

EPIBENTHIC MACROFAUNAL ASSEMBLAGES AND BOTTOM HETEROGENEITY IN THE SHALLOW INFRA-LITTORAL OF THE MALTESE ISLANDS

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Marine ecologists have dedicated much time and effort in attempts to distinguish and classify marine benthic communities. In the Mediterranean, the vertical zonation scheme of PÉRÈS & PICARD (1964), as subsequently revised by PÉRÈS (1967; 1982), has been extensively used in spite of a number of difficulties associated with it (BOUDOURESQUE & FRESI, 1976; GOLIKOV, 1985). PÉRÈS (1967, 1982) identifies seven vertical zones, one of which, the infralittoral, represents the vertical extent of occurrence of marine phanerogams and photophilic algae. This zone thus includes some of the most important shallow-water coastal ecosystems. PÉRÈS (1967, 1982) subdivides the infralittoral into a number of biocoenoses and facies. Malta lies in the centre of the Mediterranean, but in spite of its biogeographical interest, only scanty information on the ecology of its coastal benthic communities is available. From preliminary diving surveys, the authors noted that the Maltese infralittoral is very heterogeneous, both physically and biologically. For example, five or more different types of bottom are frequently present within an area of a few square metres. The aim of this study was to obtain information on the structure, composition and distribution of the epibenthic faunal assemblages in the Maltese shallow infralittoral, by studying a cove which is representative of such habitats. The study area, a cove known as Dahlet ix-Xmajjar, is a V-shaped, northwest-facing inlet situated on the northernmost tip of the island of Malta. The cove is moderately exposed, has unpolluted water and is little frequented. Depth varies from 1 m inshore to 15 m at the mouth of the cove. The bottom is very heterogeneous, especially in the innermost part where it consists of a short stretch of bedrock, patches of bare medium to coarse sand, boulders, accumulations of pebbles and cobbles, and meadows of the seagrasses *Cymodocea nodosa* and *Posidonia oceanica*. Along the outer parts of the cove's headlands, the bottom consists of a stretch of bedrock leading to dense *Posidonia* meadows and patches of medium to coarse sand. During the summer of 1990, three transects were laid perpendicular to the shore from mean sea-level to a depth of 25 m. Epibenthic fauna larger than 2 mm were collected by SCUBA divers from 500 cm² quadrats positioned along the transects; in all 141 quadrats were sampled. Samples containing one or more of the twenty most abundant species, chosen on the basis of their occurrence in at least 10% of the total samples collected, were analysed statistically by centroid clustering using the Bray-Curtis and the Jaccard coefficients. Collectively, Mollusca and Crustacea formed the bulk of the macrofauna collected (80%, Fig. 1). Both coefficients used gave principal clusters corresponding to the two main types of bottom present in the study area (Fig. 2): soft sediment with *Posidonia* meadows, and hard substrata with photophilic algae.

For the soft sediment/*Posidonia* assemblage, the characteristic species were the gastropods *Smaragdia viridis* and *Tricolia speciosa* whilst for the rock/photophilic algae assemblage, the characteristic species were the gastropods *Rissoa variabilis* and *Columbella rustica*. However, as shown by the number of sub-clusters of quadrats within each main cluster, both bottom types were very heterogeneous due to frequent overlap with other bottom types, namely: bare medium/coarse sand, medium/coarse sand covered with decomposing *Posidonia* debris, bedrock covered with a very thin layer of sand, and sediment with *Cymodocea nodosa*. As a result of the high degree of heterogeneity in bottom type, there was extensive overlap between putative faunal assemblages. A number of species assigned by PÉRÈS (1967, 1982) to particular assemblages were not found to be assemblage-specific in the area studied. These included the decapods *Pagurus chevreuxi*, *Pisa tetraodon* and *Galathea bolivari*, and the gastropods *Bittium latreillii*, *Alvania discors* and *Jujubinus striatus*, all of which were collected on both bedrock and *Posidonia*. In general, of the two most abundant taxa, molluscs were more assemblage specific than crustaceans. These results indicate that substratum type is the main determinant of the faunal composition in the study area and that communities were being assembled primarily on the basis of the substratum preference of their component species, and only secondarily in response to other factors, both biotic and abiotic. While the traditional bionomic schemes are useful in discussing the main infralittoral benthic assemblages which occur over wide areas, they are not as useful when applied at the local level where the bottom is very heterogeneous. Here, micro-edaphic factors seem to be the main ones controlling the structure and composition of faunal assemblages. This study shows that it is not always possible to distinguish discrete faunal assemblages within the shallow infralittoral zone. Rather than attempting to equate infralittoral assemblage types from different geographical areas, it may be more useful for workers to study the key factors which determine the structure of the infralittoral assemblages of a particular locality and how these differ from those important in other localities.

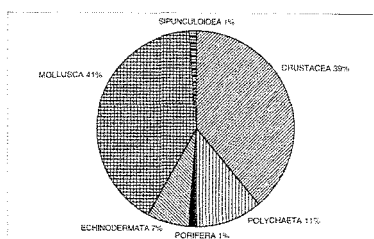


Fig. 1. Relative composition of the fauna calculated on the basis of number of individuals collected.

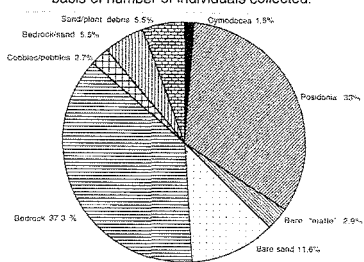


Fig. 2. Relative abundance of different bottom types along the transects

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