Unexpected abundance: *Millepora* corals in Late Pleistocene reefs of Egypt

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Coral reefs throughout the world are well known for the dominance of scleractinian corals. However, one group of hydrozoan corals can be very common in modern tropical coral reefs as well: *Millepora*, the fire coral. The modern Red Sea is particularly well known for its high abundances of *Millepora*, where the fire coral is dominant on current-exposed reefs. Yet, this hydrozoan has been described as rare in the fossil record throughout the world and the documented abundances in fossil reefs do not match the numbers from modern reefs. The main interpretation to explain this phenomenon so far has been a lower preservation potential of milleporids compared to scleractinians due to differences in skeletal structure.

During an investigation of six Eemian Egyptian reef sites (29 line intercept transects, typically of 20 m length) we found *Millepora* in 69% of the fossil reef transects. The abundances were comparable to the adjacent modern reefs (65.13% to 0.26%). Preservation of fossil *Millepora* was good to excellent and in some cases well-preserved pore characters allowed for identification to species level. Our findings seem to be in stark contrast to results and interpretations of earlier studies, which suggest that *Millepora* is very rare in the fossil record globally. To understand the reason for this mismatch, we compared the associated scleractinian fauna between fossil reefs with and without *Millepora* presence. Furthermore, as a differentiation between shallower habitats close to the reef edge and deeper habitats along the reef slope was possible, we were able to investigate habitat preferences. *Porites* abundances were higher in fossil reefs without *Millepora*. Based on a comparison with modern communities, this suggests that the exposure to water energy might be a decisive factor for *Millepora* presence in the fossil reef. Therefore, preservation and consecutive investigation of appropriate fire coral-habitats is a pre-requisite for valid comparisons.

Another factor for the mismatch between our results and earlier studies might be a difference in diagenetic conditions that allow preservation of hydrozoan skeletons in the fossil record. Preservation of the investigated Egyptian sites is favored by their young geological age and their geographic location in a desert climate, reducing dissolution by aggressive meteoric waters. Furthermore, the extremely high abundance of *Millepora* in modern Red Sea coral reefs may in part mitigate the lower preservation potential of the hydrozoan skeleton in comparison with that
of scleractinian corals.