

## Characteristic and distribution of coal-bearing sediments in Lom Depression

### Характеристика и разпространение на въгленосните седименти в Ломската депресия

*Marlena Yaneva, Nadja Ognjanova-Rumenova, Stefan Shanov, Gabriel Nikolov, Nikolay Nikolov*  
*Марлена Янева, Надя Огнянова-Руменова, Стефан Шанов, Габриел Николов, Николай Николов*

Geological Institute, Bulgarian Academy of Sciences, Acad. G. Bonchev Str., Bl. 24, 1113 Sofia, Bulgaria;  
E-mail: marlena@geology.bas.bg; nognjan@geology.bas.bg

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The present study aims to characterize the coal bearing sediments from Lom Basin, located in Lom Depression. Twenty one boreholes, drilled during 2007–2008 and kindly provided by ENEMONA, have been described and sampled for sedimentological and diatom studies. The preliminary results are present here. For purposes of our study 7 core-drills were studied up to now by methods of sedimentology and diatom analysis. They are located in Momin brod prospecting area (5 drills) and in new Rasovo prospecting area (2 drills) (Fig. 1). Preliminary data from investigation of 4 boreholes in Momin brod pros-

pecting area were presented in Yaneva, Ognjanova-Rumenova (2010).

The first mention of the coal there is by Vankov (1905) on the Geological map of Bulgaria (in Konjaroff, 1932). He describes Tertiary sediments, containing coal seams. This coal has been studied since 1909. Massive investigations had been held during 80-s of the last century. During these last investigations 785 samples collected from various core-drills in Lom Depression had been studied for diatom content. Only much dissolved single frustules had been established in 4 samples from one core-drill C-5 (Temniskova-

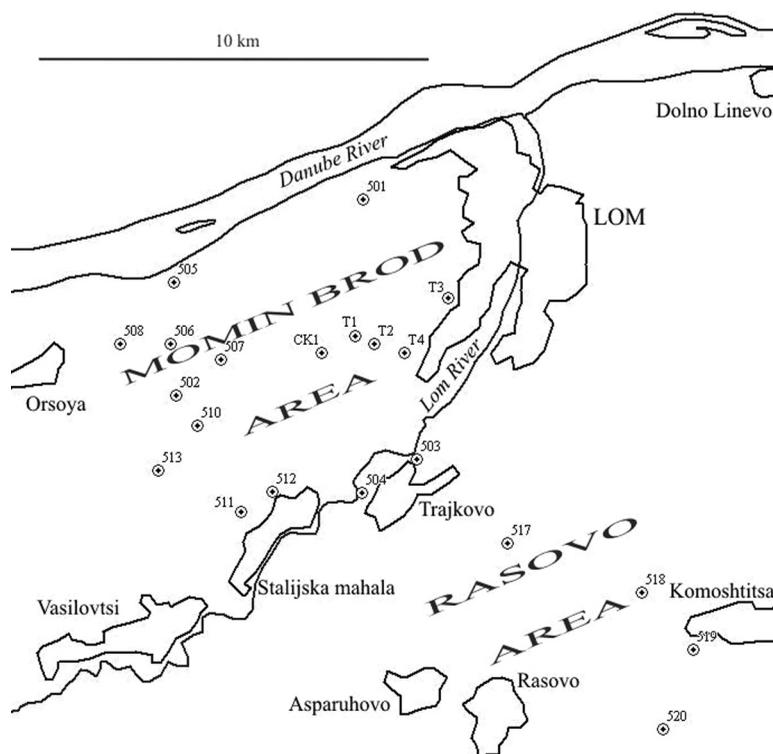


Fig. 1. Location of the prospecting boreholes in Lom Depression

Topalova, 1994). Massive diatom presence in clays is established for the first time during our study.

The coal-bearing sediments in Lom Basin are included in the Brusartsi Formation (Kojumdgieva, Popov, 1988). It covers sediments from the Archar Formation (Kojumdgieva, Popov, 1988) and is covered by Quaternary alluvial and loess deposits. The studied boreholes drilled through sediments of the Brusartsi Formation and stopped in the sediments of the Archar Formation. The lowermost Archar Formation comprises sand deposits. Its thickness in Lom Depression is between 20 and 100 m, but in core-drills took the upper 5–10 m. Sand is light gray and almost white in colour, very well sorted, and is composed mainly of quartz and less feldspars, some epidote, garnet and sphene, rare ore minerals. The age is the Upper Pontian. Sand from Rasovo area is silty-clayey and is less sorted than those from Momin brod area. The Brusartsi Formation comprises gray and grayish-green clays, sandy clays and rare sand interbeds, with few coal seams in the bottom parts, intercalated by clays and coaly clays. The thickness is between 40 and 140 m, in studied boreholes – from 70–105 m (Momin brod area) to 90–110 m (Rasovo area). Total thicknesses of clay beds are between 2 and 22 m, sands are between 0.5 and 2 m, and coal seams are from 0.5 up to 7–10 m (when intercalated with more or less organic rich clays). Clays are silty and sandy, in the lowermost parts (above and in-between coal seams) with significant diatom presence up to 50% (diatomaceous clays to diatomites). Some samples show high silt content, but after microscopic observation it is clear, that this is due to the enrichment in diatom remnants. The main rock-forming minerals are smectite (montmorillonite), illite, chlorite (clinochlore), less quartz and feldspars, after X-Ray diffraction analyses. Clay particles are oriented parallel to the bedding surface thus most of the diatomaceous clays show laminar structure with thickness of a single lamina 1–3 mm. Clays from the upper part of the section are more silty and sandy, with massive structure. Sand is medium to well sorted, composed of equal quantities of quartz and feldspars, very few grains of garnet, amphibole, sphene and epidote. Pyrite represents opaque minerals. Sand from Rasovo area is poorly sorted and unsorted, too. The age of the Brusartsi Formation is determined as the Dacian-Romanian. Sediments from the Brusartsi Formation are covered by alluvial deposits (poorly

sorted sand, gravels and conglomerates, in intercalation with sandy clays) with bulk thickness between 23 and 42 m (Momin brod area) up to 63 m (Rasovo area) which are covered by loess deposits with thickness about 15–37 m of Quaternary age.

The diatom analysis shows that the diatom flora is a freshwater one. The planktonic representatives of genus *Aulacoseira* Thw. have the highest abundance – and they compose the rockforming complex. On some levels there are periphytic (epiphytic) forms, belonged to genera *Fragilaria* Lyngbye sensu lato, *Tetracyclus* Ralfs, *Navicula* Bory sensu lato, *Cymbella* Ag. sensu lato, *Eunotia* Ehr., *Amphora* Ehr. The most abundant species is *Pinnularia nobilis* var. *neogena* (Grun.) Cl. It can be considered as biostratigraphic marker for the Late Miocene-Pliocene age. Dissolved frustules are registered in our study, too. After SEM investigation on the frustules of *P. nobilis* var. *neogena* high stages of dissolution of the frustules were determined. Dissolution occurs progressively and centripetally, and the final stage is the corroded silica matrix of the central area. Diatom dissolution depends on water chemistry and time related factors, such as the sediment accumulation rate. The dissolution rate depends also on pH and temperature.

Structural, textural and mineralogical composition of sediments from the Brusartsi Formation led to the conclusion that sedimentation during the Dacian-Romanian occurs in a relatively shallow broad basin with low hydrodynamics. Results from diatom analysis confirm this conclusion and indicate that the basin was eutrophic freshwater lake. The temperature regime was similar to the lakes of the moderate latitudes. The existence of lacustrine-paludal environment is proved also by presence of thick clay deposits in all boreholes from Momin brod area. These results are in agreement with conclusion based on geochemical and pollen analysis (Stefanova et al., 2008) about deltaic/limnic sedimentary environment. The newly obtained data of grain-size composition of deposits from Rasovo area show that alluvial sedimentation predominate there and less thickness of clays and fewest coal seams supposes that lacustrine-paludal environment occurs for shorter time. Our study complements the conclusion made by Siskov and Angelov (1984) that in Lom depression area a vast, lower-upper delta plain has been formed with lateral facies migration in which uneven peat accumulation occurred.

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