

FORAMINIFERAL RESPONSE TO HEAVY METALS: AN EXAMINATION OF POTENTIAL BIOINDICATORS AND INCORPORATION USING THE PROPAGULE METHOD

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ABSTRACT

Benthic foraminifera have a history as environmental indicators of heavy metals in marine environments. However, there is debate over various aspects of their interaction: the effects of essential versus nonessential elements, whether aberrant test morphologies are more a response to factors such as temperature or salinity than to heavy metal contamination, and potential incorporation of heavy metals into the foraminiferal test structure. Sediment samples will be taken from Sapelo Island, Georgia and Little Duck Key, Florida and used to grow foraminiferal assemblages in a controlled laboratory setting according to the propagule method. These assemblages will be exposed to different concentrations of two essential elements, copper and zinc, and two non-essential elements, arsenic and cadmium. The population density, abundance, diversity, and possible test irregularities of the foraminifera in each assemblage will be recorded. Laser ablation ICP-MS will be used to ascertain whether incorporation of the heavy metals has occurred and in what concentrations. Finally, assemblages will be collected from Key Biscayne, Florida, a site known for heavy metal contamination. The population dynamics, potential test deformities, and heavy metal incorporation of the Key Biscayne assemblages will be directly compared with those of the laboratory-grown assemblages. It is hypothesized that (a) essential elements will have a stronger effect on the population dynamics of the assemblages, (b) that test deformities result primarily from exposure to heavy metal contamination during growth, and (c) incorporation of heavy metals in foraminiferal calcite occurs at elevated concentrations of heavy metals in the surrounding seawater.

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