GEOLOGICKÝ ZBORNÍK — GEOLOGICA CARPATHICA 30, 1, BRATISLAVA, MARCH 1979

HEDVIGA BYSTRICKÁ*

RUPELIAN IN THE BANSKÁ BYSTRICA BASIN

(Tab. 1.—10.)

A b s t r a c t: A rich assemblage of a calcareous nannoplankton was found in the borehole JK-9, drilled near the village Kordíky. On the basis of the species analysis, it was possible to rank the assemblage to the NP 24-*Sphenolithus distentus* Zone (E. M a r t i n i, 1971) which represents the Upper Rupelian and the Lower Egerian. This attributed to the solution of the Banská Bystrica basin stratigraphy, where up to now no Paleogene sediments younger than those of the Lower Oligocene had been found. The question whether the sea sedimentation of this region is bound only to the Paleogene or whether it reaches up the Miocene remains open. The assemblage found is correlated with similar developments in Moravia, Hungary and Germany.

Р е з ю м е: В статье описано богатое сообщество известкового наннопланктона из буровой скважины JK-9 недалеко с. Кордики. На основе анализа видов сообщество было приурочено к зоне NP-24-Sp. d. (E. M a r t i n i, 1971), представляющей верхний рупельский и нижний эгерски ярусы, что способствовало решение стратиграфии бассейна Буанской Быстрицы, где до недавного времени не были найдены никакие палеогеновые отложение более молодого чем нижний олигоцен возраста. Вопрос, если морская седиментация этого региона связана только с палеогеном, или если она длилась до миоцена, остается открытым. Приводится корреляция найденного сообщества с похожими образованиями в Моравии, Венгрии и Германии.

Introduction

Many authors dealt with the problems of the sedimentation and the biostratigraphy of the Tertiary sediments of the Banská Bystrica basin. One of them was even D. Štúr, 1868 and after him mainly D. A n d r u s o v (1954), J. S e n e š (1955), J. L o z e r t — U. N á p r s t e k (1957), I. C í c h a (1960), J. J a r o š (1960, 1963), E. P l a n d e r o v á — M. P u l e c — O. S a m u e l — M. V a ň o v á (1963), B. P a c l t o v á (1966) and O. S a m u e l (1975). The above mentioned authors did not come to the same results. At present, there are two opinions about the biostratigraphy of the Tertiary filling of this region

According to one of them, the representative of which is the group of the Geological Institute of D. Štúr in Bratislava (E. P l a n d e r o v á, M. P u l e c, O. S a m u e l, M. V a ň o v á 1963) the Tertiary sea sedimentation of the basin is bound to the Paleogene and it was in action in the span of the Upper Lutetian — the Lowest Oligocene. The age of the sediments, except the basal transgressive conglomerate litofacies was proved by large and small foraminifers and pollen spectra. The Neogene sediments are already of a limnic-freshwater character.

The other oppinion, defended by I. C í c h a, 1960 and B. P a c l t o v á, 1966, supposes the sea sedimentation also in the Lower Miocene — the Chattian—

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Aquitanian. Also these authors derive the stratigraphic ranking from the foraminifera and the pollen-spores content of. the sediments.

The microfauna and the calcareous nannoplankton from shallow boreholes drilled for the solution of landslides in the Kordiky-Králiky-Malachov region were observed. Four from 8 boreholes contained foraminiferal microfauna which was possible to rank to the Middle and Upper Priabonian. The calcareous nannoplankton was found only in one sample of the JK-9 borehole.

Fig. 1. Location of borehole JK–9.

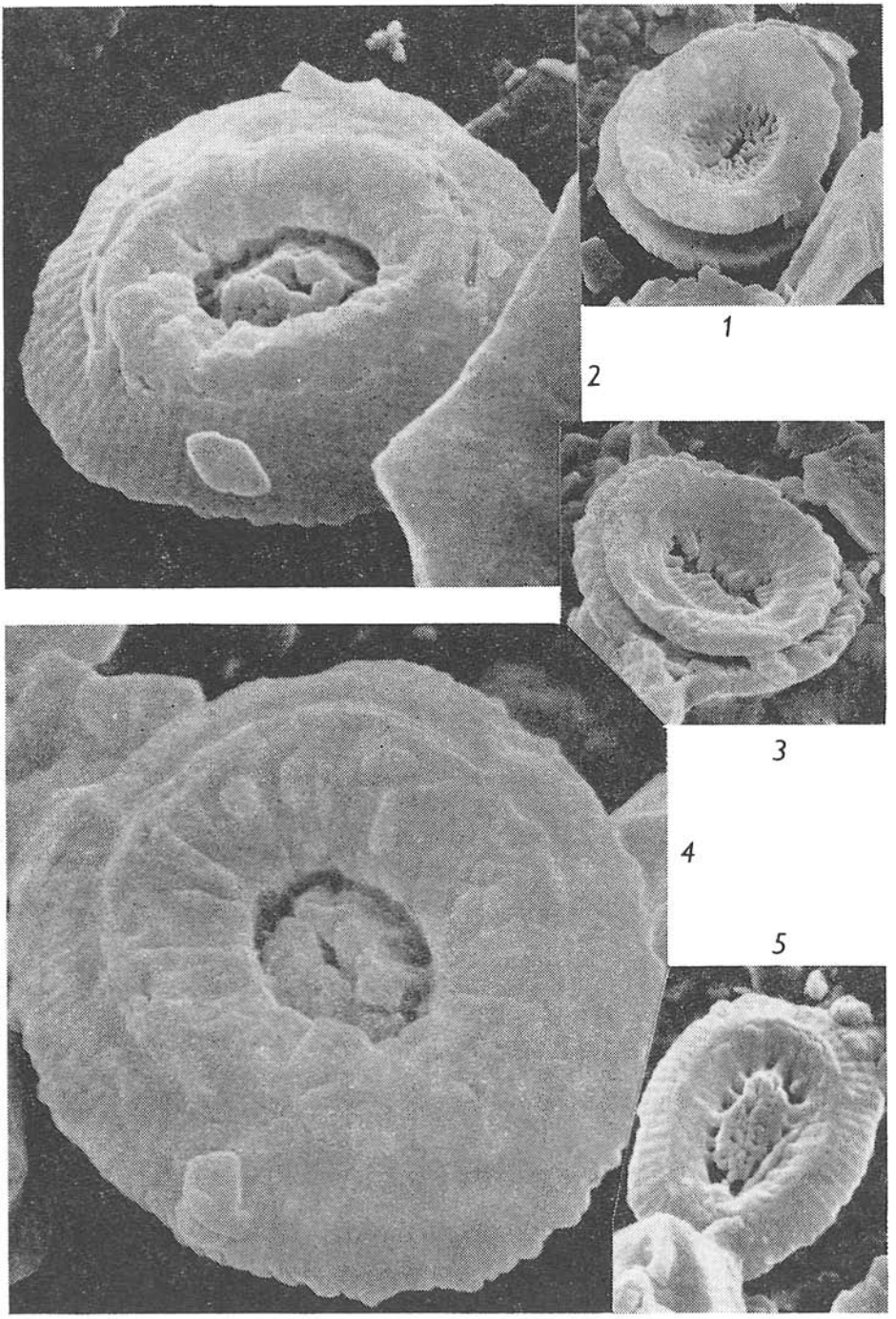
Biostratigraphical classification of the JK-9 borehole

The JK-9 borehole is located at the E border of the village Kordiky in the direction about 150 m SSE from the state highway. It was drilled to 30 m. From 30–3,5 m it caugth Tertiary sediments. (grey, very fine sandy claystones). They were overlapped from 3,5 m by Quarternary earth. Samples from the depth of 30 m and 21 m were employed to determine the age of the sediments.

The claystones from the 30 m's depth contained a foraminiferal assemblage in which the following species were identified: *Nodosaria acuminata* Hant., *Bolivina crenulata* Cush., *Angulogerina gracilis germanica* Cush. et Edw., *Globigerina officinalis* Subb., *Globigerina ouachitaensis* Howe et Wall., *Globigerina praebulloides* Blow, *Caucasina coprolithoides* (Andr.). The species composition of the assemblage indicated the Upper Priabonian age. No calcareous nannoplankton was found here.

Plate I

Fig. 1, 2, 4. *Reticulofenestra lockeri* Müller. — Fig. 1. Proximal side, magn. 3500x, fig. 2, 4 distal side, magn. 9000x. — Fig. 3, 5. *Dictyococcites daviesi* (Haq) Perch — Nielsen. — Fig. 3. Proximal side, magn. 6500x, fig. 5 distal side, magn. 5000x.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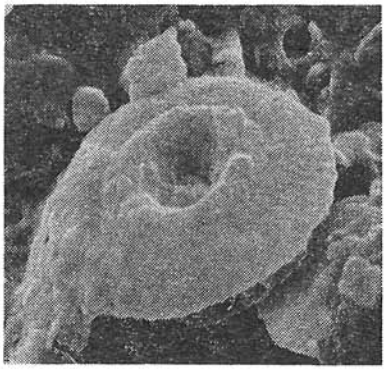

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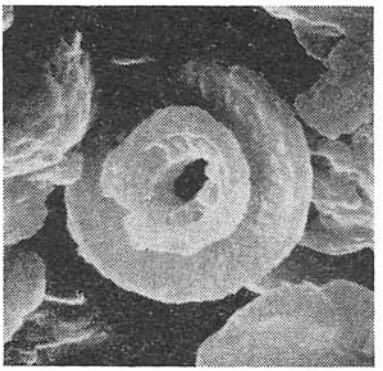

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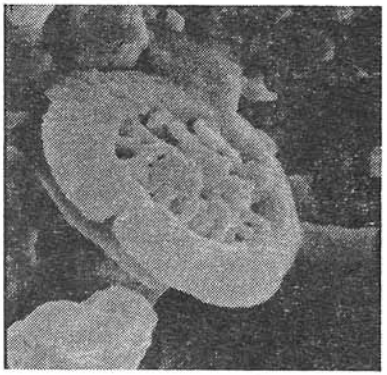

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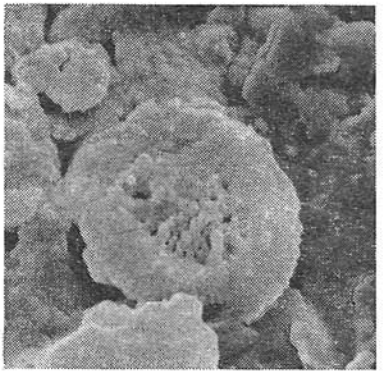

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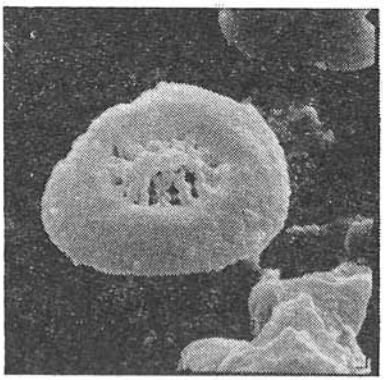

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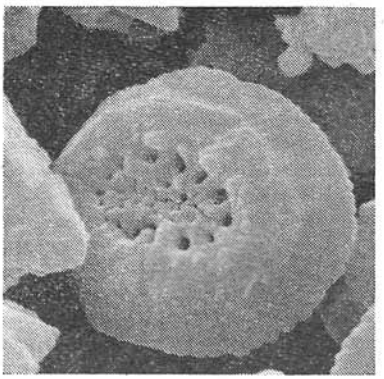

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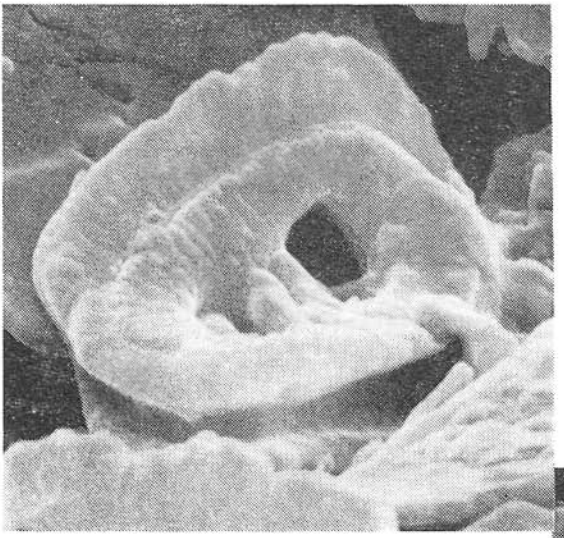
Plate II

Fig. 1, 2. *Coccolithus rupeliensis* Müller. — Fig. 1. Distal side, magn. 4000x, fig. 5 proximal side, magn. 5000x. — Fig. 3, 4, 5. *Dictyococcites ornatus* (Müller) Bystrická. — Distal side, magn. 5000x. — Fig. 6. *Dictyococcites daviesi* (Haq) Perch — Nielsen. — Distal side, magn. 6000x.



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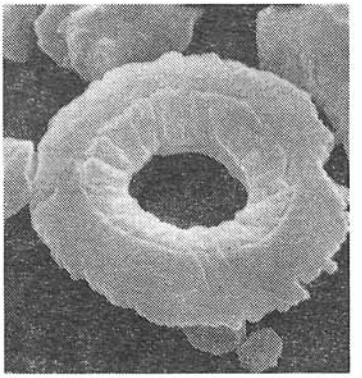

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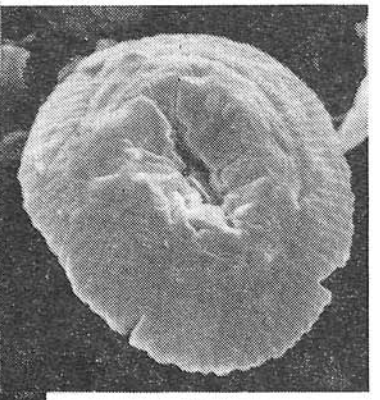

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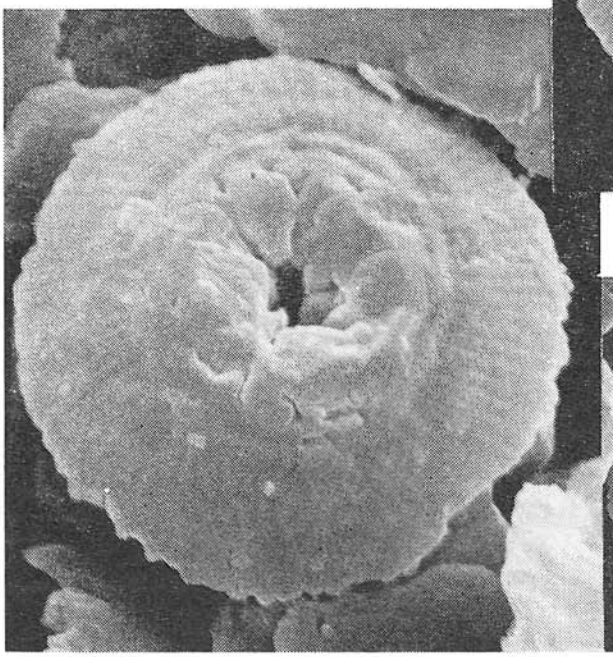

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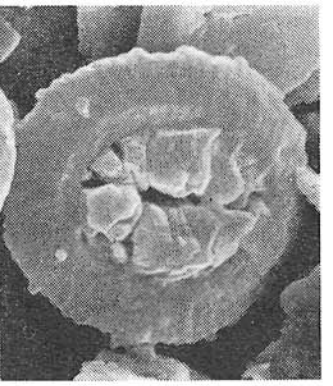

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Plate III

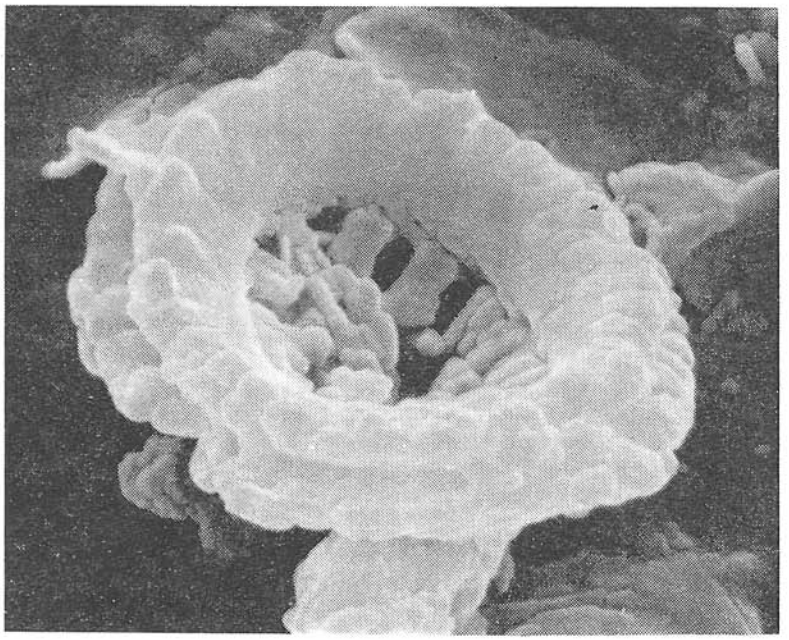
Fig. 1. *Helicosphaera recta* Haq. — Proximal side, magn. 10 000x. — Fig. 2. *Reticulofenestra umbilica* (Levin) Martini et Ritzkowski — distal side, magn. 4000x. — Fig. 3, 5. *Dictyococcites bisectus* (Hay, Mohler et Wade) Bukry et Percival. — distal side; fig. 3 magn. 4000x, fig. 5 magn. 5000x. — Fig. 4. *Reticulofenestra abisecta* (Müller) Roth. — Distal side, magn. 7000x.

The sample from 21 m's depth did not contain foraminifera, but it provided a very rich and excellently preserved calcareous nannoplankton containing the following species: *Coccolithus eopelagicus* (Bram. et Ried.) Bram et Sull., *Coccolithus pelagicus* (Wall.) Schil., *Coccolithus rupeliensis* Müller, *Chiasmolithus altus* Buk. et. Perc., *Chiasmolithus cf. solitus* (Bram. et Sull.) Hay, Moh. et Wade, *Chiasmopolithus cf. ouamaruensis* (Deflandre) Hay, Moh. et Wade, *Chiasmolithus titus* Gart., *Cruciplacolithus delus* (Bram. et Sull.) Perch-Niel., *Cyclicargolithus floridanus* (Roth et Hay) Buk., *Cyclococcolithus formosus* Kampt., *Cribrocentrum reticulatum* (Gart. et Smith (Perch-Niel)., *Dictyococcites daviesi* (Haq) Perch-Niel., *Dictyococcites ornatus* (Müll.) Bystr., *Reticulofenestra abisecta* (Müll.) Roth, *Reticulofenestra clatrata* Müll., *Reticulofenestra lockeri* Müll., *Reticulofenestra umbilica* (Lev.) Mart. et Ritz., *Dictyococcites bisectus* (Hay, Moh. et Wade) Buk. et Per., *Toweius callosus* Perch-Niel., *Toweius occultatus (Lock.) Perhc-Niel., Ponstosphaera multipora* (Kampt.) Roth, *Pontosphaera bicaveata* (Perch-Niel.) Bystr., *Helicosphaera recta* Haq, *Helicosphaera compacta* Bram. et Wilc. *Lophodolithus nascens* Bram. et Sull., *Transversopontis obliquipons* (Defl., Hay, Moh. et Wade), *Neococcolithes cf. nudus* Perch-Niel., *Neochiastozygus chiastus* (Bram. et Sull), (Perch-Niel.), *Isthmolithus recurvus* Defl., *Sphenolithus moriformis* (Brön. et Strad.) Bram. et Wilc., *Orthozygus aureus* (Strad.) Bram. et Wilc., *Trochoaster simplex* Klumpp, *Discoaster barbadiensis* T.S.H., *Discoaster deflandrei* Bram. et Ried., *Discoaster saipanensis* Bram. et Ried., *Discoaster* tani Bram. et Ried., *Nannotetrina spinosa* (Strad.) Achut. et Strad. and different Cretaceous species.

The nannoplankton assemblage represents a very varied thanatocenosis with Cretaceous and Paleogene forms, the stratigraphical range of some of them reaching up to the Miocene. The placolits were very well preserved and na difference could be observed between the autochthon and the reworked older specimes in the state of preservation. The main part of the assemblage was formed by species of a relatively large stratigraphic diapazone, which were typical for the Upper Eocene ad the Lower Oligocene sediments. They were as follows: *Coccolithus pelagicus* (Wall.) Schill., *Coccolithus eopelagicus* (Bram. et Ried.) Bram. et Sull., *Cyclococcolithus formosus* Kampt, *Cyclicargolithus floridanus*, (Roth et Hay) Buk., *Reticulofenestra umbilica* (Lev. Mart. et Ritz.) *Dictyococcites bisectus* (Hay, Moh. et Wade) Buk. et Perc. *Dictyococcites daviesi* (Haq) Perch-Niel. and *Reticulofenestra lockeri* Müll, ranked to those quite numerous. *Isthmolithus recurvus* Defl. and *Orthozygus aureus* (Strad.) Bram. et Wilc. index fossils of the Upper Eocene and the Lower Oligocene, were found rarely.

Plate IV

Fig. 1. *Reticulofenestra clatrata* Müller. — Proximal side, magn. 10 000x. — Fig. 2, 3. *Cyclicargolithus floridanus* (Roth et Hay) Bukry. — Fig. 2. Distal side, magn. 10 000x, fig. 3 proximal side, magn. 6000x. — Fig. 5. *Isthmolithus recurvus* Deflandre. — Magn. 5000x.



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Some exclusively Oligocene species of a narrow stratigraphic ranges enabling the ranking of the assemblage to the Middle Oligocene were identified. They were:

Reticulofenestra lockeri Müll. (Early – late Oligocene) NP 21–NP25 Zones *Reticulofenestra clatrata* Müll. (Mid Oligocene), NP 23–NP 24 Zones *Dictyococcites ornatus* (Müll.) Bystr. (Mid Oligocene), NP 23–NP 24 Zones *Coccolithus rupeliensis* Müll. (Mid Oligocene), NP 23–NP 24 Zones *Reticulofenestra abisecta* (Müll.) Roth (Mid-late Oligocene) NP 24–NP 24 Zones *Helicosphaera recta* Haq (Mid – late Oligocene), NP 24–NP 25 Zones.

The Middle Oligocene is represented by the NP 23-*Sphenolithus predistentus* Zone and by the lower part of the NP-24-*Sphenolithus distentus* Zone in the Standard calcareous nannofossils zonation of E. Martini, 1971. The latter occupies also the lower part of the Upper Oligocene. In the sense of our distribution, the NP 23-Zone can be correlated with the Lower Rupelian and the NP 24 Zone with the Upper Rupelian and the Lower Egerian.

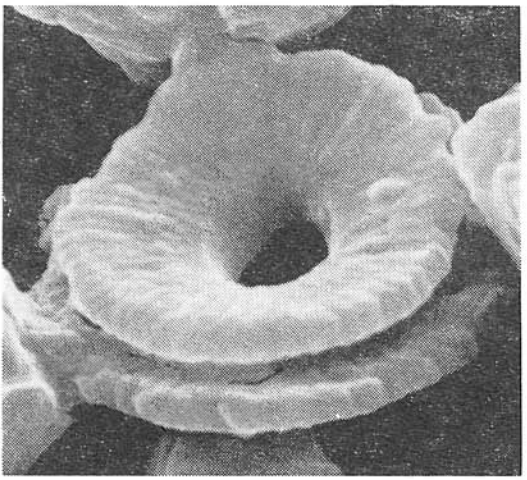
According to the findings of C. Müller, 1970, obtained from the study of the Oligocene nannoplankton of the Bavarian Molasse, N. Germany and Belgium, *Reticulofenestra abisecta* (Müll.) Roth and *Helicosphaera recta* Haq appearing in the NP 24 Zone can be used as the index fossils to distinguish the NP 23 and the NP 24 Zones in the assemblages not containing sphenoliths. On the basis of this, the assemblage here studied can be ranked to the NP 24 -*Sphenolithus distentus* Zone and it can be taken for the Upper Rupelian.

Comparison with other Oligocene assemblages

The Oligocene calcareous nannofossils have been studied little in the region of Czechoslovakia up to now. The first data are known from the S. Slovakia (H. Bystrická – R. Lehotayová, 1974). The coccolith assemblage ranked by the authors to the NP 22-*Helicosphaera reticulata* Zone, NP 23-*Sphenolithus predistentus* and NP 24/25-*Sphenolithus distentus*/*Sphenolithus ciperoensis* Zones was found in the sediments with the Kiscell clay foraminifera in the region of Mužla, Kováčová, Kováčovce. The nannoplankton of the Kováčovce region (the MV 12 borehole) was ranked to the NP 24 Zone. Simultaneous species of the Upper Eocene–Lower Oligocene prevailed in the assemblage. *Reticulofenestra abisecta* (Müll.) Roth and *Coccolithus rupeliensis* Müll. were present from stratigraphically important species. The asemblage contained a few expressive species of the Middle Oligocene and the reworked component was substantialy smaller than that of nannoflora of Kordíky. There was also a conspicuous difference in the way of preservation. The nannoplankton of Kováčovce was to a greater degree deformed and secondary overgrown which

Plate V

Fig. 1. *Cyclicargolithus floridanus* (Roth et Hay) Bukry. – Proximal side, magn. 10 000x. – Fig. 2. *Helicosphaera compacta* Bramlette et Wilcoxon. Distal side, magn. 4500x. – Fig. 3, 4. *Cyclococcolithus formosus* Kamptner. – Fig. 3. Distal side, magn. 6000x, fig. 4 proximal side, magn. 5000x. – Fig. 5. *Coccolithus pelagicus* (Wallich) Schiller. Proximal side, magn. 4500x. – Fig. 6. *Cribrocentrum reticulatum* (Gartner et Smith) Perch–Nielsen. Proximal side, magn. 7000x.



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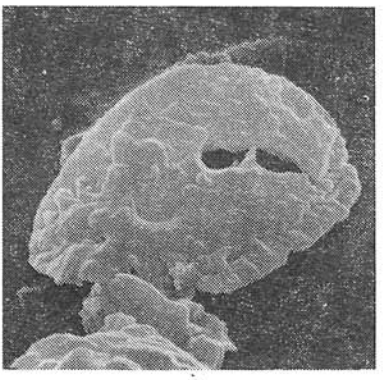

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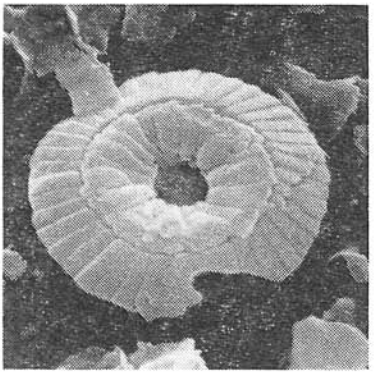

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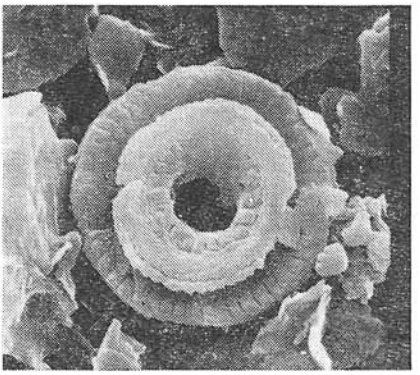

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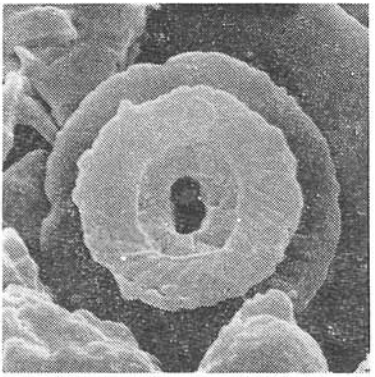

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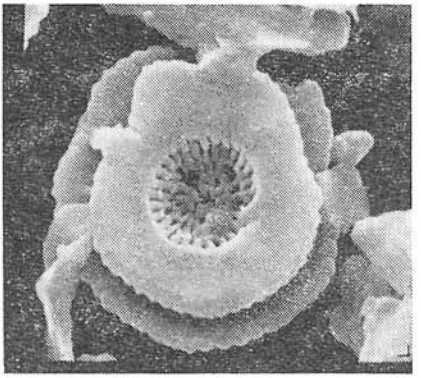

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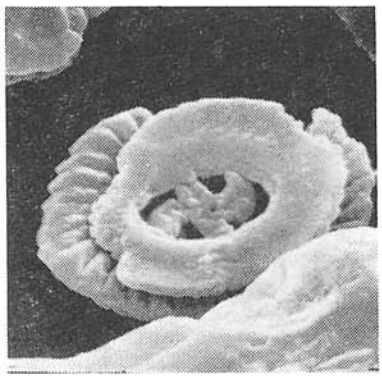
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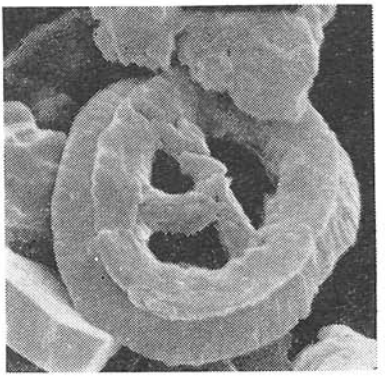
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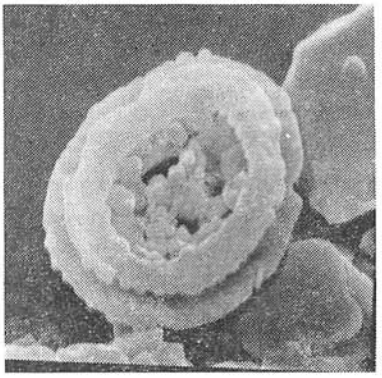
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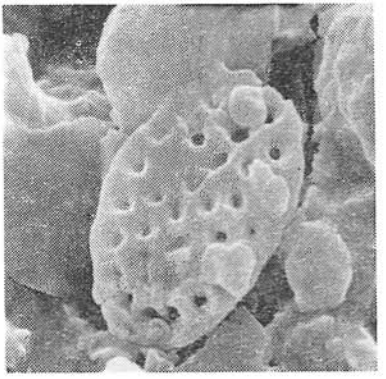
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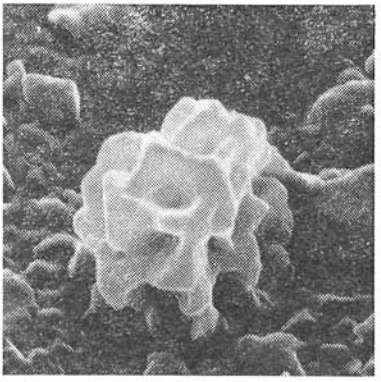
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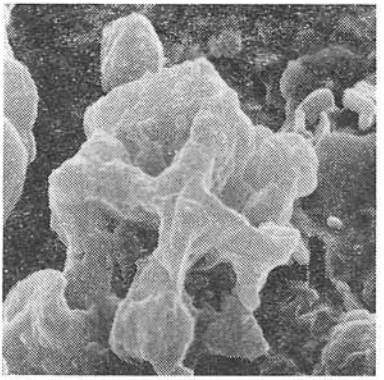
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Plate VI

Fig. 1. *Chiasmolithus titus* Gartner. Proximal side, magn. 7000x. — Fig. 2. *Chiasmolithus cf. ouamaruensis* (Deflandre) Hay, Mohler et Wade. — Distal side, magn. 5000x. — Fig. 3. *Chiasmolithus sp.* Proximal side, magn. 4500x. — Fig. 4. *Pontosphaera multipora* (Kamptner) Roth. — Distal side, magn. 4500x. — Fig. 5. *Sphenolithus moriformis* (Brönnimann et Stradner) Bramlette et Wilcoxon. — Magn. 7000x. — Fig. *Nannotetrina spinosa* (Stradner) (Achuthan et Stradner). — Magn. 5000x.

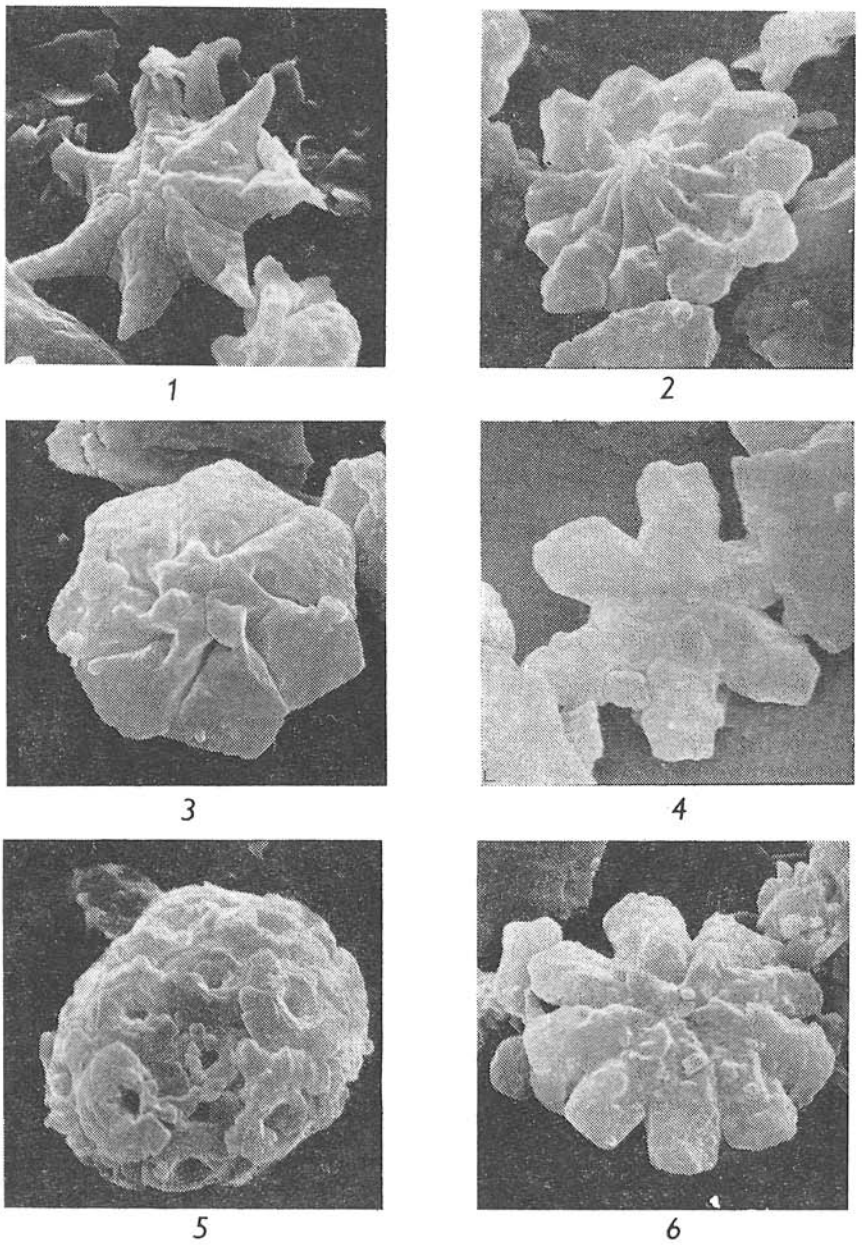


Plate VII

Fig. 1. *Discoaster saipanensis* Bramlette et Riedel. Magn. 5000x. — Fig. 2. *Discoaster barbadiensis* Tan Sin Hok. — Magn. 4000x. — Fig. 3. *Discoaster* sp. — Magn. 4500x. — Fig. 4. *Discoaster cf. mirus* Deflandre. — Magn. 4750x. Fig. 5. *Coccosphere*, sp. indet. — Magn. 7000x. — Fig. 6. *Discoaster* sp. — Magn. 4000x.

made species identification difficult. The specimens composition was the most similar to the nannoflora of the Novaj locality in Hungary (M. Báldi – Beke, 1973).

In Moravia there was the Oligocene calcareous nannoplankton studied from the Menilitic Formation (F. Jurášová, 1974) and from the Subsilenian-Ždanice unit (F. Jurášová, 1975). The assemblages from the Menilitic formation were ranked to the NP 21-*Ellipsolithus subdistichus* Zone. The nannoplankton of the Subsilenian-Ždanice unit was very rich in overgrown forms and it was ranked by the author to the NP23/24 Zone, mainly on the basis of the similarly high allochthonous specimens as it was known of the Rupelian sediments of Germany.

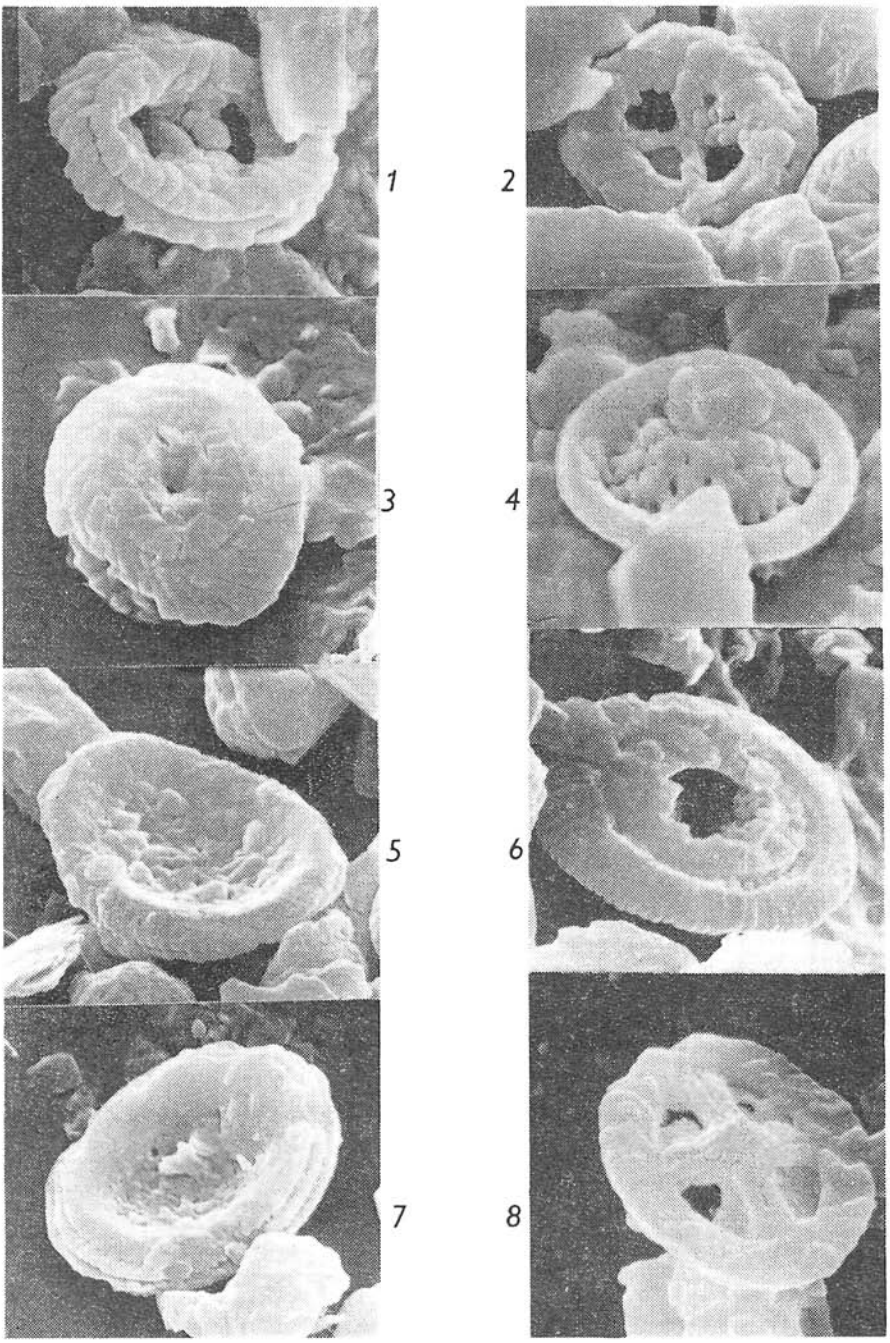
The Oligocene calcareous nannoplankton was studied in detail in Hungary (M. Báldi – Beke, 1973, 1975, 1977). The nannoflora of the NP 24-Zone was found in the parastratotype locality of the Kiscelian near the village Novaj. The assemblage was characterized by a very abundant content of the *Reticulofenestra lockeri* Müll. and *Discolithina lateliptica* Báldi and by a less expressive Cretaceous-Paleogene admixture. Unique occurance of the *Sphenolithus ciperoensis* Bram. et Wilc. was marked already in this zone, while *Helicosphaera recta* Haq was present in the NP 25-*Sphenolithus ciperoensis* Zone. The whole of the Oligocene was caught in the borehole in the area of Budapest. The NP 21–NP 23 Zones were found in the development of the Tard Clay formation and the NP 24 Zone was found above them in the development of the Kiscell Clay. The rich and very varied nannoplankton contained locally many sphenoliths, mainly the *Sphenolithus distentus* (Mart.) Bram. et Wilc., which according to the author, in the difference from the Novaj assemblage indicates a connection with a mediteranian region and a warmer climate.

The assemblage studied has the most of similarity with those of the nannoplankton of the Upper Rupelian of the Bavarian Molasse (C. Müller, 1970). The both assemblages contain many reworked Cretaceous and Eocene forms and the specimens typical for the Upper Rupelian such as *Reticulofenestra abisecta* (Müll.) Roth, *Reticulofenestra clatrata* Müll., *Reticulofenestra lockeri* Müll., *Dictococcites ornatus* Müll.) Byst. *Coccolithus rupeliensis* Müll., and *Helicosphaera recta* Haq are represented in both.

Plate VIII

Fig. 1. *Zygolithus diplogrammus* Deflandre. Proximal side, magn. 9000x. – Fig. 2. *Praediscosphaera cretacea* (Arkhangelsky) Gartner. Proximal side, magn. 6000x. – Fig. 3. *Watznaueria barnesae* (Black) Perch–Nielsen. Distal side, magn. 5000x. – Fig. 4. *Pontosphaera sp.* – Magn. 9000x. – Fig. 5. *Cartnerago obliquum* (Stradner) Reinhardt Proximal side, magn. 4500x. – Fig. 6. *Blackites sp.* Distal view of shield, magn. 5000x. – Fig. 7. *Arkhangelskiella sp.* Proximal side, magn. 4000x. – Fig. 8. *Vekshinella crux* (Deflandre et Fert) (Shafik et Stradner. – Distal side, magn. 8000x.

Photographs made under scanning-electron microscope JSM-U$_3$ at D. Štúr Institute of Geology Bratislava – by K. Šebor – M. Švec.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Conclusion

A rich calcareous nannoplankton was found at the study of the sample from the 21 m's depth of the JK-9 borehole near the village Kordíky. The specimen analysis proved it was the Middle Oligocene assemblage of the lower part of the NP 24-*Sphenolithus distentus* Zone, which in our literature ranks to the Upper Rupelian. The assemblage was very similar to the boreal Upper Rupelian nannoplankton of the lower Bavarian Molasse.

This finding did not solve the problem whether the sea sedimentation of the Banská Bystrica basin had been limited to the Paleogene or whether it had continued to the Miocene. However, it proved it had been still going on in the Upper Rupelian, i.e. it had taken a longer time than to the Lower Oligocene, which was biostratigraphically proved up to now.

Translated by K. Bystrická

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