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Taphonomic pathways and environmental differentiation based on the clypeasteroid echinoid *Echinocyamus*

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Taphonomic pathways that dictate the preservation of skeletal components differ along environmental gradients. Understanding preservation potentials within different habitats are key factors in reconstructing paleoenvironments. Actualistic studies allow for direct correlation of taphonomic features with environmental parameters serving as models for fossil analogies. This study concentrates on a single genus of clypeasteroid echinoids thus alleviating the influence of differential skeletal architectures on taphonomic pathways. The goal of this study is to gain detailed information on the alteration and preservation of recent examples and their variations with respect to environmental conditions with the goal of applying this knowledge to fossil populations.

Numerous tests of the minute clypeasteroid echinoid *Echinocyamus pusillus* were collected from the Island of Giglio (Mediterranean Sea) from various depths and environments. The tests were analyzed for taphonomic alteration including the abrasion of the (1) tubercles, (2) stereom and (3) genital and ambulacral pores. The preservation of the (4) ambitus and the (5) test were also analyzes as well as the degree of (5) encrustation and (6) fragmentation. When drillholes of predatory gastropods were present, these were analyzed for the (7) drillhole outline and (8) cross-section. These features were analyzed both qualitatively and quantitatively and subjected to statistical analysis.

Results indicate that most tests show a rather good preservation with individuals from sheltered areas featuring a low grade of tubercle and stereom abrasion. Pores are mostly not affected and the encrustation rate is low. Areas with higher wave activities yield individuals which features higher abrasion grades. Pores are more often affected than in sheltered areas, while the encrustation rate is significantly lower. Drillholes are generally robust to abrasion, since almost all drillhole outlines and the concave cross-sections are well recognizable. Preservation potentials in specific environments are a interpreted as the result of ambient conditions as well as survival probabilities as complete tests which can differ highly between habitats. Finally, preliminary comparisons to fossil populations of *Echinocyamus* are made.