

(Portoroz, Slovenia, 29-30 October 2014)

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## **DISTRIBUTION AND CONSERVATION NEEDS OF A NEGLECTED ECOSYSTEM: THE MEDITERRANEAN VERMETID REEF**

### **Abstract**

*Vermetid reefs are a key intertidal habitat in the Mediterranean. Despite recent evidence of local extinction in the Eastern Mediterranean, their role as habitat engineers and the high numbers of ecosystem services they provide, vermetid reefs are among the least known marine habitats of the Mediterranean. Here we present a literature-based study to assess for the first time their distribution inside the basin and provide evidence of a general lack of protection at Mediterranean scale.*

**Key-words:** vermetid reef, distribution, MPA, Mediterranean Sea

### **Introduction**

In recent years, many studies highlighted the need of protecting under-represented habitats in the Mediterranean Sea (Abdulla et al., 2008; Gabrié et al., 2012). However, most of these studies focused their attention on offshore and deep sea habitats. Only a single study briefly mentioned the presence of the vermetid reefs, reporting their importance for the high biodiversity levels they support (Abdulla et al., 2008). These reefs are built by the vermetid gastropod *Dendropoma petraeum* and the coralline alga *Neogoniolithon brassica-florida* which cements the shells together and triggers vermetid settlement. In temperate waters, vermetid reefs protect the coasts from erosion, regulate sediment transport and accumulation, serve as carbon sinks and provide habitat for a variety of fish and invertebrates of commercial, recreational or conservation interest (Chemello, 2009; Milazzo et al., 2014). Despite their ecological importance, vermetid reefs are not explicitly taken into account in international environmental laws, with the exception of European Habitat Directive (92/43/EEC), that generically protects the biogenic reefs (code 1170). The aim of this work is to point out the distribution of the vermetid reefs, using literature data, and to summarize their conservation status at Mediterranean scale.

### **Materials and methods**

We searched on both scientific (ISI Web of Science and Scopus) and non-scientific (as Google) databases all the references concerning the vermetid reefs in the Mediterranean and in the adjacent Atlantic. All records have been validated – when possible – and georeferenced, approximating their position to that of the nearest place with the same geographical name. Data from Spain and Italy were then validated on our personal databases. Using the Medpan database (<http://www.medpan.org/en/mapamed>) records were interpolated with the presence of marine protected areas (MPAs) or Sites of Community Importance (SCI). We then calculated a frequency of protection, both at national and at Mediterranean scale, trying to identify potential conservation gaps.

## Results

We have collected 112 records of vermetid reefs in the Mediterranean and in the adjacent Atlantic Ocean. Vermetid reefs have a prevailing distribution along the southern Mediterranean coast, below 40°N, with 44 sites in the eastern basin and 68 in the western one. According to the biogeographic classification of Gabrié et al. (2012), the Levantine Sea (29 reefs) and the Tyrrhenian Sea (26 reefs) are the Mediterranean ecoregions with the highest number of reefs, while Spain (29 reefs) and Italy (20 reefs) are the coastal countries with the most conspicuous number of vermetid reefs. Considering MPAs, national marine parks, coastal reserves and SCIs, 49 sites (43.75%) are theoretically protected, while 63 (56.25%) do not benefit from any form of protection activity. If we exclude SCIs, a conservation scheme applied only in Europe and often without any management plan, only 32 reefs (28.57%) are comprised within a MPA or a coastal reserve. No reefs are protected in Algeria, Cyprus and Lybia, while Lebanon, Tunisia and Turkey protect less than 20% of their reefs. Malta, Italy, Syria and Morocco protect 50% or less of their reefs. Spain and Israel protect more than 50% of their vermetid reefs, although Israeli vermetids got recently extinct (Galil, 2013).

## Conclusion

We must obviously consider these as preliminary results, due to an inadequate coverage and a low quality of the published data and to a different distribution of the researchers studying vermetid reefs in the Mediterranean Sea. These also affects a likely overestimation of the true protection levels. If we take into account the well-known area of Northwestern Sicily, 53.33% in frequency and 15.6% in length of the vermetid reefs are protected (Chemello, 2009). If these percentages will be confirmed at a Mediterranean scale, this leads us to consider vermetid reefs more as a neglected habitat than an underrepresented one. Since vermetid reefs are threatened by rapid environmental change, we fear that this important intertidal habitat is in danger if knowledge gaps are not filled and conservation measures are not taken at trans-national level.

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