

Morphometric changes of the genus *Watznaueria* in the Toarcian-Aalenian: implications for taxonomy, biostratigraphy and evolution.

Elisabetta Erba

Department of Earth Sciences, University of Milan, Milan, Italy. elisabetta.erba@unimi.it

Stefano Visentin

Department of Earth Sciences, University of Milan, Milan, Italy

Giulia Faucher

Department of Earth Sciences, University of Milan, Milan, Italy

We conducted a morphometric investigation of the genus *Watznaueria* in a Lower-Middle Jurassic pelagic section from the Lombardy Basin (western Tethys Ocean) where a continuous and complete succession outcrops at Colle di Sogno, without evidence of siliciclastic and/or bioclastic input. In the evolutionary history of calcareous nannoplankton, the Toarcian-Bajocian interval is particularly crucial because it was the time of emergence and early diversification of the genus *Watznaueria*. Bio-morphometric analyses were performed for the species *W. colacicchii*, *W. contracta* and *W. britannica*. In the studied interval, along with specimens unequivocally attributable to individual species, several specimens appear to be similar but with some characters not corresponding to the diagnostic features, as described in the species formal definitions. Morphometries were conducted on photographs taken with a Q imaging Micropublisher 5.0 RTV digital camera mounted on a Leitz Laborlux optical polarizing microscope, at 1250x magnification. Images were analysed using a PC with Q-capture Pro suite software adapted for nannofossil analyses. Measurements were taken using ImageJ software, with an error of $\pm 0.08 \mu\text{m}$.

Regardless of the size of the coccolith and of the central area, the parameter that univocally allows the separation of *W. colacicchii* from *W. contracta* is the coccolith width (W)/central area width (w) ratio. The W/w ratio remains unchanged stratigraphically, allowing the unambiguous identification of the first occurrence of the two taxa. In the Colle di Sogno section, several *W. britannica* specimens are smaller, thinner and more elliptical than the holotype. In the literature, a wide dimensional range of coccolith length and width, and a variety of morphologies of the bridge spanning the central area have been described. Our data show a progressive increase of the coccolith size and a relative decrease in ellipticity. We identified as *W. britannica* only the specimens fully consistent with the formal definition of the species, while separated a *W. aff. W. britannica* group comprising all specimens with different features. Moreover, a new species has been determined based on a peculiar and diagnostic bridge spanning the central area.

The revised morphometry-based taxonomy allows to increment the *Watznaueria* biohorizons and the revision of the early evolution of the genus. Across the Toarcian-lower Bajocian interval, the *Watznaueria* species show a progressive increase in size and of the W/w ratio, the latter due to a shrinkage of the central area. The structures in the central area display a gradual change from a cross to a two-button bridge to a single-button bridge, along with a tendency towards an increasingly more closed central area.