

Middle and Upper Miocene Palynology from the South-western Parts of the Pannonian Basin

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Palynological characterization of the Middle and Upper Miocene deposits from the Croatian part of the Pannonian Basin has resulted in a palynological zonation of the compositional development of the successive dinocyst assemblages. Seven characteristic palynozones of regional palynostratigraphic range and eight local subzones can be recognized.

The first zone is *Unipontidinium aquaeductum* Zone, of Badenian age. The leading form is from deeper and distal environment, associated by *Nematosphaeropsis lemniscata*, *Batiacasphaera sphaerica* and *Impagidinium patulum*. It could be correlated with Mediterranean zone of the same name *Unipontidinium aquaeductum* – LAN6, from the Serravallian of Italy (POWELL 1986; ZEVENBOOM 1995). During Badenian, based on the following dinocyst assemblage: *Systematophora placacantha*, *Spiniferites* spp., *Operculodinium* spp., *Hystrichokolpoma cinctum*, *Melitasphaeridium machaerophorum*, *Systematophora placacantha* Zone is defined in proximal, open marine environment.

Sarmatian *Polysphaeridium zoharyi*–*Lingulodinium machaerophorum* Zone is characterized by relatively rich marine community, but the most forms are euryhaline like *Polysphaeridium zoharyi* and *Lingulodinium machaerophorum*. Prasinophyta genera *Leiosphaeridia*, *Tytthodiscus*, *Hidasia* and *Mecsekia* are very important in the Sarmatian *Cymatiosphaera miocaenica* Zone, which characterizes stratified environment.

Lowest Pannonian *Mecsekia ultima* Zone is, also, characterized by the domination of prasinophytes, especially by the genera *Mecsekia*.

The succeeding zone is the *Spiniferites bentorii* Zone that can be correlated with the same named zone in Hungary (SÜTÖ-SZENTAI 1988). Based on the dominance of the following species it is subdivided into three subzones: *Spiniferites bentorii pannonicus*, *Spiniferites bentorii oblongus*, and *Pontiadinium pecsvaradensis*. In the upper part of this zone few Mediterranean dinocyst species are recognized, indicating communication between Mediterranean and Paratethys at that time.

The beginning of the succeeding *Spiniferites balcanicus* Zone is defined by the dominance of the same species. This zone characterizes the Upper Pannonian deposits.

The assemblages of the upper part of the *Spiniferites balcanicus* Zone are similar to the Hungarian *Spiniferites balcanicus* Zone (SÜTÖ-SZENTAI 1988).

The dominance of the *Galeacysta etrusca* marks the beginning of the *Galeacysta etrusca* Zone. This zone characterizes uppermost Pannonian distal deposits and it can be correlated both, with same named zone in Hungary (SÜTÖ-SZENTAI 1988) and the Messinian "Iago-mare" in Italy (ZEVENBOOM 1995). It can be separated into subzones *G. etrusca*–*Spiniferites virgulaeformis* and *G. etrusca*–*Spiniferites cruciformis*.

After disintegration of the Central Paratethys at the end of Sarmatian, and the rise of Lake Pannon, two main transgression-regression cycles are documented in the Upper Miocene deposits. During the maximum transgression of the first cycle in the Middle Pannonian (= "Pannon E" sensu PAPP et al. 1985; = "Upper Pannonian" sensu STEVANOVIĆ et al. 1990) Mediterranean dinoflagellates migrated into the Pannonian Basin. The connection with the Eastern Paratethys established at the end of Pannonian (= "Upper Pontian" sensu STEVANOVIĆ et al. 1990; MAGYAR et al. 1999) and enabled the endemic Lake Pannon dinoflagellate taxa to migrate via Eastern Paratethys into the Mediterranean.

References

- MAGYAR, I., GEARY, D.H. & MÜLLER, P. (1999): Paleogeographic evolution of the Late Miocene Lake Pannon in Central Europe. – *Palaeogeography, Palaeoclimatology, Palaeoecology*, 147: 151-167, Amsterdam.
- PAPP, A. (1985): Diskussion des Begriffes Pannonien. – In: PAPP, A., JAMBOR, A. & STEININGER, F.F. (eds.): M6 Pannonien. Chronostratigraphie und Neostatotypen, Miozän der Zentralen Paratethys, 7: 21-24, Verlag der Ungarischen Akademie der Wissenschaften, Budapest.
- POWELL, A.J. (1986): A dinoflagellate cyst biozonation for the late Oligocene to middle Miocene succession of the Langhe region, Northwest Italy. – In: WRENN, J.H., DUFFIELD, S.L. & STEIN, J.A. (eds.): Papers from the First Symposium on Neogene Dinoflagellate Cyst Biostratigraphy. – American Association of Stratigraphic Palynologists, Contributions Series 17: 105-128, Houston.
- STEVANOVIĆ, P. (1990): Basic features of caspiabackish molluscan fauna of the Pontian and its origin in the Paratethys. Comment on the Pontian malacofauna from the Pannonian Basin and its origin. – In: MALEZ, M. & STEVANOVIĆ, P. (eds.): P11 Pontian. Chronostratigraphie und Neostatotypen, Neogen der Westlichen („Zentrale“) Paratethys, 8: 47-55, JAZU-SANU, Zagreb-Beograd.

SÜTO-SZENTAI, M. (1988): Microplankton zones of organic skeleton in the Pannonian s.l. stratum complex and in the upper part of the Sarmatian strata. – *Acta Botanica Hungarica*, 34(3-4): 339-356, Budapest.

ZEVENBOOM, D. (1995): Dinoflagellate cysts from the Mediterranean Late Oligocene and Miocene. – 221 p., Ph.D. Thesis, University of Utrecht, Cip-Gegevens Koninklijke Bibliotheek, Den Haag.

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