[2] Bay Path College, Longmeadow, MA, USA, gsempreb@baypath.edu

Virtuelle Paläontologie

## Applied three dimensional biometry on Larger Benthic Foraminifera: a tool to approach palaeobiology, ontogeny and functional shell morphology

**Antonino Briguglio[1] & Johann Hohenegger[1]**

Larger Benthic Foraminifera (LBF) are characterized by complex shell morphology. Systematics and taxonomy are based on several morphological parameters easily to obtain on preferred sections of such shells.

The use of computed micro tomography on these shells gives the opportunity to investigate simultaneously different morphological parameters on the same specimens obtaining an infinite number of virtual sections avoiding test destruction. Beyond the morphological study of the tests, the three dimensional scan reveals, after some rendering and segmenting operations, quantitative information on volumes and surfaces, impossible to obtain with the oriented section methodology. Insights on ontogeny can be inferred as well as correlations between growth rate and environmental changes. Such inter-fingering between biology and ecology is definitely revealed and can be directly measured and quantified for both recent and fossil specimens.

The three dimensional model allows to verify evolutionary concepts, developed during the last centuries by the traditional two dimensional biometry obtained with oriented sections, with new three dimensional measurements, more precise and comprehensive. In such directions we are working since two years and several results have been obtained.

The study of the volume of LBF lumina gives precise information on the ontogeny and on the palaeoenvironmental conditions the organisms was living under. Growth cyclicity and periodic growth functions have been discovered for both recent and fossil forms testifying obvious correlation with environmental variations.

Furthermore, some algorithms have been recently created to link, algebraically, axial oriented sections to chamber volumes to get growth trend and tendencies only by a two dimensional analysis that are proved by MCT.

A quantitative and qualitative study on several surface elements of LBF tests (e.g., papillae, pustulae, spines, septal filaments) also gives interesting results as each surfaces can be mathematically expressed and solved. Correlations between insolation – and therefore water depth, water turbidity, currents influence – and different surface structures type density can be modelled by complex mathematical equations.

[1] Institut für Paläontologie, Universität Wien, Althanstraße 14, A-1090 Wien, Austria, email: antonino.briguglio@univie.ac.at

Taphonomie und Paläoökologie

## Hydrodynamic effects of morphology on bivalve shell transport and its taphonomic implications

**Devapriya Chattopadhyay[1], Ashish Rathie[1], Anirban Das[2], Partha Pratim Saha[3] & Sandipan Dutta[4]**

Bias introduced by the differences in the hydrodynamic properties of shells is an interesting topic for palaeontologists, especially taphonomists. Since the fossilized shell assemblages are often the results of post-mortem transportation of shells, it is crucial to identify such biases to ensure the validity of ecological interpretation of a community structure. Shell size, shape, state of taphonomic alteration plays important role in dictating the hydrodynamic properties as explored in this study. One other process that substantially changes the morphology of the shell is predation, specially drilling predation. Predatory drill holes in marine invertebrates represent an important source of information on the nature of biotic interactions and have often been used to explore the ecological and evolutionary roles of such interactions. Measures of drilling frequencies, and of valve and site stereotypy represent the raw data for inferring the intensity and selectivity of drilling predation. Any biases that may affect these measures are therefore of special interest as they may impact the ecological and evolutionary interpretations of the data. One potential source of bias relates to the hydrodynamic properties of shells: presence of drill holes or drill hole position may influence how shells behave when subjected to moving fluids.

In a flow tank study with bivalve *Donax scortum*, we found that the threshold current velocity for the entrainment of undrilled convex-up shells is generally determined by its size. Taphonomically altered smooth shells require a higher velocity compared to the Recent sculptured shells. The direction of the movement of shell depends on the asymmetry and size of the valve. While compared with the drilled shells, we found that the entrainment velocity for undrilled shell is significantly lower than for centrally drilled shells. One possible explanation for the observed differences is the effect of the drill hole on lift. According