



The Eocene *Fossil-Lagerstätte* of Bolca (Italy): a guarantee of organic matter preservation?

C. A. Papazzoni (1), **A. Ferretti** (1) and E. Trevisani (2)

(1) Dipartimento del Museo di Paleobiologia e dell'Orto Botanico, Università di Modena e Reggio Emilia, Via Università 4, I-41100 Modena, Italy, (2) Museo di Storia Naturale di Ferrara, Via De Pisis 24, I-44100 Ferrara, Italy.

Sediments rich in organic matter, best exemplified by black shales and sapropels, represent unusual deposits in the fossil record. Special depositional conditions have been from time to time proposed to explain their genesis, invoking either an increase in primary productivity or an improved organic matter preservation in stagnant/anoxic basins. Within this controversy, *Fossil-Lagerstätten* may be useful towards providing a definite answer. In fact, reversing the problem, if we guarantee taphonomic conditions of exceptional fossilization in anoxic settings, should we expect high contents of organic matter?

The early Eocene *Fossil-Lagerstätte* of Bolca (Italy) is renowned worldwide for its extraordinarily preserved fish fauna. The attention given to this site, known since the 16th century, has been almost exclusively focused on the study of the vertebrate fauna. Most of the spectacular biota come from fine-grained and evenly laminated limestones, up to 1 m thick. These productive layers are intercalated with storm-induced coarse-grained limestones rich in molluscs and foraminifera. Papazzoni & Trevisani (2006) recently proposed a depositional model for the classic Pesciara Section of Bolca, referring to a basin with restricted circulation and anoxic conditions on the bottom. In order to better constrain the paleoecologic scenario, a geochemical investigation is currently in progress. The preliminary results are reported below.

Total organic carbon concentration (TOC) has been measured for 13 samples from either the productive layers or the coarse-grained limestones. Most of the samples display organic matter contents lower than 0.5%, ranging between 0.16% and 0.49%, with 0.33% as mean value. One sample from the lowermost fish-level has an isolated

maximum TOC content of 8.6% most probably reflecting an episode of enhanced concentration of organic matter. TOC values of fish-layers are slightly higher than those measured in the intercalated storm deposits, but are still low. These values are comparable with TOC values reported from other stagnation-deposits of exceptional fossil content (e.g., Solnhofen with TOC 0.2-0.9%; Hückel, 1974). Therefore, exceptional fossilization in anoxic conditions does not appear to guarantee high organic matter contents.

The $\delta^{13}\text{C}$ isotopic composition of the Bolca samples ranges between -23.98 per mil and -26.66 per mil. Values of bioclastic limestones (mean -26.12 per mil) are significantly lighter than those of the productive layers (mean -25.22 per mil). Organic matter C/N ratios vary between 33 and 48, with a mean value of 42.8 for productive layers and a mean value of 37.2 for bioclastic layers. These values would indicate a terrestrial origin for the organic matter preserved in the *Fossil-Lagerstätte* of Bolca.

References:

Hückel, U., 1974, Vergleich des Mineralbestandes der Plattenkalke Solnhofens und des Libanon mit anderen Kalken. Neues Jahrbuch für Geologie und Paläontologie Abhandlungen 145: 153-182.

Papazzoni, C. A. & Trevisani, E., 2006, Facies analysis, palaeoenvironmental reconstruction, and biostratigraphy of the “Pesciara di Bolca” (Verona, northern Italy): An early Eocene *Fossil-Lagerstätte*. Palaeogeography, Palaeoclimatology, Palaeoecology 242: 21-35.