

RECENT EVIDENCE THAT THE DEEP SEA AROUND MALTA IS A BIODIVERSITY HOTSPOT

J. Evans ^{1*}, R. Aguilar ², H. Alvarez ², J. A. Borg ¹, S. Garcia ², L. Knittweis ¹ and P. J. Schembri ¹¹ Department of Biology, University of Malta, Msida MSD2080, Malta - julian.evans@um.edu.mt² Fundacion Oceana, Gran Via 59, 28013 Madrid, Spain**Abstract**

Recent ROV surveys of deep-sea areas around the Maltese Islands resulted in the discovery of highly diverse habitats, including extensive rocky areas dominated by living cold water corals and gorgonians at depths of 300–1000 m, a sub-fossil lithistid sponge reef at a depth of ca. 300 m, deep-water caves located at 270–450 m, and vast expanses of soft-bottom habitats, each of which had a rich variety of associated fauna. Most of these habitats are of high conservation interest, highlighting the need for the establishment of offshore marine protected areas in order to protect these very diverse, but highly vulnerable, deep-sea habitats.

Keywords: *Biodiversity, Deep sea ecology, Zoobenthos, Malta Trough, Sicily Channel*

Introduction

The diversity of the Mediterranean deep sea is poorly known, but has received increased research attention in recent years [1]. This is particularly true for hard substratum communities, which could not be studied in detail until the advent of Remotely Operated Vehicle (ROV) exploration that has led to the discovery of highly diverse assemblages such as cold water coral (CWC) reefs [2]. One of the five CWC provinces known from the Mediterranean is located in Maltese waters (the ‘South Malta CWC province’) [2], but apart from this area, observations of the deep-sea surrounding the Maltese Islands are scant and mainly based on areas with muddy bottoms studied through trawl surveys.

Material and Methods

During June–July 2015, Maltese deep-sea areas were surveyed by the R/V ‘Oceana Ranger’ using a Saab Seaeye Falcon DR ROV as part of the project ‘LIFE BaHAR for N2K’ (‘Benthic Habitat Research for Marine Natura 2000 Site Designation’, <http://lifebahar.org.mt/>). The surveys were carried out within the 25 nautical mile Fisheries Management Zone (Figure 1) around the Maltese Islands and focused on previously unstudied regions such as the Malta Graben.

Results and Discussion

The ROV surveys resulted in the following new findings regarding deep-sea habitats in Maltese waters:

- ◆ New areas with extensive and diverse CWC assemblages at depths of 300–1000 m extending some 20 km along the Malta Graben, including black coral (*Leiopathes glaberrima*) forests at 300–400 m and predominantly white corals (*Madrepora oculata* and *Lophelia pertusa*) in waters deeper than 500 m, with some areas dominated by the gorgonian *Callogorgia verticillata*, together with other less abundant habitat-forming species such as *Acanthogorgia hirsuta*, *Villogorgia bebrycoides*, *Paramuricea macrospina*, *Dendrobrachia bonsai*, and *Muriceides lepida* and a high diversity of associated fauna (especially sponges, echinoderms, molluscs and crustaceans).
- ◆ A dead (possibly fossil) lithistid sponge reef located north of Gozo at a depth of ca. 300 m, and extending over a 7 km wide area, serving as a substratum for several species including *Bebrycia mollis*, *C. verticillata*, *V. bebrycoides*, *Stenocyathus vermiformis*, bryozoans, sponges, ophiuroids and hydroids.
- ◆ Deep-water caves located west of Gozo at depths of 270–450 m.
- ◆ Extensive soft-bottom areas with epibenthic species such as *Funiculina quadrangularis*, *Isidella elongata*, *Pennatula* spp., and in some areas *Kophobelemnion stelliferum* and *Thenea muricata*, as well as motile echinoderms and crustaceans (including *Nephrops norvegicus*).
- ◆ An overall high species diversity, with some 75 fishes, 55 cnidarians, 35 crustaceans, 32 molluscs, 21 echinoderms and 15 sponges identified so far from a preliminary analysis of the ROV video footage, as well as tunicates, bryozoans, brachiopods and annelids.

These findings indicate that the deep-sea around Malta represents an important biodiversity hotspot with a variety of different assemblages dominated by suspension feeders (mainly cnidarians and sponges) as habitat-forming taxa. The Malta Graben, in particular, seems to serve as a conduit transporting organic matter and nutrients to deep water, thus making conditions favourable for such suspension feeders, which in turn are accompanied by a high diversity of associated fauna. Reefs such as those formed by CWC and lithistid sponges are included in Annex I of the EU ‘Habitats Directive’ (Natural habitat types of

Community interest whose conservation requires the designation of special areas of conservation) [3], while bathyal muds with facies of *F. quadrangularis* and *I. elongata* and deep-sea caves are also considered to be of conservation interest [4]. The present results highlight the need for the relevant authorities to consider establishment of offshore marine protected areas in order to protect these very diverse, but highly vulnerable, deep-sea habitats.

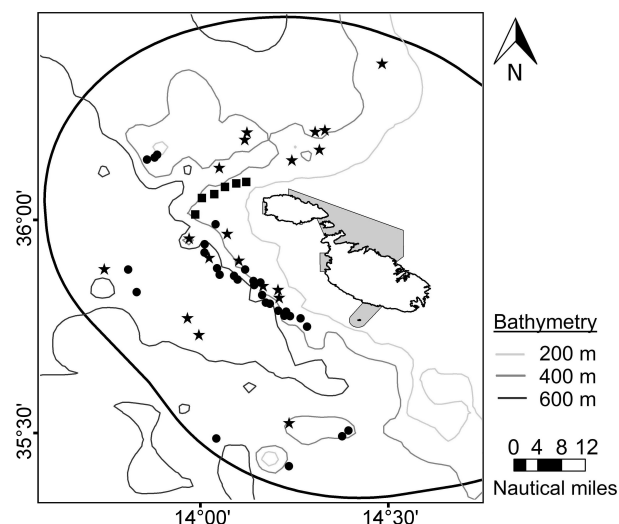


Fig. 1. Map of the Maltese Islands showing the sites with living cold water corals (circles), dead lithistid reef (squares) and muddy bottom (stars) identified through the present survey. The partial extent of the 25 nautical mile Fisheries Management Zone (oval around the Maltese Islands), and the location of current Marine Protected Areas in Maltese waters (grey shading) are also shown.

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