

## EARLY CRETACEOUS AGGLUTINATED FORAMINIFERA OF THE GRESTEN KLIPPEN BELT, EASTERN ALPS (AUSTRIA)

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The Early Cretaceous limestone – marl rhythmites of the Upper Blassenstein member in the Gresten Klippen belt were studied with respect to their sedimentological development and micropaleontological content.

### LITHOLOGY:

Grey mudstones mottled black or faintly laminated by bloturbation; carbonate content 80–90 %, insoluble quartz residue, clay minerals (mainly micas) and plagioclase. Average thickness of beds about 17 cm with smooth bedding planes. In thin sections: nannofossil micrites, rarely calcispheres (radiolaria), crinoid fragments (*Saccocoma*) and silt-size quartz grains. Occasional indistinct pelletisation due to bloturbation.

Intercalated pelites are black soft argillaceous marls or marls, approximately 5 cm thick. Carbonate content between 10 and 50 %. Insoluble residue of clay minerals (micas, chlorite, smectite), quartz, and plagioclase.

Two types of rhythmites can be distinguished:

#### Type A sequence:

distinct mudstone–pelite intercalations, e.g. section Nb, with sharp contacts and abrupt change in carbonate content. Bed thickness is constant; limestone–marl ratio about 3 to 4. Mudstones are burrowed; bioturbation in bedding planes causes faint lamination.

#### Type B sequence:

gradational contacts of limestones and marls, e.g. upper part of section Na. Fine intercalations of mudstones and black pelites are common, resulting in even to wavy lamination. Bioturbation less intensive.

### BIOSTRATIGRAPHY:

Rich nannofossil assemblages with *Calccalathina oblongata*, *Crucellipsis cuvillieri*, and *Nannoconus steinmanni*. Age: Valanginian–Hauterivian, nanno zones CC3 to 4 of Sissingh. Samples are devoid of planktonic foraminifera but rich in radiolaria. Calcareous benthics with *Lenticulina eichenbergi*, *L. ouachensis*, *Epistomina caracolla* along with the nannoplankton restrict the age to the Hauterivian.

### ECOLOGY:

The foraminifera are dominated by agglutinated forms. The fauna is dwarfed and dominated by distinct species in each sample. In the investigated sections the dominance of *Dorothia hauteriviana* versus *Ammobaculoides carpathicus* or *Bigenerina gracilis* is remarkable. Such phenomena are normally connected to special factors such as oxygen depletion.

The assemblages most similar to these are those described by Butt (1982) from the W African Atlantic margin off Morocco (DSDP Site 370). These were explained as stemming from deep water near the CCD with some degree of oxygen deficiency. The accompanying assemblage of *Ammodiscus*, *Glomospira*, *Reophax*, and nodosariids is also similar in the two locations. In contrast, however, are the mid-shelf assemblages from the Agadir region (Morocco) where *Dorothia hauteriviana* occurs together with *Lenticulina elchenbergi*, *L. ouachensis*, *Epistomina caracolla*, and *Spirillina*.

Therefore the investigated rhythmites of the Upper Blassenstein member are interpreted by the foraminiferal fauna and the rich radiolaria content in a nannoplankton facies as being pelagic deep water sediments with black shale deposition in time of oxygen depletion. Transport of shallower deposits into the basin is indicated by the calcareous benthics.

The control of insoluble residue from both sediment types makes acidic residues useless for ecological interpretations. Complicated agglutinates such as *Dorothia* and partly also *Bigerina gracilis* are dissolved together with the calcareous fauna.