Morphological change during the ontogeny of *Orbulina suturalis* from the Danube Basin

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The ontogenetic studies of species *Orbulina suturalis* have been the subject of much speculation since their first describe by d´Orbigny in 1839. Research on their ontogeny is difficult due to the lack of preservation of ontogenetic stages in fossil record. Despite of it, genus *Orbulina* provide us an excellent material for ontogenetic studies and by using X-ray tomographic microscope, from an adult shell, we can reconstruct their complete ontogenetic evolution. The growing of the shell is gradual; each successive stage represents a part of the growing structure. It means, that they entire ontogenetic history is preserved within their test (Hembleben et. al., 1989; Caromel et. al., 2015).

Our specimen was studied using X-ray micro-tomography SkyScan 1172. The effective pixel size was ca. 0.56 µm. Tube voltage was set to 40 kV, current source was 250 µA. Data were acquired with angle step 0.120 degree. The acquired data were processed using flat field correction and reconstructed by supplied software N Recon (Bruker).

Generally, among the spinose planktonic foraminifera, we can distinguish 5 ontogenetic stages: prolocular, juvenile, neanic, adult and terminal. It is called the five stage model (Hembleben et. al., 1989). The determination and morphological describe of these stages allow us to understand the mechanism of shaping adult morphology and final morphological disparity. Recent studies and systematics concepts are based on the morphology of the adult stages. The identification of the complete ontogeny is difficult and limited in the fossil record. Despite of it, genus *Orbulina*, provide us an excellent material to distinguish the five stage model of ontogeny by using X-ray tomographic microscope.

The ontogeny begins with the first compressed chamber, which is the not calcified proloculus. The second stage is initiated by the addition of the deuteroconch. This is the first multi-chambered morphology during the life cycle of *Orbulina suturalis*. The biggest morphological changes take part in between the juvenile and the adult stage, which is the neanic stage. This stage is marked by chamber inflation, wall thickening, pore development and spine creation. The adult stage of species *Orbulina suturalis* starts with the growing of the terminal, spherical chamber, which is enveloping the previous compressed chambers. The last stage of ontogeny is marked by reproduction, gametogenesis (Hembleben et. al. 1989).

Researches on ontogenetic stages help us to understand the environmental influences on evolutionary processes. Environmental influences affect differently juvenile ontogenetic

stages compare to an adult specimen. On the other hand, it could help us to understand mechanisms, such as heterochrony. Through the ontogeny planktonic foraminifers require different environment. By studying grow of the shell attributions we could make more accurate paleoecological reconstructions (Hembleben et. al., 1989; Caromel et. al., 2015).

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References:

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