

Calcareous nannofossil biostratigraphy (Upper Bajocian–Lower Bathonian) of the Ravin du Bès section (Bas Auran, Subalpine Basin, SE France), evolutionary trends of *Watznaueria barnesiae* and new enigmatic morphotypes of the genus *Rucinolithus*

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A biostratigraphic and evolutionary study based on calcareous nannofossils was performed on the Ravin du Bès section (Bas Auran area, SE France), proposed as formal candidate of Global Boundary Stratotype Section and Point (GSSP) for the base of the Bathonian stage (Fernández-López *et al.*, 2007). Semiquantitative estimates of total nannofloral abundance and single species abundance were carried out. The following biohorizons were identified and calibrated to ammonite biostratigraphy: the first occurrence (FO) of *Watznaueria* aff. *W. barnesiae*, the FO of *Pseudoconus enigma*; the FO of *Rucinolithus* sp.; the last occurrence (LO) of *Hexalithus magharensis*; the FO of *Stephanolithion speciosum octum* and the FO of *Watznaueria barnesiae*. These results, consistent with biostratigraphic schemes previously proposed (Erba, 1988, 1990; de Kaenel & Bergen, 1993; de Kaenel *et al.*, 1996; Bown & Cooper, 1998; Mattioli & Erba, 1999) confirm that calcareous nannofossils are good biostratigraphic markers for the Bajocian/Bathonian boundary interval. Moreover, the finding of *P. enigma* within the sub-Mediterranean province allows a direct calibration between Tethyan and Boreal nannofossil events and biozones.

This study showed an evolutionary trend from *Watznaueria communis* to *Watznaueria barnesiae* that seems to support the theory of punctuated equilibrium rather than a phyletic gradualism.

We also documented the occurrence of new morphotypes of uncertain polycycloliths. These enigmatic nannoliths are very similar to specimens of the Cretaceous taxon *R. terebrodentarius*, whose peculiar structure arises doubts on its origin. In fact, as previously speculated (Tremola & Erba, 2002; Erba, 2004), *R. terebrodentarius* nannoliths might be the result of CaCO₃ precipitates or biocalcification by bacteria under peculiar oceanographic conditions, rather than products of coccolithophorid algae.

References

- Bown, P.R. & Cooper, M.K.E. 1998. Jurassic. In: P.R. Bown (Ed.). *Calcareous Nannofossil Biostratigraphy*. British Micropalaeont. Soc. Publ. Series. Kluwer Academic Publishers, London: 34-85.
- de Kaenel, E. & Bergen, J.A. 1993. New early and Middle Jurassic coccolith taxa and biostratigraphy from the eastern proto-Atlantic (Morocco, Portugal and DSDP Site 547B). *Eclogae Geol. Helv.*, **86**: 861-907.
- de Kaenel, E., Bergen, J.A. & von Salis Perch Nielsen, K. 1996. Jurassic calcareous nannofossil biostratigraphy of western Europe. Compilation of recent studies and calibration of bioevents. *Bull. Soc. Geol. Fr.*, **167**: 15-28.
- Erba, E. 1988. Calcareous nannofossils from the Bas Auran section. In: M. Innocenti, C. Mangold, G. Pavia & H. Torrens (Eds). *A proposal for the formal ratification of the basal boundary stratotype of the Bathonian stage based on a Bas Auran section (S.E. France)*. 2nd International Symposium on Jurassic Stratigraphy: 333-346.
- Erba, E. 1990. Calcareous nannofossil biostratigraphy of some Bajocian sections from Digne area (SE France). *Mem. Descr. Carta geol. Ital.*, **40**: 237-356.
- Erba, E. 2004. Calcareous nannofossils and Mesozoic Oceanic Anoxic Events. *Marine Micropaleontology*, **52**: 85-106.
- Fernández-López, S.R., Pavia, G., Erba, E., Guiomar, M., Henriques, M.H., Lanza, R., Mangold, ?, Morton, N., Olivero, D. & Tiraboschi, D. 2007. Formal proposal for the Global Boundary Stratotype Section and Point (GSSP) of the Bathonian Stage, at the base of the Zigzag Zone in the Ravin du Bès Section (Bas-Auran, Subalpine Basin, SE France). *International Subcommission of Jurassic Stratigraphy. Bathonian Working Group Ballot*: 1-43.
- Mattioli, E. & Erba, E. 1999. Synthesis of calcareous nannofossil events in Tethyan Lower and Middle Jurassic successions. *Riv. Ital. Paleontol. Stratigr.*, **105**: 373-376.
- Tremolada, F. & Erba, E. 2002. Morphometric analyses of Aptian *Assipetra infracretacea* and *Rucinolithus terebrodentarius* nannoliths: Implications for taxonomy, biostratigraphy and paleoceanography. *Marine Micropaleontology*, **44**: 77-92.