



Morphological and Geochemical analysis of Recent Caribbean Globorotalid Foraminifera

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Globorotalia menardii, *Globorotalia tumida* and *Globorotalia unguolata* are abundant Caribbean planktonic foraminiferal species. Their general characteristics are a lenticular, trochospiral tests, which become pinched towards the outer margin forming a carinate keel. Juveniles possess smooth tests, which become more pustulose during ontogeny. Increase in overall size is achieved by formation of new chambers so the size of the foraminifera will increase throughout ontogeny. This work is concentrated within the Caribbean Sea – Gulf of Mexico region. It investigates the various extent morphotypes, and attempts to link them to environmental characteristics. Questions that are trying to be answered here, are what is the range of morphological variation within the globorotalid specimens. Can end members at the extremes of this variation be identified and can this morphological variation be linked to environmental conditions, and or geographical areas.

Morphologically the *menardii*-form globorotalids show a range of morphotypes from robust heavily keeled forms with a heavy secondary calcitic crusting, to more delicately walled finer keeled forms with little or no calcitic crust. $\delta^{18}\text{O}$ analysis of both groups indicate that there is an overall trend of increasing depth with size. However chemical analysis of the two morphotypes, show significantly different isotopic signals within corresponding size fractions. The $\delta^{18}\text{O}$ data shows that the low crusted *menardii* have a lighter isotopic signal than the heavily crusted specimens. This indicates that they were living in warmer shallower waters than the heavily encrusted specimens. It appears from the data that, while some specimens of *G.menardii* descend

within the water column during their life cycle, some appear to remain in shallower surface waters.

Less morphological variation is shown by *G. tumida* and *G. unguolata* which, have very similar morphological characteristics. The main difference between the two, other than overall size, is the extent of the secondary encrusting. This secondary encrusting is considered to be ecophenotypic, with *G. unguolata* representing a shallow warm water dwelling juvenile form, and *G. tumida* the deeper dwelling adult form of a single species. This hypothesis is supported by the $\delta^{18}\text{O}$ Oxygen data which shows the smaller, *G. unguolata* specimens, have a lighter isotopic signature than the *G. tumida*, indicating that they formed their tests in warmer, shallower water than where the larger specimens of *G. tumida* formed their test. A major finding of this work is that secondary encrusting, in the species studied is linked to the depth of test formation, not the stage of ontogeny.