

ACTUOPALEONTOLOGICAL INVESTIGATIONS OF SHALLOW WATER
RED SEA ECHINOIDS

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The regular and irregular echinoid fauna of the Northern Bay of Safaga (Red Sea, Egypt) has been investigated within the framework of an actuopaleontological study of the flora, fauna, sediments and facies. The distribution of echinoids has been compared to grain size parameters as well as to the distribution of other organisms.

The study area (ca. 10 x 7 km) was investigated using SCUBA-diving techniques along 55 transects with a total length of 126 km. Echinoid presence was quantified using weights of fragments (2 mm) originating from 67 standardized bulk samples distributed throughout the Bay. The complex morphology of the echinoid test and the spines allow the identification of fragmented material upon comparison to complete specimens. The resulting data was analyzed using correlation techniques as well as Q and R-mode multivariate statistical analysis. This method counters the difficulties originating from the cryptic habitats and patchy distributions.

The results of the analysis show that echinoid distribution can be analyzed for both regular and irregular echinoid taxa despite taphonomic bias and restrictions imposed by the analytic method. Time averaging in fact counters the difficulties arising from the patchy distributions of echinoids. There is a close correlation of echinoid distribution to sedimentary and bottom facies as well as to grain size parameters and other environmental factors. The distribution of irregular echinoids is highly differentiated with coarse coastal sand dominated by Clypeaster sp., Echinodiscus auritus, Fibularia ovulum, and Lovenia elongata; muddy sands by Laganum depressum, Clypeaster sp. and Echinocyamus crispus; and muds by members of the Schizasteridae. Regular echinoids, mostly Eucidaris metularia, Echinometra mathaei, Tripneustes gratilla, Heterocentrotus mammillatus and Diadema setosum, dominate the sediments found within, or near reefs, coral carpets and patch reefs.

The methodology used in this actuopaleontological investigation should be useful in recognizing the distribution patterns of ancient echinoid faunas, especially in light of the significance of regular echinoids in the bioerosion of reefs and irregular echinoids in the bioturbation of sediments.