

SPATIAL HETEROGENEITY OF SESSILE BENTHOS IN A SUBMERGED CAVE OF THE EASTERN MEDITERRANEAN

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Abstract

Despite their scientific interest and high conservation value, marine caves of the eastern Mediterranean are poorly explored. Herein, a submerged cave from the Aegean Sea was surveyed through SCUBA diving and photoquadrats. A rich fauna of 65 taxa and 4 distinct benthic assemblages were identified. The biotic spatial heterogeneity observed was associated with the unique topography of the different cave sectors.

Keywords: Biodiversity, Rocky shores, Aegean Sea

Introduction

Marine caves constitute characteristic habitats of the Mediterranean rocky coastline. They harbour rare and protected species and have been characterized as 'biodiversity reservoirs' for particular groups of sessile animals [1]. Their topographic complexity generates abiotic gradients reflected in a marked spatial variability of their biota [2], [3]. Partially and totally submerged cave systems are protected by the EC (92/43/EEC). Recent evidence of temperature-induced alterations in Mediterranean cave-dwelling communities [4] highlights the criticality for their monitoring and conservation. However, quantitative data on the biodiversity and community structure of marine caves from the eastern basin do not practically exist.

Material and Methods

Fará cave, a submerged cave from the Aegean Sea (Lesvos Island: 38°58'11.64" N, 26°28'39.54" E), was mapped in detail and its benthic communities were investigated through the use of a non-destructive photographic method. The cave is 32 m long and is located at an average depth of 14 m. Fieldwork was carried out with SCUBA diving. The sampling scheme included 9 photoquadrats (3 from the ceiling, right and left walls of the cave) at 5 meters intervals, from the cave exterior to the inner dark zone. In total 75 photoquadrats were taken and the percent coverage of each species was calculated with photoQuad. Multivariate analysis was undertaken with Primer.

Results and Discussion

Sample analysis revealed a rich sessile fauna of 65 taxa belonging to 8 taxonomic groups. As previously shown [1], [3] for marine caves, Porifera were the dominant animal group in terms of species richness (45), followed by Anthozoa (8). Concerning the biotic coverage throughout the cave, Porifera had the highest percentage (41.9%), followed by Rhodophyta (12.6%), Anthozoa (11.3%), Polychaeta (9.9%), and Bryozoa (4.5%). The remaining 1.6% was covered by Chlorophyta, Foraminifera, Hydrozoa, Bivalvia, Brachiopoda, and Tunicata, while 18.6% was characterized as unidentified biogenic substrate.

Multivariate resemblance analysis revealed four distinct groups of stations (Fig. 1). The first group comprised the sciaphilic algal dominated (e.g. *Peyssonella rosa-marina*, *Mesophyllum* sp.) community of the exterior and entrance wall stations. The second included the two left wall stations, located 5 and 10 m from the entrance, where the locally higher sedimentation rate favored a differentiated fauna (e.g. *Axinella* spp., *Penares euastrum*). The third group constituted a typical semidark cave community dominated by sponges (e.g. *Dendroxea lenis*, *Spirastrella cunctatrix*, *Phorbas tenacior*, *Agelas oroides*). The scleractinian *Madracis pharensis* prevailed on the ceilings and overhanging walls. The last group included the inner totally dark stations, dominated by encrusting sponges (e.g. *Diplastrella bistellata* and *Hexadella pruvoti*) and serpulid polychaetes. Encrusting and cushion shaped growth forms dominated within the cave while erected forms had much lower coverage. In the middle and inner cave sectors, the encrusting bryozoans *Hippaliosina depressa* and *Onychoella marioni* formed nodules, while serpulid polychaetes formed bio-constructions.

The ceiling stations of the entrance (0C) and middle cave zones (15C) were grouped with the semidark and totally dark stations respectively, probably due to the sharper decrease of light in relation to the corresponding walls, as a result of the substrate inclination.

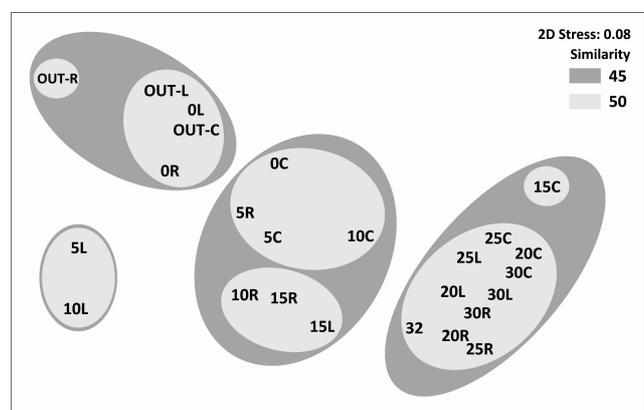


Fig. 1. Resemblance of cave assemblages demonstrated in MDS plot. C: ceiling, L: left wall; R: right wall. Numbers indicate distance from cave entrance.

The unique geomorphology of the different cave sectors can induce spatial heterogeneity of cave assemblages presumably through the modification of abiotic features [2], [3], which deserves further study in this geographic area. The creation of a digital photographic database depicting the current status of marine cave communities enables their future monitoring. This is crucial for caves frequently visited by divers and for those located in Mediterranean sub-areas which are highly subjected to alterations attributed to global climate change.

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