacles contribute to the construction of cold-water coral habitats south of Malta (Mediterranean Sea). Poster presented at: HERMIONE Project 2nd Annual Meeting, 11-15 April 2011, Malaga (Spain) (Retrieved from: <https://www.researchgate.net/publication/267764624>)