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Cenomanian (Cretaceous) Brachiopod-Rich Facies of the Carbonate Platform-to-Basin Transition in the Matese Mountains (Central-Southern Italy): Stratigraphic and Paleoenvironmental Meaning.

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Several stratigraphic studies following an integrated approach have demonstrated that the most different faunal and floral assemblages have experienced several events of extinction, diversity reduction and diversification during Cretaceous. Such events are basically coeval to rapid reorganizations of the regional-to-global hydrosphere/atmosphere systems following relevant geotectonic pulses. Biotic assemblages shifted repeatedly among modes of carbonate production dominated by oligotrophic specialized and meso-eutrophic opportunistic taxa, namely k- and r-mode forms, as a consequence of major turning points in the evolving paleoceanographic conditions.

The brachiopod assemblages which inhabited the middle Cretaceous transitions between shallow- and deep-water environments are assumed here to bear particular concern in this light since they have closely recorded the fluctuating paleoceanographic conditions which developed in a crucial time interval of the Mediterranean Tethys.

Brachiopods are respiring sessile filter feeders, low-Mg calcite secreting organisms actually found in temperate and cool waters of normal salinity. They are adapted to meso-eutrophic environments in shallow- to deep-water settings and occur in heterotrophic, sciophilous assemblages. Brachiopods dysplay overall biological and ecological requirements typical of the r-mode, foramol benthic associations. Owing to their ecologic features, Brachiopods are hence expected to thrive in those paleoceanographic conditions dampening the development of tropical, chlorozoan carbonate platforms. Brachiopods have been traditionally considered to bear poor paleoenvironmen-

tal and sedimentological significances. Despite this, they characterize, up to dominate, the peculiar benthic assemblages developing during major extinction events and/or drownings of shallow-water carbonate platforms of the Mesozoic (e.g.: Chen *et al*., 2005; Graziano *et al*., 2006a). An intriguing Brachiopods-Cyanobacteria association typically flourished in these cases.

Stratigraphic data on several Cretaceous successions of central-southern Apennines and Apulia (southern Italy) have demonstrated that brachiopods were a main component of r-mode assemblages which developed in the Late Valanginian, late Early Aptian, earlymost and latemost (?) Cenomanian, and latemost Campanian (Graziano & Taddei Ruggiero, 2006b). Apart from the latemost Campanian, these time intervals correspond to distinct environmental disruptions of the Tethyan ocean leading to oceanic anoxic events (*Weissert*, *Selli*, and *Bonarelli* (?) OAEs), biocalcification crises and/or platform drownings. The observed remarkable association of brachiopods with cyanobacteria, though in complex stratigraphic relationships, especially in Late Valanginian, late Early Aptian, earlymost and latemost (?) Cenomanian times accounts for drastic environmental deterioration of the surface oceanic waters which were highly unfavourable for oligotrophic, k-mode organisms. We assume that such a relevant correlation between Cretaceous brachiopod beds and disruptions of the paleoceanographic conditions may provides an additional tool to improve the comprehension of the internal structure of major paleoecologic changes due to the environmental collapse of oceanic waters.

We address here to two distinct Cenomanian brachiopod-rich levels (rhynconellids) which have been investigated in the carbonate successions of the Matese Mts (central-southern Apennines). These successions are commonly referred to the marginal areas of a large Mesozoic-Cenozoic paleogeographic domain of the mediterranean Tethys, namely the Apennine carbonate platform, which was bounded eastward by the deep-water deposits of the Molise-Lagonegro Basin. This occurrence is a relevant feature (see Motchurova Dekova & Taddei Ruggiero, 2000) since reports on Late Cretaceous brachiopods in Italy are quite rare. Facies analysis and biostratigraphic investigations reveal that the two brachiopod-rich levels are related to different depositional settings and chronostratigraphic intervals.

The lower one deposited within a lowermost Cenomanian incipient drowning succession, only few metres thick, which deposited in the *Mantelliceras mantelli* ammonite Zone (Accordi & Pallini, 1996) and is encased in a shallow-water sequence. The level is exposed at Serra Le Tre Finestre (east of La Gallinola Mt.) and is made up of relatively deep-water pelagic wackestones bearing ammonites, benthic and planktic foraminifers along with bioclastic (mostly rudists) and intraclastic debrites. The drowning succession sharply overlies an orbitolinid grainstone indicative of subti-

dal environments. Brachiopods (*Costerymnaria italica* Motchurova Dekova & Taddei Ruggiero and *Costerymnaria* sp.) occur as both well preserved shells and reworked fragments accounting for the local development of a submarine slope.

The upper one deposited within an uppermost (?) Cenomanian persisting outer shelf succession exposed between the villages of Bojano and S. Polo, at the southern hillslope of La Costa Mt. *Erymnaria matensis* (Capasso) and *Costerymnaria italica* Motchurova Dekova & Taddei Ruggiero, occur along with rudist- (caprinids, radiolitids and caprotinids) and gastropod-rich assemblages. Rudist biogenic beds are the result of both primary and secundary accumulations as storm-related reworking may be evident. *Caprina carniata* (Boehm) and *Neocaprina gigantea* Plenicar have been collected (G. Sirna pers. Comm.).

As regards the lowermost Cenomanian drowning succession bearing the lower brachiopod level, we observe that it is basically coeval to the earlymost Cenomanian cooling of the surface oceanic waters as argued on the basis of the tethyan oxygen isotopic curves (e.g.: Stoll & Schrag, 2000).

As regards the latemost (?) Cenomanian brachiopod-rich level, we observe that the brachiopod shells float in an abundant matrix made up of microbial wackestone with some ostracods and small-sized gastropods. A similar intriguing brachiopod-cyanobacteria association has been recently found in a Lower Toarcian drowning succession (Gran Sasso Mts, central Italy) which has been genetically linked to the environmental disruption reflecting the coeval OAE (Graziano *et al*., 2006a). A definitive dating of the upper brachiopod-rich level to the latemost Cenomanian would eventually confirm an analogous correlation to the OAE2 thus providing a further evidence of the peculiar paleoenvironmental meaning of the brachiopod-cyanobacteria associations.

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