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TITLE: Natural History of Rhodolith/Maërl Beds: Their Role in Near-Shore Biodiversity and Management

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ABSTRACT:

Rhodolith/maërl beds are living and dead aggregations of free-living non-geniculate coralline algae that cover extensive benthic areas in recent oceans and are common in fossil deposits. They are slow growing organisms and can be long-lived (>100 years), distributed over a wide depth range from intertidal sites to 270 m. Rhodolith/maërl beds are a common feature of modern and ancient carbonate shelves worldwide that represent a sedimentary transition from sandy/muddy areas to the rocky substrate. They are bioengineers and provide a three-dimensional habitat for associated species. It has been demonstrated that rhodolith/maërl grounds are a suitable habitat for multispecies recruitment and provide refuge for juvenile life stages of commercially important shellfish species. Rhodoliths are resilient to a variety of environmental disturbances, but can be severely impacted by harvesting these commercial species, ocean acidification or global warming. The value of rhodoliths as a unique biotope around the world is under threat from different kinds of human activities. Despite the importance of rhodolith/maërl beds in the marine environment, a major limitation for protection is the lack of a clear definition of an ecosystem. A thorough review of the literature revealed a total of 12 vernacular/scientific terms that have been applied to free-living coralline red algae and these should be treated as synonyms. The Challenger Expedition (1872?1876) was one of the first voyages that promoted the understanding of the rich flora and fauna associated with coralline deposits. During the nineteenth century additional surveys in other areas of the world have confirmed the value of this ecosystem. During twentieth and twenty-first centuries many researchers have produced a vast scientific literature, documenting the importance of rhodolith/maërl, to understand their relevance regarding biodiversity in nearshore habitats. The relevance includes the description of new species or where the distribution of poorly known species has been extended, but more importantly the high number of associated species which includes species under protection, species ecologically relevant or species which are part of a formal fisheries. As a consequence of the concern about the state of the ecosystems in Europe at the end of the twentieth century, the EU developed a network of protected areas known as Natura 2000 sites. A series of publications on the conservation status of the maërl/rhodoliths in Atlantic and Mediterranean waters, Brittany, Gulf of California, and their relationship with fisheries, stated clearly that the health of rhodolith habitats in some areas of the world is decreasing, and there is an urgent need for management strategies. The combination of the interest in developing rhodolith/maërl conservation in other countries, the decline of the French Atlantic maërl deposits, and the correlation of rhodolith/maërl presence in or near oil deposits has motivated the exploration of rhodoliths in other areas such as Brazil, México, Australia and New Zealand. Understanding is increasing about the ecological role of rhodoliths in nearshore environments worldwide, the biodiversity associated with rhodoliths, and how human activities are having an increasing impact. The recognition of the importance of rhodolith beds as biodiversity centers has increased with the number of published papers and the growth in knowledge about the taxonomic status of the associated species.

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