

The Levantine bathyal - a desert at the bottom of the sea?

Bella S. GALIL¹ and Menachem GOREN²

¹National Institute of Oceanography, HAIFA (Israel)
²Dept. of Zoology, Tel-Aviv University, TEL-AVIV (Israel)

The Levant basin is the easternmost part of the Mediterranean Sea, east of the line connecting Rhodes, Crete and the coast of Cyrenaica. It is isolated from the deep Atlantic waters by the topographical and hydrological barriers posed by the shallow Gibraltar Straits and the Sicilian-Tunisian sill. The Levantine deep waters are distinguished by severe oligotrophy and salinity and temperature values that are higher than in the rest of the Mediterranean.

Investigations of the Levant bathyal biota were initiated with the voyages of the "Pola" one hundred years ago (1890-1893), the most extensive deep-sea expedition to take place in the Levant basin. The Danish Oceanographical Expedition to the Mediterranean, aboard the research steamer "Thor", sampled nine sites along the western limits of the Levant, from Cyrenaica to Rhodes, in 1910. The Lamont Geological Observatory research vessel "Vema" collected plankton samples in July-August of 1956. During a ten-day sojourn in the Levant in January 1987, the "Meteor 5" obtained deep-sea biota from the region between Crete, Cyprus and Israel. The small number of scientific expeditions to the Levant prompted FREDJ and LAUBIER (1985), in their seminal work on the deep Mediterranean benthos, to declare that "the Levant Sea has practically never been studied". The paucity of data bolstered the concept of eastward faunal attenuation: FREDJ and LAUBIER (1985) stated that only 20% of the Mediterranean deep-sea species are known from its eastern part.

A series of eleven cruises conducted between 1988 and 1991 to study the bathyal biota off the coast of Israel brought up a wealth of new data. The 37 species collected at depths between 200-1,530 m add seven new records for the Levant basin and extend the distribution of sixteen more species to the easternmost boundary of the Mediterranean.

As knowledge is gained on the Levantine bathyal biota, and the inventory of its components becomes more complete, so the list of organisms considered absent from the Levantine basin diminishes. Even thus, the impoverishment of the Levantine bathyal fauna is clearly evident. GOREN (1986), who studied the recolonization of the Red Sea at the post glacial period, indicated that the number of fish species in the Red Sea is much lower than in similar Indo-Pacific regions. It is suggested that the Mediterranean, which like the Red Sea underwent severe temperature and salinity changes, has not yet reached its biotic climax. However, these environmental upheavals do not account for the extreme fauna sparsity of the Levant bathyal compared with the bathyal biota at other regions of the Mediterranean.

The Mediterranean received a substantial part of its fauna from the Atlantic Ocean following the last glacial period, bringing into the sea temperate, subtropical and some tropical species. Yet, in the Levant basin, warming of the surface water together with large-volume flooding of fresh and low salinity water caused by deglaciation is considered to have resulted in restricted thermohaline convection, stagnation of subsurface water and deposition of sapropels at water depths greater than 600-1,000 m (VERGNAUD-GRAZZINI *et al.*, 1977; MUERDTER *et al.*, 1984; HERMAN, 1989). Thus, during interglacial periods, the Levantine bathyal underwent faunal extinctions induced by environmental deterioration caused by the anoxic episodes, followed by partial faunistic replenishment in glacial periods. Therefore, we suggest that the impoverishment of the Levantine bathyal fauna results from it being doubly blighted: during glacial periods the prevailing high temperature and salinity prevented settlement by members of the stenothermic and stenohaline Atlantic bathyal, as far as they were able to cross the Gibraltar and Sicilian sills, while during the postglacial, anoxic conditions in the bathyal restricted its recolonization.

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