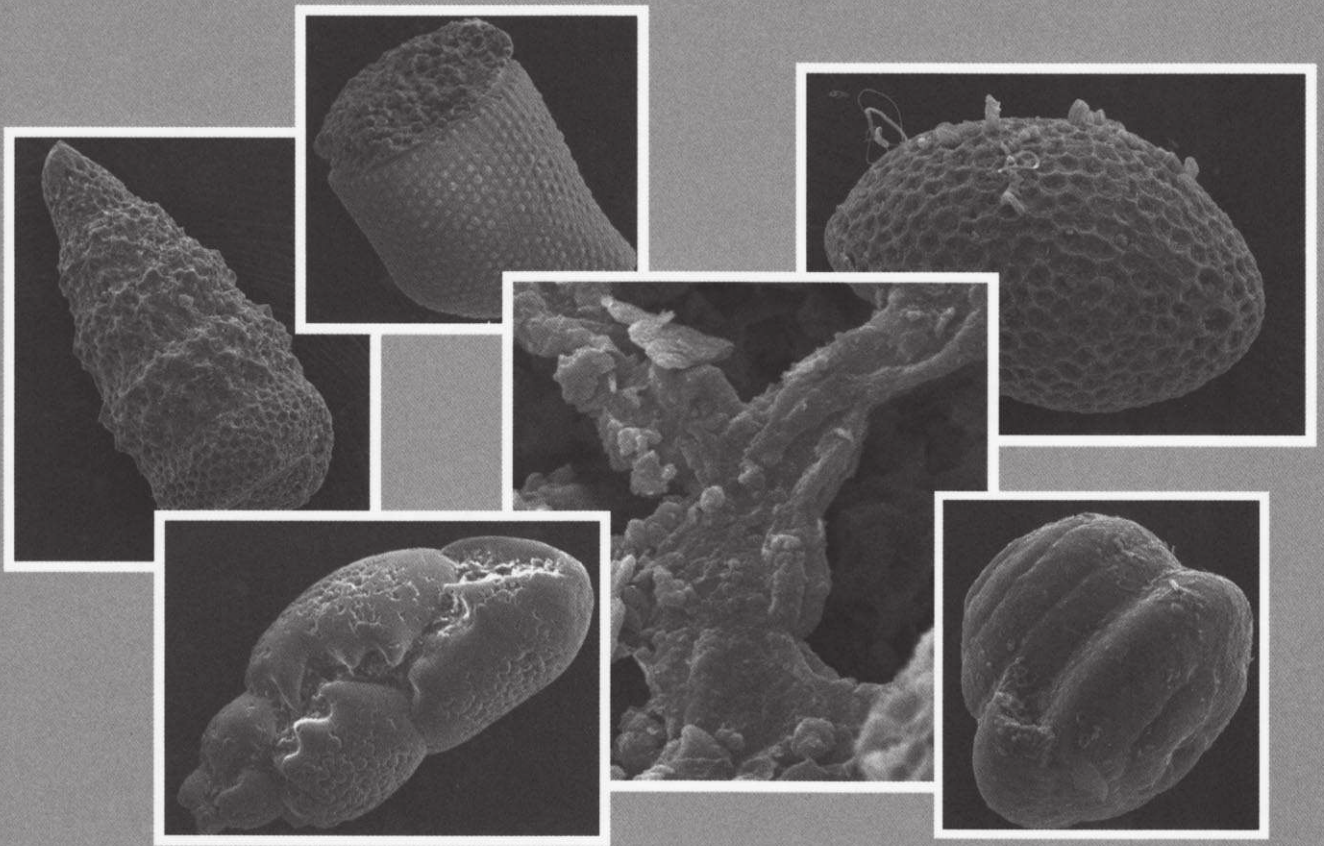


Integrating Microfossil Records from the Oceans and Epicontinental Seas



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and tops the lutites of Unit 3 described by Ross and Degens (1974). Therefore, Unit 3 is the single lithological unit that is present both in the basinal and shallow settings of the Black Sea.

Holocene calcareous nannoplankton assemblages are absent from the sites located seaward near the Danube Delta. This fact could be explained by the Danube Delta evolution, including changes of the coastline position (Panin, 1997). Hence, we may suppose a low salinity for the surface waters in this area during Holocene times, below the limit permitting the coccolith survival. In the other studied sites, calcareous nannoplankton assemblages are present in the youngest Holocene deposits, yielding a very low diversity. In fact, the assemblages *in situ* are represented by only two species, *Emiliana huxleyi* and *Braarudosphaera bigelowii*, both taxa being able to survive in low salinity environments (Bukry, 1974). The foraminiferal assemblages are mainly composed of taxa belonging to the genera *Ammonia*, *Haynesina*, *Porosonion*, *Elphidium*, *Criboelphidium* and *Quinqueloculina*. Most of the assemblages are made by *Ammonia beccarii* s.l. and *Criboelphidium poeyanum*. The most common identified ostracods in the Holocene studied deposits are: *Cyprideis littoralis*, *Leptocythere multipunctata*, *L. devexa*, *L. histriana*, *Amnocythere striatocosta*, *A. reticulata*, *A. cymbula*, *Callistocythere diffusa*, *Cythereis rubra pontica*, *Heterocythereis amnicola*, *Loxoconcha granulata*, *L. gibboides*, *L. aestuarii*, *Limnocythere inopinata*, *Cytherura euxinica*, *Cytheroma variabilis*, *Paracytherois agigensis*, *Pontocythere bacescoi*, *P. tchernjanskii* and *Xestolebris decipiens*.

The changes in microfaunal and nannofloral composition and abundance indicate that salinity increased during Holocene times in the NW Black Sea, from a brackish setting to a marine one, similar to the one found in modern times. Taking into account the fluctuation pattern of nannofloras, a sudden increasing in salinity could be assumed for deeper parts of the Romanian shelf, while a progressive increasing could be supposed for extremely shallow areas.

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Surviving strategies of nummulitids. Three-dimensional analysis of the *Nummulites fabianii* group at the Eocene/Oligocene boundary.

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The calculation from 3D images of chamber volumes and shapes and their changes during ontogeny provides a large amount of information quite impossible to obtain by the traditional two-dimensional methodology of oriented thin sections. The volume measurement itself does not give information about shell geometry but indicates the influence of temporal changes during the foraminiferal growth.

Environmental changes are therefore reflected in deviation from a specific Bauplan. Such deviation can be observed by a three dimensional study of the ontogeny of larger foraminiferal shells through geological time. A pilot study has been done on the *N. fabianii* group which survives the prominent cooling event at the Eocene/Oligocene boundary. The calculation on the chamber volumes shows a drastic growth speed reduction across the boundary. Among the investigated species, the Oligocene specimens (i.e., *N. fichteli*) reach the same size of the Late Eocene ones (*N. fabianii*) 40 chambers later. Such reduction in growth speed may testify to an adaptation by nummulitids to survive in colder environments and possibly lower nutrient levels. A complete trend in speed reduction has been observed from the Late Eocene nummulitids through the late Priabonian to the early Oligocene. As a linear correlation has been confirmed between chamber volume measurements and chamber area in equatorial section, the same trend has been observed through thin section analysis with a larger number of specimens. Size reduction is a well-known adaptation to climatic changes but has never been fully demonstrated so far on larger benthic foraminifers.

The occurrence of the Early Cenomanian at southern Moravia (Czech Republic)

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The Cenomanian sediments of the Waschberg Zone (Ždánice Nappe) were found in the limestone quarry near Mikulov in the Pavlovské vrchy hills. They can be characterized as green-grey glauconitic sandy claystone to clayey sandstone containing few discontinuous laminae of clayey limestone. It seems to be conformable to the underlying Ernstbrunn Limestone that is laminated in the top 10 centimetres. The Cenomanian sandy claystones are actually sandwiched between underlying limestone and overthrust another tectonic slice of the same limestone as a part of a duplex structure well visible in the quarry wall. The sandy claystones form 3 m long and 18 cm thick lens tectonically reduced by the overthrust.

The microfossil taphocoenosis consists of abundant phosphatic faecal pellets, sponge spicules replaced by glauconite, benthic and planktonic foraminifers, and broken shark tooth. Calcareous nannofossil taphocoenosis is poor (15 species) and the nannofossils poorly preserved. Dominance of *Watznaueria barnesae* (>90%) indicates strong diagenetic impoverishing of the taphocoenosis. Rare Polycyclolithaceae, including strongly recrystallized specimens of *Eprolithus floralis*, unidentified fragments of placoliths, and single specimens of poorly preserved representatives of genera *Prediscosphaera*, *Zeughrabdothus*, *Vagalapilla* form the rest of taphocoenosis. Presence of *Prediscosphaera cretacea* and broadly oval specimens of *Manivitella pemmatoidea* (estimated length 15–25 µm) may indicate the Cenomanian age.

Poorly preserved planktonic foraminifers *Rotalipora gandolfii* Luterbacher & Premoli Silva, *R. globotruncanoides* Sigal, *R. montsalvensis* Mom., *Praeglobotruncana delrioensis* (Plummer) and *P. stephani* (Gandolfi) give evidence for an early Cenomanian age - the middle part of the *R. globotruncanoides* Zone. In the benthic assemblage agglutinated species prevail over calcareous. Among the agglutinated taxa *Marssonella oxycona* (Reuss), *Hagenowella gibbosa* (d'Orbigny), *H. courta* Marie, *Dorothia* sp., *Arenobulimina* sp., *Heterocoskinolina*? sp. and (?)*Eggerellina mariae* ten Dam were identified. Calcareous benthics comprise *Quinqueloculina* gr. *antiqua* Franke, representatives of genera *Laevidentalina*, *Lenticulina*, *Hemirobulina*, *Gyroidinoides*, *Valvulineria*, *Gavelinella*, *Globorotalites* etc. The occurrence of the Lower Cenomanian at Pavlovské vrchy hills represents a normal marine facies of