

Characterization of cogwheel structures in foraminifera

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Studying biomineralization of foraminifera has become more popular over the last decade and is increasingly directed towards its linkage with element incorporation and isotope fractionation. The next step forward, is to investigate the “systematics” between structure (biomechanical constraints) and chemistry (biochemical constraints). We aim to catalogue species-specific variations in ultra-structures of foraminiferal shells, so-called cogwheels. These features, measuring in general 2-10 μm in diameter, vary greatly between species and become visible after slightly etching the surface of the shell. By using SEM pictures and the software “ImageJ” we can select and automatically measure different parameters of these cogwheels as well as of the pores. These structures will be compared within individuals (e.g. different chambers) as well as between different species. The ultimate goal is to link chemical (e.g. Mg content) to physical (e.g. shape and size) cogwheel properties. By investigating these combinations systematically and by linking them to phylogeny, we hope to find evolutionary patterns and to get insight into calcification mechanisms and geochemical controls. This will improve our mechanistic understanding of proxy incorporation and help to better interpret climate and environmental foraminiferal archives.

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