



Ordovician to Devonian palynostratigraphy of well Rogozina of the Moesian Platform in Bulgaria: implications to the palaeogeography and earliest land plant evolution

Палиностратиграфия на Ордовика, Силура и Девона в сондаж Рогозина, Мизийска платформа, България: значение за палеографията и излизането на първите растения на сушата

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Recently, Ordovician to Devonian palynostratigraphy has been made of well Rogozina that penetrated the deepest and oldest sedimentary rocks from the Moesian Platform in Bulgaria. It is located in the eastern part, close to the terrestrial Bulgarian/Romanian border where the Moesian Platform passes to the South Dobrogea. The borehole bottom is at depth of 5600 m where Tremadocian age of sedimentary rocks has been firstly determined in Bulgaria on the basis of acritarchs.

Ordovician

The palynological association at the core bottom (light gray shales and siltstones) consists of mainly acritarchs and probably cryptospores. The acritarchs *Leiofusa somniculata*, *Leiofusa simplex*, *Leiofusa crassiuscula*, *Verychachium antiquum*, *Vulcanisphaera nebulosa*, *Vulcanisphaera africana*, *Cymatiogalea velifera* and *Saharidia fragilis* have suggested a Tremadocian age (see Vecoli, Le Hérisse, 2004). Among these species, *Leiofusa somniculata* was reported only from the Tremadoc of Sardinia, Italy (Pittau, 1985). Cryptospores assigned to *Laevolancis divellomedia*, *Tetraedraletes medinensis* and *Dyadospora murusattenuata* from the same stratigraphic level seem to be the oldest land plant witnesses from the northern periphery of Gondwana. Their age is ca. 20 Myr older from the previously known cryptospores of the Middle Ordovician of Argentina and Saudi Arabia (Rubinstein et al., 2010; Wellman, 2010; Strother et al., 1996, 2015). It is to be reminded the simultaneous age of these three simple cryptospore species found precisely in NW Anatolia in Turkey (Lakova et al., 2006). There, at Karadere area, the age determina-

tion was based on graptolites, i.e. Late Tremadocian (see Göncüoğlu et al., 2014). What concerns the paleobiogeographic signal of the Tremadocian acritarch association of well Rogozina, it is of evident North Gondwanan affinities with high-latitude position in the cool temperate zone of the southern hemisphere, and it is comparable with North Africa, Sardinia, Iberia, and Armorica.

Silurian

Upwards, in the thick monotonous fine siliciclastic sedimentary series of dark gray shales and siltstones (at depths of 4925–4930 m), an acritarch association has been determined of Llandovery/Wenlock age including *Deunffia monospinosa*, along with longer-ranging species, such as *Elektoriskos willierae* and *Hellosphaeridium citrinum*. A successive stratigraphic level from bottom to top has been assigned to the *Cingulochitina cingulata* chitinozoan zone (Wenlock).

Going further upward this subsurface section, a next stratigraphic level of interest is that of Ludlow/Pridoli boundary interval where the chitinozoans *Sphaerochitina sphaerocephala*, *Eisenackitina philipi*, *Eisenackitina lagenomorpha* have been identified. *Eisenackitina philipi*, first found in Gotland (Laufeld, 1974), and later in other localities in Baltica, might indicate that during the Late Silurian the Moesian Platform was already closer to Baltica. This confirms previously published hypothesis (Stemans, Lakova, 2004) based on miospore study that at Late Silurian and Lochkovian times the Rheic Ocean narrowed enough so that the eastern part of Moesian Platform shared same microzooplankton and terrestrial spore palynological associations with Baltica.

The uppermost Silurian level rich in palynomorphs was determined as the *Margachitina elegans* chitinozoan zone (Pridoli).

Lower Devonian

Fungochitina lata and *Cingulochitina plusquelleci* zones were documented upwards which are standard Lochkovian chitinozoan zones for Gondwana and its northern periphery. The highest level of the siliclastic black shale series (at depths of 3950.3–3957.8 m) belongs to the Emsian *Bursachitina bursa* chitinozoan zone.

Thus, the R-1 Rogozina core has provided material for palynological study that resulted in documentation of more or less continuous Tremadoc to Emsian succession of siltstones, shales and minor sandstones in the easternmost part of the Moesian Platform in Bulgaria.

The results will be published with special emphasis on their palaeobiogeographical implication and the occurrence of cryptospores in the Tremadoc, as well as correlation of chitinozoan zones of the Pridoli and Lower Devonian interval in well Rogozina with previously studied wells Kardam and Mihalich.

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