



## **Test shape variation reveals the evolutionary history of *Globorotalia menardii menardii***

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*Globorotalia menardii menardii* is a tropical dwelling planktonic foraminifer occurring in marine sediments since the middle Miocene. The evolutionary prospection of this species, using different morphometric parameters of the test like the spiral height and the axial length, revealed different test size patterns between the tropical Atlantic and the eastern tropical Pacific for the last 8Ma. A strong event is observed in the early Gelasian (2.58Ma), showing a population collapse followed by a rapid and significant increase in the tropical Atlantic. Two hypotheses have been suggested to explain the observed pattern: (1) A punctuated evolutionary event restricted to the tropical Atlantic or (2) leakage and passive dispersal from specimens that gradually evolved in the Indian Ocean via distal tributaries of the Agulhas current system.

We compare the test shape evolution of *G. menardii menardii* using geometric morphometrics through time. Data from three Atlantic sites (Site 502 within the Caribbean, Site 667A in the eastern Atlantic, Site 925B in the western Atlantic) as well as one from the eastern Pacific (Site 503) containing 12,048 specimens from 122 samples are compiled.

The preliminary geometric morphometric results provide new insights about the evolutionary history of *G. menardii menardii* within the Atlantic. They highlight different morphotypes throughout the investigated timespan and between the eastern Atlantic and the Caribbean. Three different phases are distinguishable. In the first phase (8Ma - ~6Ma), one common basal morphotype occurs at either site. The second phase (~6Ma - 2.6Ma) shows morphotypes different from the first phase. Moreover, the morphotypes of the two localities differ, but with a strong overlap between the two populations. Two well separated morphotypes in the shape space developed within the third phase (2.6Ma - present), one in each site, which differ significantly in shape and size from the previous morphotypes.

These shape variations suggest extinction of the pre-early-Gelasian morphotypes and their subsequent replacement by different morphotypes that possibly invaded the Atlantic Ocean. Hence, the evolutionary prospection of test shapes seems to reject the hypothesis of a regional punctuated evolutionary event in favour to the hypothesis of Agulhas faunal leakage and dispersal.