

RELATING RANGE, ABUNDANCE, AND SPECIES RICHNESS IN FOSSIL AND LIVING ECHINOIDS : A POSSIBLE BENEFIT OF PHYLOGENETIC CONTROL

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Range, species abundance, and species richness are three variables often considered in ecological and evolutionary studies. Characteristic traits of certain groups can be passed on to new species and, thus be persistent in the lineage. The relationships between these variables can, therefore, lend important insight into the phylogenetic histories of organisms. Once a relationship between parameters for modern organisms has been determined, then this same relationship can be examined in the ancient ancestors. Comparison of such parameters of fossil groups and their modern counterparts can help delineate the random or nonrandom occurrence of traits. For example, are the same genera that are species-rich also the ones with the widest ranges? Are the most species-rich genera of the past also the most species-rich genera of today? Nonrandom patterns might suggest phylogenetic control on these traits.

Echinoids are good organisms for this type of study because of their commonness both as fossils and modern organisms. The Upper Eocene of the Gulf Coastal Plain provides a wealth of well-preserved, diverse fossil echinoid groups. These groups have been extensively studied over the last several decades. These studies have produced well-known distribution patterns, such as relative abundance and biostratigraphic ranges.

The modern echinoid group boasts several many echinoid species with over four hundred of them in the irregular group. Since this group is best preserved as fossils, it is also the focus of this study. Modern distribution patterns such as geographical range can be determined. These patterns can be compared to what is known about similar ancient groups to see if there is indeed a similarity in the ecological and evolutionary parameters. Once these questions are answered there may be a better understanding of the evolutionary and ecological trends of the echinoids. If there is evidence for phylogenetic control of the range, abundance, and species-richness of echinoid taxa this could be an indication that extinction resistance may evolve to be concentrated in certain genera. This information might, then, enable the prediction of the course an organism might take in the future when faced with ecological changes. This has extremely important implications in the preservation of species diversity.