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Calcareous Nannofossils biostratigraphy of the Early Miocene sediments of the Vienna Basin NE part (Slovakia)

AIDA ANDREJEVA–GRIGOROVIČ & EVA HALÁSOVÁ

Department of Geology and Paleontology Comenius University , Mlynská dolina G 842 15 Bratislava, Slovakia
E-mail: grigorovic@nic.fns.uniba.sk, halasova@nic.fns.uniba.sk

Abstract. Calcareous nannoplankton was studied in samples from the 16 boreholes in the NE part of the Vienna basin. Designated associations of the calcareous nannofossils belong to the biozones of calcareous nannoplankton NN2, NN3, NN4 (sensu Martini 1971) . Investigated nannoflora enables us to specify the age of deposits as the Eggenburgian, Ottnangian and Karpatian. The determined associations of calcareous nannoflora of the Vienna basin (Central Paratethys) were correlated with standard Neogene chart .

Key words: Early Miocene, biostratigraphy, calcareous nannoplankton,Vienna basin

Material

The source of material were samples from 16 drilling cores from the NE part of the Vienna basin: Bresty 1, Cunín-5,6,8,11,21,23,35,49, Kúty 7,9, Moravský Ján 3, Gbely 100, Petrova Ves 1,2, Smolinské 22.

Nannoplankton was found out in the calcareous deposits from the boreholes Cunín -11, 21, 49, Kúty 7,9, Gbely 100, Moravský Ján 3, Petrova Ves 1,2 and Smolinské 22.

Results

Calcareous nannoflora has been recorded only in the calcareous clayey sediments, rarely in aleurites (Plate.I). Preservation state of the specimens was different. Great quantity of nannofossils were redeposited from the Cretaceous, Paleogene and sometimes from Lower Miocene deposits. The following characterizations of the appointed associations go from older to younger.

I. association: *Discoaster druggii, Sphenolithus disbelemnos, S. dissimilis, S. compactus, S.moriformis, S. conicus, Orthorhabdus serratus, Triquetrorhabdulus carinatus, T. challengeri, T. milowii, Reticulofenestra minuta, R.cf.haqii, Helicosphaera ampliaperta, H. granulata, H.carteri.* All these specimens occur sporadicaly. *Coccolithus pelagicus, Cyclicargolithus floridanus* and *Thoracosphaera sp.* are represented in great quantity. In the core No.5 of the drillhole Petrova Ves 2 is for the nannoplankton association characteristic great number of the specimens *Thoracosphaera albatrosiana, T. heimii, T.operculata, T.saxea, T.tuberosa.* In all studied samples is typical the presence of redeposited nannofossils, mainly from the Paleogene deposits. Preservation state is very bed with secundary recrystalization. The association has been assigned on the basis of appointed taxa (fig.1) to the nannofossil Zone NN2 Discoaster druggii. The age of sediments is the Eggenburgian. Such association has been recovered in the samples of the boreholes Petrova Ves 2, Cunín21?, 11?,49?

II. association: *Sphenolithus belemnos, S. disbelemnos, S.dissimilis, S. compactus, S.moriformis, Orthorhabdus serratus, Helicosphaera ampliaperta, H. intermedia, H.mediterranea, H. scissura, Reticulofenestra haqii, R. minuta, Pontosphaera multipora, Triquetrorhabdulus milowii,* (*ojedinelo Calcidiscus leptoporus*), *Cyclicargolithus floridanus, Coccolithus pelagicus, Thoracosphaera sp.* The stage of preservation of the nannoplankton is moderately good and even very good by redeposited nannofossils of the Cretaceous, Paleogene and Lower Miocene age. Mainly *Triquetrorhabdulus, Sphenolithus* and *Helicosphaera sp.* were observed. Designated association was integrated to the nannofossil Zone NN3 (fig.1) and the age of deposits is the Ottnangian. Such association was found in the samples of the borehole Cu 11, Kúty 9, Petrova Ves 1.

III. association: *Sphenolithus heteromorphus, S. compactus, S. moriformis, Helicosphaera ampliaperta, H.carteri, H.mediterranea, H. intermedia, H.granulata, H.scissura, Rhabdosphaera sicca, Orthorhabdus serratus, Reticulofenestra pseudoumbilicus, R.minuta, Pontosphaera multipora, Thoracosphaera sp., Triquetrorhabdulus milowii, Coccolithus pelagicus, Cyclicargolithus floridanus, Calcidiscus premacintyrei,* rarely *Calcidiscus leptoporus*, recycled taxa from Cretaceous and Paleogene. On the basis of appointed nannofossil taxa (Fig.1) association belongs to the nannoplankton Zone NN4 and the age is the Karpatian.

The discontinuous drilling cores didn´t allow to define limits between the calcareous nannoplankton Zones in the Early Miocene sedimentary succesion. The age of the nannoplankton assamblages was setted by comparison of the studied complexes with calcareous nannoplankton Zones of the standard scale, based on the European and oceanic profiles (Young in Bown, 1998). The correlation

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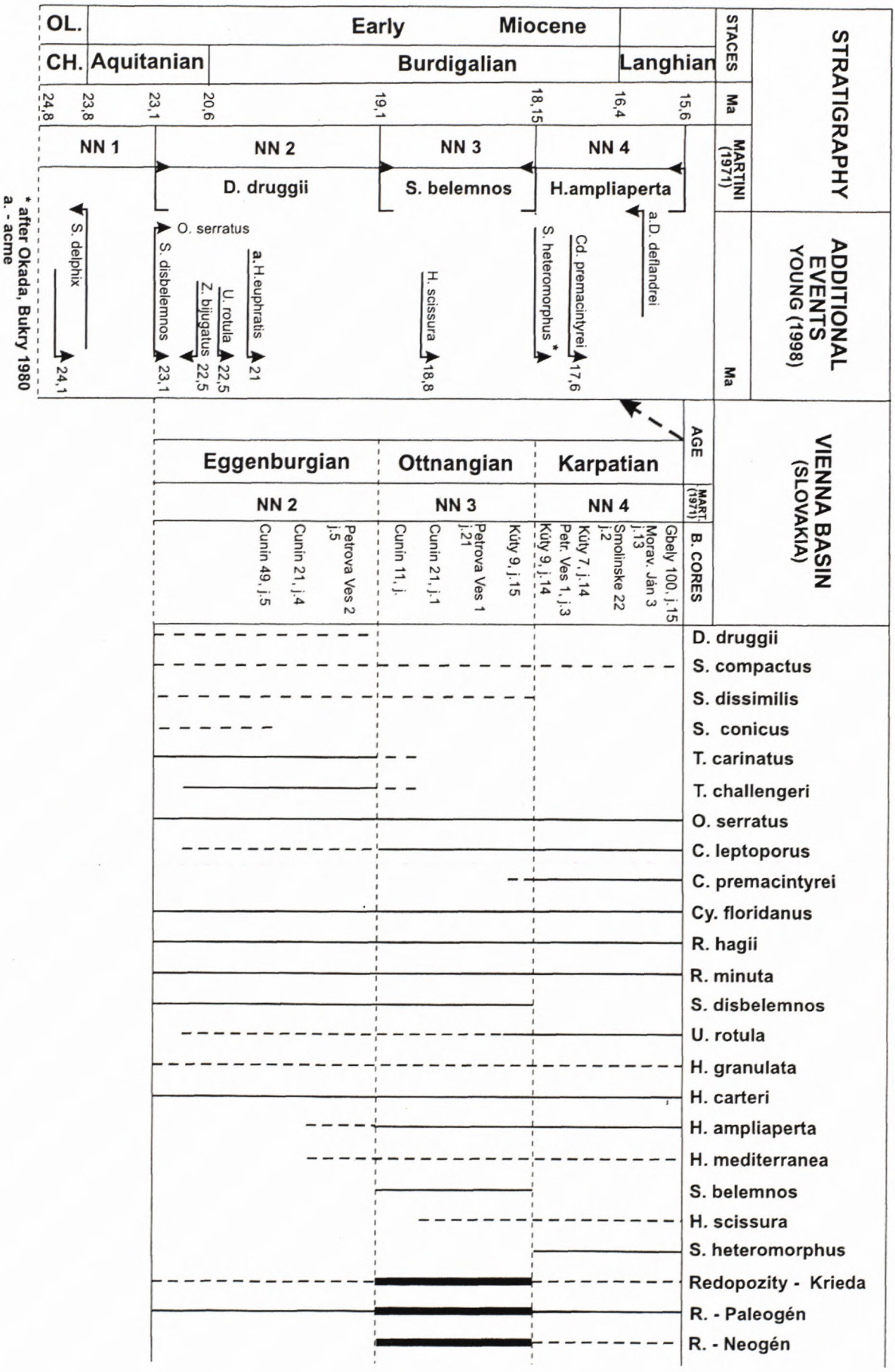

Fig. 1 Stratigraphical categorization of the samples in accordance with calcareous nannofossils

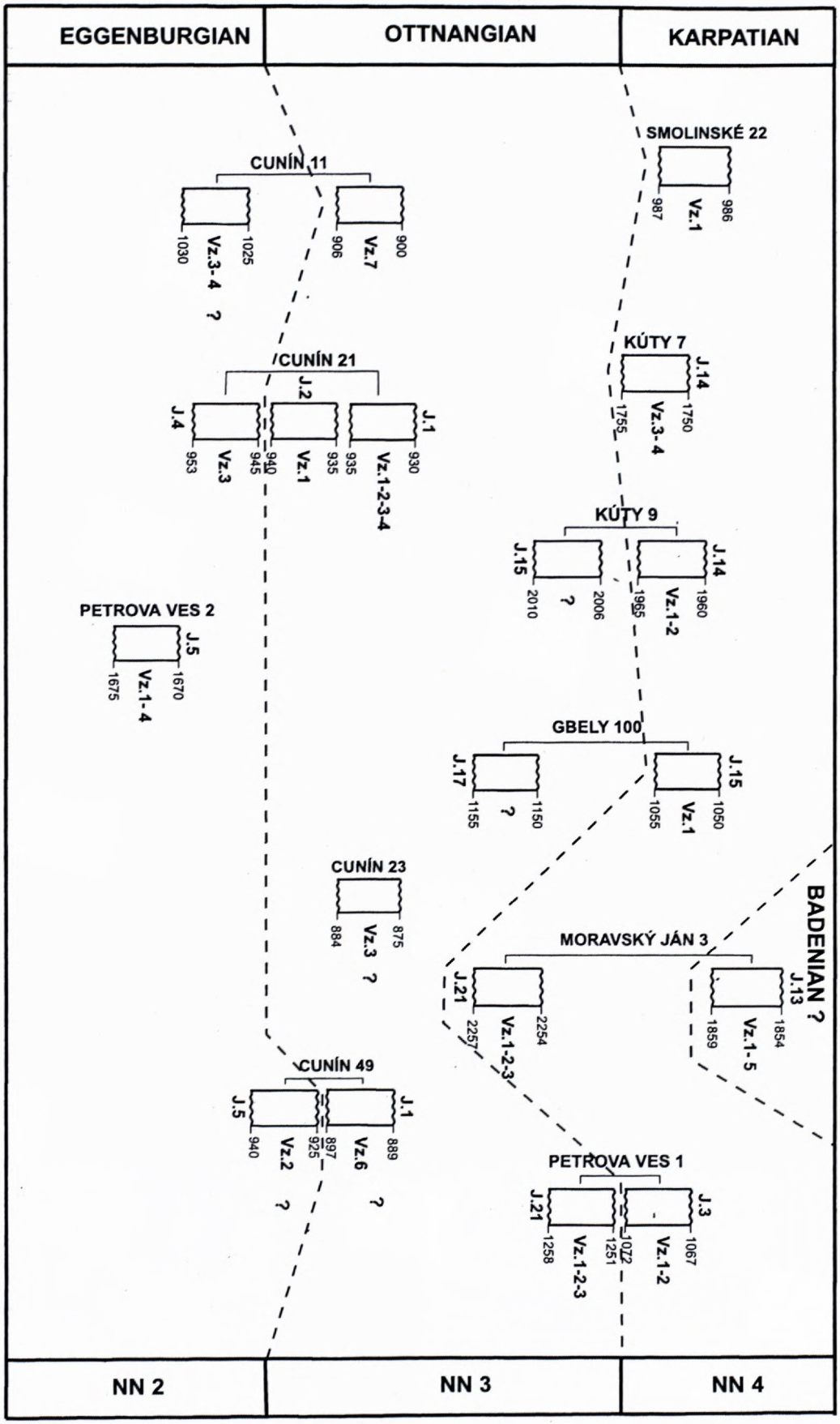

Fig. 2 Categorization of the studied segments of the drilling cores on the basis of calcareous nannofossils their correlation and biostratigraphic division

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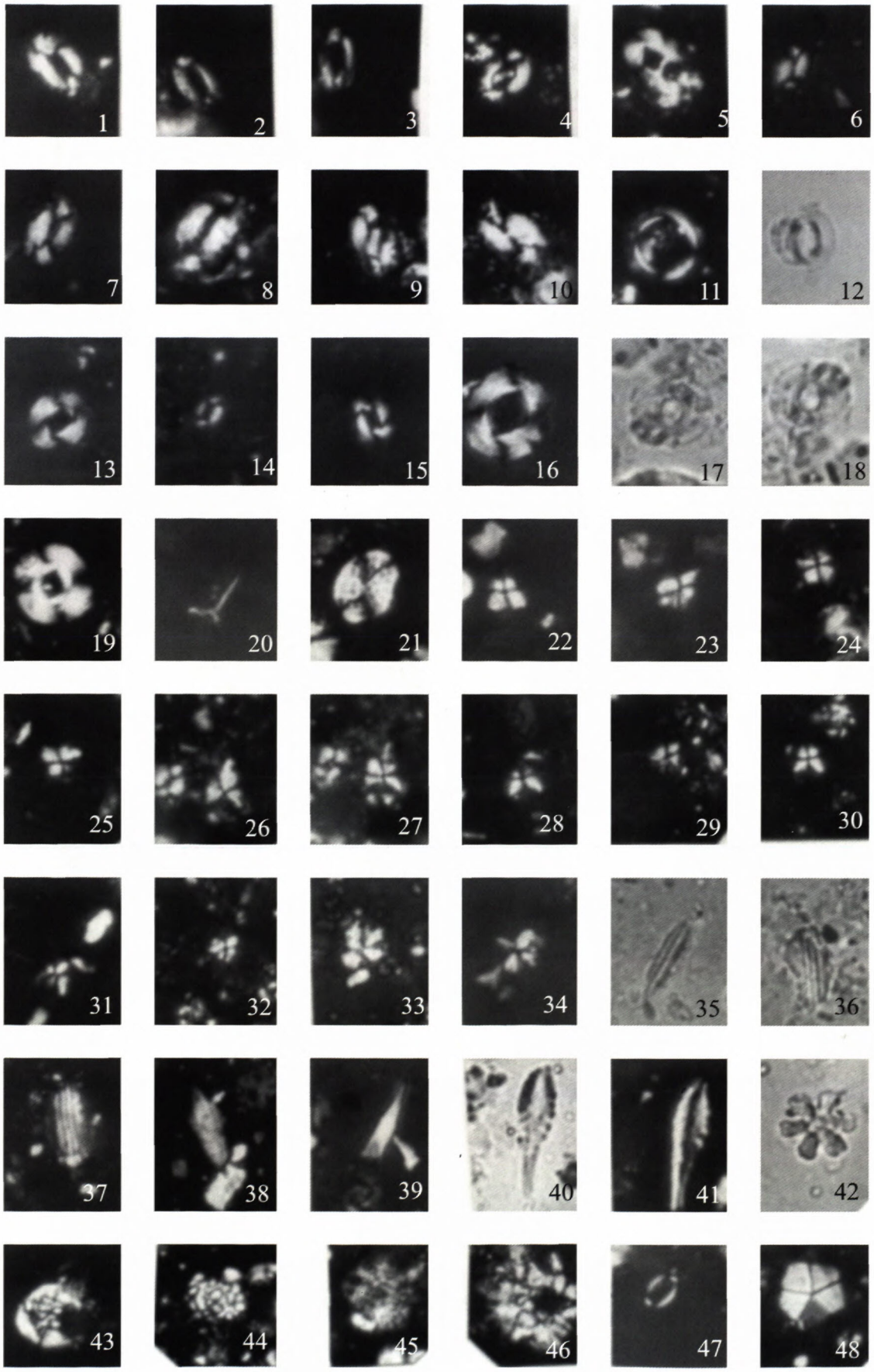

of the boreholes on basis of the calcareous nannofossils is given in the Fig. 2.

Early Miocene calcareous nannofossils give possibility to correlate the Eggenburgian (NN2) deposits with the Upper Aquitanian and Lower Burdigalian deposits, the regional stage Ottnangian (NN3) and the Karpatian (NN4) with the Upper Burdigalian of the Mediterranean region.

The Vienna basin deposits of the „Lower Lagenid Zone„ and the „Uvigerinella graciliformis Zone„ correspond on the basis of calcareous nannofossils to the Zone NN4(Karpatian).

Paleoenviromental reconstruction

The results of the calcareous nannofossils associations study in the Lower Miocene deposits show, that the depositional conditions were not optimal. The missing of the carbonate sediments in the discontinuous drilling cores don´t allow us to construct complete picture of the basin. The obtained data enable to state that the basin was marine and had a connection with the Mediterranean. This connections were restricted, the shallow water shelf conditions with terrigenous influx don´t allow bloom of cocolithophorales. The Karpatian basin indicate the best conditions, abundant calcareous nannofossils in good preservation stage have been recorded .

Conclusions

The calcareous nannofossils study provide possibility to identificate assemblages of the calcareous nannofossil Zones NN2 - Discoaster druggii, NN3 - Sphenolithus belemnos and NN4 - Helicosphaera ampliaperta. These zones determine the age of the deposits as the Eggenburgian, Ottnangian and Karpatian. The Lower Miocene deposits of the Vienna basin can be correlated with the Uppermost Aquitanian and Burdigalian in the Mediterranean region. We can to note, that the Lower Miocene Vienna basin was marine and was connected with Mediterranean.

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Calcareous nannofossils considered (in alphabetical order of generic epithets)

Calcidiscus leptoporus (MURRAY & BLACK) LOEBLICH & TAPPAN
Calcidiscus premacintyrei THEODORIDIS
Coccolithus pelagicus (WALLICH) SCHILLER
Cyclicargolithus floridanus (ROTH & HAY)BUKRY
Discoaster druggii BRAMLETTE et WILCOXON
Helicosphaera ampliaperta BRAMLETTE & WILCOXON
Helicosphaera carteri (WALLICH) KAMPTNER
Helicosphaera granulata (BUKRY & PERCIVAL) JAFAR & MARTINI
Helicosphaera mediterranea M
Helicosphaera intermedia MARTINI
Helicosphaera scissura MILLER
Orthorhabdus serratus BRAMLETTE & WILCOXON
Pontosphaera multipora KAMPTNER
Rhabdosphaera sicca (STRADNER)
Reticulofenestra cf. *haqii* BACKMANN
R.minuta ROTH
Reticulofenestra pseudoumbilicus (GARTNER) GARTNER
Sphenolithus heteromorphus DEFLANDRE
Sphenolithus moriformis (BRÖNIMANN & STRADNER) BRAMLETTE & WILCOXON
S.conicus BUKRY
Sphenolithus compactus BACKMAN
S.disbelemnos FORNACIARI & RIO
S.dissimilis BUKRY & PERCIVAL
Sphenolithus belemnos BRAMLETTE et WILCOXON
Thoracosphaera sp.
Thoracosphaera heimii (LOHMANN) KAMPTNER
Thoracosphaera saxea STRADNER
Thoracosphaera albatrosiana KAMPTNER
Th.operculata BRAMLETTE & MARTINI
Thoracosphaera tuberosa KAMPTNER
Triquetrorhabdulus carinatus MARTINI
Triquetrorhabdulus challengeri PERCH-NIELSEN
T.milowii BUKRY

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1.–3. *Helicosphaera ampliaperta* BRAMLETTE & WILCOXON – Gbely 100, Cunín 11; 4. *Helicosphaera intermedia* MARTINI – Petrova Ves 1, b.3; 5. *Helicosphaera mediterranea* MÜLLER – Kúty 9; 6.–7. *Helicosphaera scissura* MILLER – Cunín 21, Gbely 100; 8. *Helicosphaera granulata* (BUKRY & PERCIVAL) JAFAR & MARTINI – Smolinské 22; 9. *Helicosphaera euphratis* HAQ – Kúty 9; 10. *Helicosphaera carteri* (WALLICH) KAMPTNER – Gbely 100;11. *Coronocyclus nitescens* (KAMPTNER) BRAMLETTE & WILCOXON – Petrova Ves 1, b.3; 12.–13. *Reticulofenestra pseudoumbilicus* (GARTNER) GARTNER – Cunín 21, Gbely 100; 14. *Reticulofenestra minuta* ROTH – Kúty 9; 15. *R. haqii* BACKMAN – Kúty 9; 16. *R. daviesii* (HAQ) HAQ – Petrova Ves 21; 17. *Calcidiscus premacintyrei* THEODORIDIS – Gbely 100; 18. *C. premacintyrei* THEODORIDIS – Gbely 100; 19. *Cyclicargolithus floridanus* (ROTH & HAY) BUKRY – Gbely 100; 20. *Rhabdosphaera sicca* (STRADNER) – Gbely 100; 21. *Pontosphaera multipora* (KAMPTNER) ROTH – Kúty 9; 22.–23. *Sphenolithus belemnos* BRAMLETTE & WILCOXON – Cunín 11; 24.–25. *Sphenolithus compactus* BACKMAN – Petrova Ves 1; 26.–27. *Sphenolithus heteromorphus* DEFLANDRE – Moravský Ján 3; 28.–29. *Sphenolithus conicus* BUKRY – Petrova Ves 21; 30.–32. *Sphenolithus disbelemnos* – Petrova Ves 21, vz.1; 33.-34. *Sphenolithus dissimilis* BUKRY & PERCIVAL – Gbely 100, Moravský Ján 21; 5. *Triquetrorhabdulus carinatus* MARTINI – Cunín 21; 36.–37. *Triquetrorhabdulus challengeri* PERCH-NIELSEN – Cunín 21; 38. *Triquetrorhabdulus milowii* BUKRY – Cunín 11; 39. *Orthorhabdulus serratus* BRAMLETTE & WILCOXON – Cunín 21; 40.–41. *Triquetrorhabdulus* sp.– Kúty 9; 42. *Discoaster deflandrei* BRAMLETTE & RIEDEL – Kúty 9; 43. *Thoracosphaera operculata* BRAMLETTE & MARTINI – Petrova Ves 21; 44. *Thoracosphaera saxea* STRADNER – Petrova Ves 21; 45. *Thoracosphaera heimii* (LOHMANN) KAMPTNER – Petrova Ves 21; 46. *Thoracosphaera tuberosa* KAMPTNER – Petrova Ves 21; 47. *Syracosphaera pulchra* LOHMANN – Petrova Ves 21; 48. *Braarudosphaera bigelowii* (GRAN & BRAARUD) DEFLANDRE – Moravský Ján 3
Magnification: 2 400x