Geophysical Research Abstracts
Vol. 17, EGU2015-2762, 2015
EGU General Assembly 2015

Heterostegina depressa growth model: what does cell volume tell us about biogeography and ecology?

Wolfgang Eder (1), Shunichi Kinoshita (1), Julia Woeger (1), Johann Hohenegger (1), Antonino Briguglio (1,2), and Carles Ferrandez-Canadell (3)

(1) University of Vienna, Department of Palaeontology, UZA II Geozentrum, Althanstraße 14, 1090 Vienna (wolfgang.eder@univie.ac.at, shunichi.kinoshita@univie.ac.at, julia.woeger@univie.ac.at, johann.hohenegger@univie.ac.at), (2) Universiti Brunei Darussalam, Department of Petroleum Geoscience, Jalan Tungku Link, Gadong BE1410, Brunei Durassalam. (antonino.briguglio@ubd.edu.bn), (3) Universitat de Barcelona, Departament d'Estratigrafia, Paleontologia I Geociències Marines, Martí Franqués, 08028 Barcelona. (carlesferrandez@ub.edu)

The foraminiferal subfamily Heterosteginininae has been the centre of interest of many interdisciplinary studies in the last decades. Some of them reviewing only taxonomic criteria used to identify the different lineages by application of classical two dimensional biometry, while others focussing on more biological interests. This study tries to integrate new means of three-dimensional quantification on biometry used in micropalaeontology. By applying Micro-computed tomography (μCT) each chamber's volume of the foraminiferal test can be extracted and used to quantify and model the cell growth of larger benthic Foraminifera.

This work concentrated on the single but abundant extant representative of the Heterostegina lineage (sensu d'Orbigny), H. depressa, studying the growth in specimens from two natural populations, Okinawa (Japan) and Maui (Hawaii), and from laboratory cultures (offspring of the Hawaiian population). Data obtained from measurements of the volume of the 25 initial chambers were fitted to a theoretical growth model using an exponential function. Two parameters of this function, a (= initial size) and b (= growth rate) were observed to reflect distinct information related to the either provenance or the ecology of the populations.

The parameter a represents the proloculus size, which is frequently used in its two dimensional form (equatorial diameter) as a biometrical significant parameter. When comparing the proloculus volume in specimens of the three samples, a distinctive trend becomes visible: All specimens from a single locality group together, while laboratory cultured individuals are more similar to their relatives from Hawaii (with which they share the gene pool) than those from Okinawa. Proloculus volume is thus more influenced by internal (genetic) factors than to external (ecological) ones.

Parameter b shows a different trend, related to the intensity of growth. The naturally grown specimens from different geographic localities show higher similarities in growth rates than those originating from the same gene pool. Therefore, growth rate seems to be more ecologically controlled than the proloculus volume, for instance by light intensity.

More detailed investigation with larger samples from different geographical localities might allow to refine these observed patterns and to link them to the biogeographical distribution of this taxon.