A MARINE CAVE AS A MESOCOSM OF THE DEEP MEDITERRANEAN

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The deep Mediterranean is relatively poor in animal species. The warm homothermy below 300 m (approximately 13°C) is a limiting factor for many bathyo-abyssal animals and a number of important deep-sea groups are absent or poorly represented. For this reason the Mediterranean is considered to be of little interest in deep-sea biology. However, the homogeneity of the whole water column during the cold season, the local narrowness of the continental shelf, and the adaptation of the deep-sea fauna to a relatively constant high temperature have allowed some bathyal bottom dwellers to establish themselves in shallow water caves. This offers opportunities for studies of several problems of deep-sea biology.

Submarine caves share several ecological features with deep-sea habitats, such as the absence of light, the lack of photosynthetic production, a low flux of organic matter, a poor food supply and a low level of hydrodynamic energy (RIEDL, 1966; FICHEZ, 1990, 1991). Both communities depend on allochthonous organic input, and bathyal species have been found in the darkest parts of littoral caves (HARMELIN *et al.*, 1985). Faunal and environmental similarities, however, are limited by the obvious differences in pressure, temperature, habitat size, and by the dispersal abilities of deep-water organisms. We have found a Mediterranean cave which more closely approximates deep-sea conditions, due to the entrapment of a cold water mass resulting in stable temperature conditions throughout the year (BOURY-ESNAULT *et al.*, 1993; VACELET *et al.* 1994). Easily accessible to scuba divers, this "bathyal island" in the littoral zone is a natural mesocosm of the deep Mediterranean which contains an unusual abundance of examples of bathyal organisms unrecorded in "normal" caves with the same temperature regime as open shallow waters (CASANOVA, 1992; LOGAN & ZIBROVIUS, 1994).

A large population of *Oopsacas minuta*, a representative of the bathyo-abyssal hexactinellid sponges, reproduces here year round - making possible the first observations of larval behavior and ultrastructure to be carried out on this phylogenetically important group of invertebrates, and opening the poorly known area of larval ecology of these deep-sea sponges (BOURY-ESNAULT & VACELET, 1994). The presence of a species of the deepest known genus of sponges, *Asbestopluma* (8840 m in the Central Pacific) is a fascinating opportunity to investigate the biology of the strange deep-sea cladorhizid sponges, which may live in the most oligotrophic abyssal basins. A highly unexpected result is that they are non-filter-feeding "sponges" with a carnivorous feeding habit. Devoid of aquiferous system, they capture and digest small crustaceans by means of filaments provided with minute hook-shaped spicules (VACELET & BOURY-ESNAULT, 1994).

A sediment layer on the floor, several meters thick, has recorded the history of the cave and of its biodiversity through bioclasts. Time-lapse photographs have shown that spoke-like traces resembling those on the abyssal sea floor are made by the proboscis of an echiuran worm, a behavioural study of which, in progress, will be highly informative about the deep-sea traces. Results on the particle content of the trapped water mass, the microbial activity and the degradation of organic material during transfer along the cave (120 m long) address the problem of fluxes of organic material in the deep-sea.

This easily accessible "bathyal island" in the sublittoral zone offers exceptional opportunities for observations and experiments that may provide important insights into such problems of deep-sea biology as colonization, microbial ecology, fluxes of organic material and metabolic physiology, cytology, reproduction, and dispersal strategy in existing, and even translocated, deep-sea species.

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