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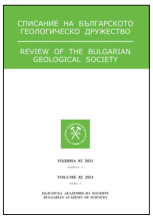

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Characteristics of the sediments hosting the Thracian settlement near the town of Letnitsa

Характеристика на седиментите, вместващи тракийското селище край град Летница

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Abstract. The Thracian settlement near the town of Letnitsa is situated on the left fluvial terrace of the Osam River. Hosting sediments are determined as sandy clayey silts, limy in various degrees. Deposits from the western and central parts are compared and both show similar mineralogical composition. These from the central parts contain more fine silt and clayey fraction, which supposes that these parts could have been flooded by the river.

Keywords: archaeology, geology, sedimentology, Thracian settlement.

Introduction

Archaeological excavations were conducted in two campaigns in 2019 and 2020 during the implementation of the project “Expansion of the gas transmission infrastructure of Bulgartransgaz EAD parallel to the northern (main) gas pipeline to the Bulgarian-Serbian border”. The archaeological site is located on the left bank of the Osam River, between the town of Letnitsa and the village of Asenovtsi, at about 1 km NNW from the river. Geographically, the site falls in the southernmost, hilly part of the Middle Danube Plain, which encloses the territory of the Danube plain between the rivers Vit and Yantra. It is characterized by highly indented flat hills and wide river valleys with meandering beds on the tributaries of the Danube River (Vit, Osam and Yantra). The western slopes of the hills are steep, while the eastern ones are sloping. The average altitude in the region is 138 m (Galabov, 1982).

The studied area falls within the Danube drainage subarea of the Black Sea drainage area, which is characterized by a temperate continental climate (cold winter, warm summer and spring-autumn maximum rainfall) (Kopralev, 2010). The groundwater in the area of the excavations is of pore and fracture type.

The present study aims to characterize the sediments building the terrace of the Osam River and hosting the Thracian settlement with respect to their structure, texture, grain-size and mineralogical composition. A comparison between deposits in two distant squares along the excavations is made, too.

Archaeological setting

The archaeological investigation established that the site has been inhabited for several historical periods – the Late Bronze, Early Iron and Late Iron Ages. During the Early Iron Age (1150–900 BC), the Thracians inhabited large houses measuring approximately 40 square meters (8 m long × 5 m wide). Three such buildings oriented towards the directions of the world were discovered. They are built in two lines, which implies a general planning of the village. Their construction was made by driving wooden trunks and branches intertwined into each other (whattle and daub construction). Build in this way the walls were thickly plastered with clay. The floor was made of a compacted earth.

In the IV century BC the habitat has moved to higher parts of the area, probably due to the rise of the water level of the Osam River. The small depth of the pits studied so far indirectly points to this. It is important to note that life here continues to flow smoothly and without significant or abrupt changes. So far, a dwelling

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has been studied, which in its construction and size does not differ much from the earlier ones from the early Iron Age. As a new element in the interior of the household can be defined the appearance of the eschara (hearth associated with ritual practices in the home) decorated with cord decoration. Imported red-figure and painted monochrome ceramics show that the region is included in the trade networks of the ancient world.

Among the studied archeological structures from the period the most numerous are the pits – over 130. They are found over the entire area of the site, and their concentration is the highest in the western and central areas of the site. There, in some cases, the pits form clusters in which their number reaches 15 or 16. The reason for this is not yet clear, but their use can be assumed according to a certain gender, sex or social sign. The pits have various shapes – cylindrical, hemispherical, with the shape of a truncated cone. There are also more complex – in the shape of an hourglass or beehive. It should be noted that they fully correspond to the information obtained in a number of studies south of the Balkan Mountains. Various, better or less reasonable assumptions can be made about their functions. Most of them can be associated with the practice of certain rituals; others can be defined as waste, and others as production pits – for clay extraction.

Geological setting

The Quaternary and Lower Cretaceous sediments have been discovered in the area around the archeological excavations (Khrischev, Nedjalkova, 1992; Filipov, Stojanov, 1993). The Quaternary ones represent alluvial deposits of the river channel, river banks and flood terraces (gravels, sands and clays), aeolian deposits (typical loess and clayey loess) and aeolian-alluvial-talus sediments (loess-like clays). The older rocks are of the Early Cretaceous age and are represented by the clays and marls with sandstone layers of the Trambesh Formation.

Archaeological excavations are located on the left bank of the Osam River, on the flood terrace. The terrace has a slight slope in the range of 1.0–1.7° to the south direction (170–190°) and is elevated about 2 m above the river. It is built of alternating gravel with sands and clays of a Pleistocene age (Filipov, Mikova, 1967) covered with aeolian formations – loess (Evlogiev, 2007; Jipa, 2014). Loess deposits are fine-grained, porous, loose and without clear stratification, often with calcareous nodules (Khrischev, Nedjalkova, 1992). The content of clays gradually increases in the southern direction and in the area of Letnitsa it is defined as clay loess (Evlogiev, 2007; Jipa, 2014). The age of the loess here is also defined as Late Pleistocene (Fotakieva, Minkov, 1966; Filipov, Mikova, 1967).

Material and methods

Described and sampled are two profiles: on the west wall of the profile in square H6, located in the western part of the site, and on the north wall of square J42, located in the center of the archaeological site. A macroscopic description of the sediments was made in the field, determining the structure and texture, color by the Munsell scale and reaction with 2% hydrochloric acid solution (Table 1). Then, under laboratory conditions, the samples were subjected to decarbonatization with 2% HCl solution (quantitative assessment of the calcareous component), followed by particle size analysis. The sieve analysis was performed by Fritsch Analizette 3-Pro, followed by pipette analysis of the fraction below 0.063 mm. The results were plotted on cumulative curves to calculate grain-size statistical parameters by graphic methods (Folk, Ward, 1957): graphic mean size (Mz), standard deviation (σ1), graphic skewness (Sk) and graphic kurtozis (KG).

Table 1. Field description of the sediments from the studied profiles

Profile	Depth (cm)	Field lithological description	Color	Sample №
Sq. H6 W wall	0–18	Plough zone. Gray-brownish clay, limy, with polygonal structure, 6×10 cm.	10YR4/3 (brown)	H6-1
Sq. H6 W wall	18–80	Archaeological bed. Modern humus horizon. Dark brown, abundance of ceramic fragments, prismatic structure, 20×10 cm. Carbonate concretions about 5–8 mm in size. Lamy.	10YR3/2 (very dark grayish brown)	H6-2
Sq. H6 W wall	80–110	Transition between archaeological and sterile horizons. Brownish-red clayey silt. Massive structure. Carbonate concretions about 5–8 mm in size. Limy.	10YR5.5/3 (light brown)	H6-3
Sq. H6 W wall	110–124	Sterile horizon. Loess. Yellowish limy clayey silt. Calcite nodules.	10YR5/6 (yellowish brown)	H6-4
Sq. J42 N wall	0–40	Plough zone. Yellowish silty clay, limy, with polygonal structure of measuring 2×2 cm.	10YR4/3 (brown)	J1
Sq. J42 N wall	40–110	Archaeological bed. Modern humus horizon. Dark brown, abundance of ceramic fragments, prismatic structure, 20×10 cm. Lamy.	10YR3/2 (very dark grayish brown)	J2
Sq. J42 N wall	110–120	Sterile horizon. Reddish-brown clayey silt. Lamy.	7,5YR3/3 (very dark brown)	J3

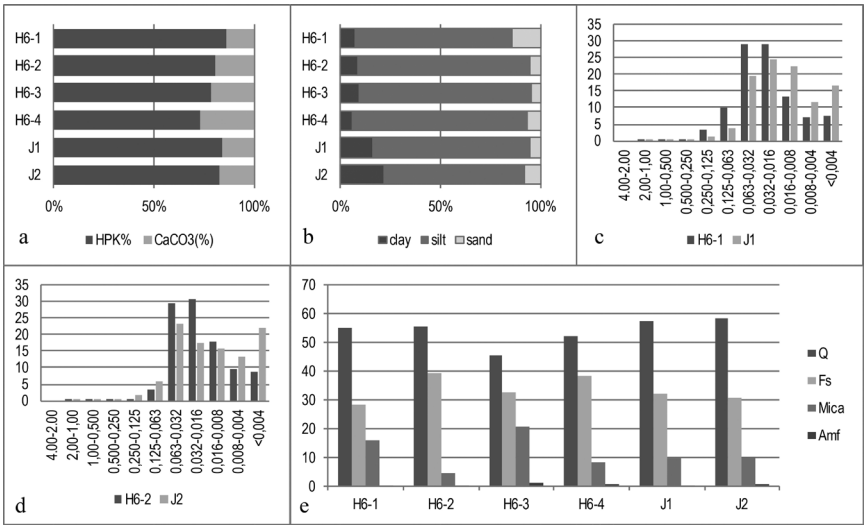

Fig. 1. Histograms of: *a*, carbonate content (HPK is insoluble component); *b*, grain-size composition by classes; *c*, content (in %) of the particle size fractions (in mm) of samples H6-1 and J1; *d*, content (in %) of the particle size fractions (in mm) of samples H6-2 and J2; *e*, mineralogical composition (in %)

The mineral composition was quantified for each fraction, as fractions over 0.25 mm were determined under a binocular microscope, and 0.125–0.25 and 0.063–0.125 mm – under a microscope with polarized light in immersion Eugenol ηe = 1,541 on minimum of 500 grains. Clay minerals were determined by X-Ray diffraction analysis (XRD) in the University of Mining and Geology "St. Ivan Rilski".

Results and discussion

Both profiles are built of plough zone, archaeological bed and sterile horizon (Table 1). A transition between archaeological bed and sterile horizon is registered in square H6. Carbonate content varies between 13 and 27% (Fig. 1a). In the western part of the archaeological site in H6 carbonate content is higher than in the central parts (J42). The highest carbonate content is registered in sample H6-4 (sterile horizon, loess) due to both dispersed calcite crystals and calcite nodules.

According to their grain-size composition, all sediments are sandy clayey silts. Silt fraction dominates from 70.08% to 87.78%, followed by clay fraction from 5.75% to 21.73%, and the sand fraction is the least one – between 4.25% and 14.03% (Fig. 1b). Sterile horizon in H6 shows all features of loess deposit and after calculating the discriminative functions proposed by Sahu (1964) to characterize the depositional setting, the aeolian origin was proved (Y1 = –12.96). Comparing both profiles, sediments from J42 contain more fine silt and clay fractions (Fig. 1c, d) and less carbonate admixtures (Fig. 1a) than those from H6.

Mineral composition is very similar (Fig. 1e). In finer sand and silt fractions quartz is the principal mineral followed by feldspars, less mica, amphibole, epidote, whereas garnet, apatite, tourmaline, zircon, and kyanite are present only in H6 samples as single grains. Quartz and feldspars dominate in medium sand fractions, and large and coarse sand is composed of quartz and rock fragments built of quartz. The following minerals are registered after XRD analyses: quartz, plagioclase, K-feldspar, muscovite, calcite, amphibole, chlorite, and smectite. The quartz content in very fine and fine sand fraction from J42 is higher than in H6 and feldspar amount is lower. The mineral composition is similar to the mineral composition of the loess in North Bulgaria (Antonov, 2003). It could be assumed that the settlement has been developed on the flood terrace covered with loess deposits. The abundance of fine silt and clay fraction in the central part of the site, which is also lower than the NW part, supports the archaeological assumption for flooding the lower parts.

References

Antonov, D. 2003. Assessment of loess composition and structure in connection with radioactive waste disposal. – *Ann. Univ. Mining and Geol.*, *46*, 1–Geol. and Geophys., 339–344.

Evlogiev, Y. 2007. Evidence for the aeolian origin of loess in the Danubian Plain. – *Geologica Balc.*, *36*, 3–4, 31–39.

Filipov, L., L. Mikova. 1967. Quaternary deposits in part of North Bulgaria between rivers Osam and Yantra. – *Ann. Com. Geol.*, *17*, 157–164 (in Bulgarian with French abstract).

Filipov, L., C. Stojanov. 1993. *Explanatory Note to the Geological Map of Bulgaria in Scale 1:100 000, Alexandria and Svistov Map Sheets.* Sofia, Committee of Geology, Company for Geophysical Surveys and Geological Mapping, 45 p. (in Bulgarian with English summary).

Folk, R. L., W. C. Ward. 1957. Brazos river bar: a study in the significance of grain size parameters – *J. Sed. Petrol.*, *27*, 3–26.

Fotakieva, E., M. Minkov. 1966. Der Löß in Bulgarien. – *Eiszeitalter und Gegenwart*, *17*, 87–96.

Galabov, Z. 1982. *Geography of Bulgaria. Phisic Geography*. Sofia, BAS, 513 p. (in Bulgarian).

Jipa, D. 2014. The conceptual sedimentary model of the Lower Danube loess basin: Sedimentogenetic implications. – *Quaternary Intern.*, *351*, 14–24; https://doi.org/10.1016/j.quaint.2013.06.008.

Khrischev, Kh., L. Nedjalkova. 1992. *Explanatory Note to the Geological Map of Bulgaria in Scale 1:100 000, Sevlievo Map Sheet*. Sofia, Committee of Geology, Company for Geophysical Surveys and Geological Mapping, 54 p. (in Bulgarian with English abstract).

Kopralev, I. 2010. *Bulgaria Geographic Atlas*. Sofia, Tangra TanNakRa, 219 p.

Sahu, B. K. 1964. Depositional mechanisms from the size analysis of clastic sediments. – *J. Sed. Petrol.*, *34*, 1, 73–83.