



FORAMS 2006

## **Morphological variability of *Globorotalia menardii* Banner and Blow in the Caribbean Sea and the eastern Equatorial Pacific during the past 8 million years**

Michael Knappertsbusch

*Naturhistorisches Museum Basel, Augustinergasse 2, 4001-Basel, Switzerland*  
*Michael.Knappertsbusch@unibas.ch*

The morphological variability of the tropical to subtropical planktonic foraminifer *Globorotalia menardii* during the past 8 million years was quantitated in samples from DSDP Site 502A (Colombia Basin, Caribbean Sea) and DSDP Site 503A (southern Guatemala Basin, eastern equatorial Pacific). Applying computer-aided morphometry spiral height ( $\delta x$ ) versus maximum diameter in keel view ( $\delta y$ ) were measured for each sample to evaluate shell variability through time. *G. menardii* shows a continuous, (mostly) unimodal, linear but time-progressive increase in  $\delta x$  and  $\delta y$  at both sites until the Late Pleistocene. For these forms the informal designation morphotype *alpha* is suggested. Using the same morphological descriptors the very similar Pliocene menardiform globorotalia species *G. limbata* and *G. multicamerata*, which are thought to have evolved from *G. menardii*, show strong overlap. They can, however, be distinguished from *G. menardii* (morphotype *alpha*) by the angle of the peripheral keel in side view ( $\Phi_3$ ) and a consistently higher number of chambers ( $e > 7$ ) in the final whorl. Particularly during and after the final closure of the Isthmus of Panama (ca. 2.4 Ma - 1.8 Ma) morphotype *alpha* tended to rapidly increase its shell size. During the Late Pleistocene *G. menardii* consisted of two different morphotypes, *alpha* and *beta*, with unequal biogeographic distributions: The first persisted from the ancestral smaller forms of morphotype *alpha* until Present and occurs in both cores. Today and in the Late Pliocene this form has a robust shell, a pronounced keel due to stronger calcite secretion and is less inflated in keel view. The second form (*beta*) appeared for the first time at 0.22 Ma and occurs predominantly at the Caribbean Sea site, although it occurs in low frequencies also at the Pacific site. Morphotype *beta* is more inflated in keel view and has a delicate, shiny shell. Morphotypes *alpha* and *beta* can be well separated in the morphospace of  $\delta X$  versus  $\delta Y$  by a line, which fits the equation  $\delta y = 3.2 * \delta x - 160$  ( $\delta y$  and  $\delta x$  in  $\mu m$ ). Specimens of morphotype *alpha* scatter below the separation line. They are interpreted to represent the extant *G. menardii menardii*, and the Miocene *G. menardii* "A" and *G. menardii* "B" described in Bolli & Saunders (1985) and Bolli (1970), respectively. Morphotype *beta*, which is located above the separation line, is

considered to represent the extant *G. menardii cultrata*. Based on these preliminary data it is suspected, that morphotype beta originated during a very recent evolutionary event in the Caribbean sea, but further research is required to confirm this hypothesis.