Size variation of the Aspidolithus/Broinsonia group during the Early Campanian (Loibichl section, Austrian Eastern Alps)

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Abstract

The morphometric analysis of the *Broinsonia* or *Aspidolithus* group has been carried out under light microscope on 11 samples from the Lower Campanian (UC14a-UC14b) of the Loibichl section (Austrian Eastern Alps). For morphometric analysis, a total of 1021 specimens of the *Broinsonia* and *Aspidolithus* group were considered for the measurement of the maximum length of the coccolith (L), the *b/a* ratio (width of the outer rim/shield divided by the small diameter of the central area), and the number and arrangement of perforations in the central area using JMicroVision software. In addition, the CaCO3 content and stable isotope ratios of 13C and 18O were determined for stratigraphic and palaeoecological interpretations. This study aims to improve our understanding of taxonomic concepts of *Broinsonia* and *Aspidolithus* group and to see, if changes in morphometrics can be correlated with a different palaeoenvironmental conditions. Five morphotypes were distinguished: *B. enormis* subs. 1, *B. enormis* subs. 2, *A. parcus expansus*, *A. parcus parcus*, and *A. parcus constrictus*. Morphometric analysis has only allowed the distinction between small morphotypes (LB. enormis or "small" *A. parcus sensu* Gardin et al. (2021)) and "large" *A. parcus/B. parca* group (L> 8 μm). Throughout the section, 3 of the evolutionary trends reported by Lauer (1975) can be observed at the study section: (1) slight overall increase in coccolith size; (2) reduction of the central area and (3) overall reduction in the number of perforations in the central area. Nevertheless, no significant trends are shown in the results that would allow a natural division from the "subspecies" of the *A. parcus* group. The multivariate method of R-mode cluster analysis using the Pearson Correlation Coefficient (PCC= 0.9006) shows two clusters. The first consists following parameters: L, the Nannoplankton Productivity Index (NPI), and the Productivity Index (PI), and the second consists of: the b/a ratio and Nannofossil Temperature Index (NTI), and the ratio of *Micula staurophora/ Watznaueria barnesiae*. Comparisons with other sections and more detailed investigations in terms of global factors are necessary to confirm influence for size variation.
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