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Living Behaviors and Molecular Characterization of Benthic Foraminifera in the Arabian Gulf

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The benthic foraminifera are among the major carbonate producers in modern Arabian Gulf waters and are found living in all marine habitats. They have been recognized as proxies to assess paleoenvironmental changes, however, their biological behaviors in modern environments needs to be further studied. The current study attempts to explain the biology of benthic foraminifera in terms of their living behaviors and molecular characterization, from different regions of the western side of the Arabian Gulf. Accordingly, two major groups of benthic foraminifera, namely rotaliids and miliolids, are examined under laboratory conditions. Results illustrate that the rotaliids are more resistant to environmental changes than miliolids, as their granular reticulopodial network is stronger than among the miliolids, with high cytoplasmic streaming. The pseudopodia extend out from both primary and secondary apertures, and aid the organism in locomotion by attaching to the wall of hard substrate. As a result they drag their whole bodies toward the direction of motion. In rotaliids, the movement rate is high and is attributed to the extension of pseudopodia through all apertures, compared with miliolids in which pseudopodia extend out from the primary aperture only. The innate behavior of both groups was observed as a function of external stimulus, i.e. light, nutrients, and availability of substrate. The observation on average life span reflected that the rotaliids was able to survive longer than miliolids. Molecular analysis reveals the presence of four groups, i.e. Ammonia, Murrayinella, Glabratellina, and Elphidium which support the morphological taxonomy at the genus level. However, BLAST analysis contradicts the species level taxonomy, which challenges the classification based upon hard-shell morphology. Nevertheless, monophyletic clustering is observed among all major groups. The study concludes that the morphological taxonomy needs to be augmented by molecular analysis, in order to develop a new inventory of species.