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Massive bioconstructions built by *Neopycnodonte cochlear* (Mollusca, Bivalvia) in a mesophotic environment in the central Mediterranean Sea

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The present paper provides a multidisciplinary fine-scale description of a Mediterranean mesophotic new habitat dominated by the bivalve *Neopycnodonte cochlear* (Poli, 1795), building large and thick pinnacles on vertical cliffs at two study areas along the southern Italian coast. The pinnacles, constituted by a multilayered aggregation of living and dead specimens of *N. cochlear*, were interconnected with each other to form a framework of high structural complexity, never observed before for this species. The bioconstruction, considerably extended, resulted very complex and diversified in the associated community of structuring organisms. This latter included 165 taxa attributable to different ecological groups occurring in different microhabitats of the bioconstruction. Among the secondary structuring taxa there were scleractinians, serpulids and bryozoans, all contributing to the deposition of calcium carbonate, and poriferans, helping to bind shells together or eroding carbonate by boring species. In comparison with coralligenous *sensu stricto* and the recently described Mediterranean mesophotic coral reef, the *Neopycnodonte* bioconstruction showed peculiar features, since it lacked the major contribution of encrusting coralline algae and scleractinians as reef builders, respectively.

The main marine bioconstruction in the Mediterranean Sea is localized in the euphotic zone and is well known under the name of coralligenous which is typically considered to be the climax biocoenosis of the circalittoral zone[1]. Coralligenous reefs are widely distributed and consist of thick carbonate concretions mainly built by red calcareous algae, with the variable contributions of sessile invertebrate calcium carbonate depositors (e.g., scleractinians, serpulids, bryozoans)[2–4]. The large amount of different habitats associated with such bioconstructions support the highest values of biodiversity in the Mediterranean Sea[2]. However, with increasing depth and as a result of light attenuation, benthic sessile invertebrates progressively replace algal concretions, becoming the most important habitat builders[5].

The biogenic role of animal bioconstructors has been repeatedly studied in Mediterranean deep-water habitats, where the predominant colonial scleractinians build large three-dimensional (3D) carbonate structures referred to as Cold-Water Corals (CWC) and provide substrate and habitat for a multitude of other organisms[6–11].

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