Acta Musei Napocensis, 45-46/I, 2008-2009 (2011), p. 75-80

PALATCA-TOGUL LUI MÂNDRUȘCĂ. ANALYSIS OF A PART OF THE LITHIC MATERIAL FROM THE BRONZE WORKSHOP

MARCEL BENEA, LUMINIȚA SĂSĂRAN, MIHAI ROTEA

Riassunto: Il sito di Palatca-Togul lui Mândrușcă rappresenta una delle più interessanti scoperte archeologiche della tarda età del bronzo in Transilvania. Sono state effettuate indagini geologiche su alcune rocce qui rinvenute. Lo studio è stato condotto su sei campioni prelevati dal materiale litico scoperto in un'officina dell'età del bronzo di Palatca. Questo tipo di materiale è stato riportato alla luce esclusivamente nel perimetro dell'officina metallurgica, area maggiormente interessata dal ritrovamento di macinini e lucidatrici. Studiando le mappe geologiche della regione in cui si trova la località di Palatca, si può osservare l'esistenza di tutte le rocce sedimentarie analizzate. Probabilmente le rocce magmatiche (il granodiorite) e metamorfiche (lo gneiss) furono prelevate dai letti dei fiumi dove appaiono in frammenti e provenienti dalle formazioni geologiche ai margini della Depressione della Transilvania. Il meteorite è una presenza unica nel paesaggio preistorico rumeno, ma la relazione tra meteoriti e metallurgia è ben nota.

Parole chiave: Palatca; età del bronzo; indagini geologiche; meteorite; rocce.

The site from Palatca-*Togul lui Mândrușcă* is one of the most interesting archaeological discoveries belonging to late Transylvanian Bronze Age and not only[1]. In an attempt to understand as best as possible its characteristics we subjected some of the discovered rocks to an analysis performed by geologists. The study was done on a batch of 6 samples taken from the lithic material discovered in the Bronze Age workshop from Palatca. These were obtained by drilling them with a jet of water, by using a borer with an internal diameter of 20 mm, electrically powered. The final length of the samples was a maximum 25 mm. The analysis consisted in macro and microscopically description. For the microscopical analysis five thin sections and a polished section were obtained; microphotographs of these sections were also taken.

The investigation of the pieces was done macroscopically (Nikon SMZ 645 binocular magnifying glass) and in thin section under transmitted polarized light (Nikon Eclipse E200 microscope). Explanation of the structure, texture and of the mineral composition was done with the help of digital microphotographies (Nikon FDX-35 camera).

[1] M. Rotea, *Cercetări arheologice la Palatca-Togul lui Mândrușcă. Observații preliminare*, RevBistriței X-XI, 1997, p. 13-19; idem, *Die späte Bronzezeit im Karpaten-Donau-Raum (14.-9. Jahrhundert v. Chr.)*, in M. Rotea, T. Bader (Hrsgg.), Traker und Kelten beidseits der Karpaten, Cluj-Napoca 2000; idem, *Non-ferrous metallurgy in Transylvania of Bronze Age*, ActaMN 39-40/I, 2004, p. 7-17; M. Rotea, Pagini din Preistoria Transilvaniei. Epoca bronzului, Cluj-Napoca 2009.

Sample 1

Macroscopically the rock has a brown color, a fine granular structure and a massive texture. Under binocular quartz crystals and fine spangles of muscovite were noticed. HCl reaction reveals the presence of calcite.

Microscopically, in the thin section we notice quartz crystals ranging from chips-like to slightly rounded shapes, potassic feldspars and fine spangles of muscovite in a calcite matrix. Hematite grains and limonite layers are finely dispersed in the rock, giving it a brown color.

By putting together the macro and microscopical observations we describe this rock as a *quartz-micaceous sandstone with carbonaceous cement.*

Sample 2

Because of the small quantity of material obtained after drilling thin sections could not be obtained from this batch. Macroscopic analysis suggests a magmatic rock, probably a *granodiorite*, but strongly damaged and disaggregated. This observation is based on the presence of quartz, potassic feldspar and biotite, minerals that together lead to the development of a hypidiomorphic granular, phaneritic structure.

Sample 3

Macroscopically the rock has all the characteristics of a *gneiss*: the alternation of quartz and feldspar bands with micaceous ones. The rock has a granular - lepidoblastic structure and a shale-like texture. The feldspars are kaolinitized, as showed by the range of colors from yellowish to brown and along with the quartz easily detaches it self away from the rock giving it a friable character.

In the thin section we can observe granules of xenomorphic quartz, well developed *hypidiomorphic* potassic feldspar crystals, partially sericitized and kaolinitized, plagioclase feldspars with polysynthetic twins and zoned structures, apatite granules and muscovite lamellae.

Sample 4

Macroscopically the rock has a white-grayish color, a fine, granular structure and a compact texture. Existence of calcite is proven by the powerful effervescence following HCl reaction.

Microscopically calcite crystals with rare interspersed quartz crystals are present. The calcite crystals are xenomorphic and form a matrix where small quartz crystals, chip-like and rare, with an undulatory extinction, are placed. Based on this observation we consider this to be a *carbonatic sandstone.*

Sample 5

Macroscopically the rock has a brown color, a granular structure and a weak shale-like texture. This is also evidenced by the muscovite spangles visible to the naked eye.

Microscopically one can notice mostly quartz crystals and subordinate calcite, muscovite, potassic feldspar, titanite, opaque minerals and areas of iron hydroxides.

The quartz is hypidiomorphic, angular tending to round, with an undulatory extinction. The calcite forms a matrix, a binder for the rest of the components. The muscovite is placed in lamellas, potassic feldspar crystals appear sporadically. Titanite appears isolated, in granules, with high refractive indices. Due to opaque (iron) minerals limonite pellicles are formed; they give the brown color to the rock.

By putting together the macro and microscopical observations we describe this rock as a *quartz-micaceous sandstone with carbonaceous cement.*

Sample 6

Macroscopically the batch has a grayish-black color, with brown spots and a compact texture. On the surface of the batch we notice a black-colored crust and some sides have a concave aspect. These characteristics, along with the high density and the fact that dust is drawn to the magnet suggest a *meteorite fragment.*

The microscopic study (Pl. I/1-6) allowed to observe the following minerals: olivine, enstatite, plagioclase feldspars and magnetite. Olivine is colorless, cracked and appears isolated. It shows colors of high interference and right extinction. Enstatite (hipersten) appears frequently idiomorphic, with a prismatic outline, low interference colors and right extinction. Plagioclase feldspars are mostly idiomorphic, have polysynthetic twins and zoned structures, with low refractive index and birefringence. It does not show inclusions and they are not altered. The opaque minerals (identified as magnetite due to the magnetic properties of the powder resulted after drilling) are finely disseminated in the rock mass. Sparsely there are areas with iron oxy-hydroxides, colored in brown-yellow, formed due to the magnetite and Fe-Mg silicates.

Based on the macro and microscopical characteristics we believe this to be a **fragment of a rocky meteorite.**

Conclusions

By analyzing the geological maps of the region[2] where Palatca commune is placed we notice the existence of all sedimentary rocks described above. Magmatic rocks (granodiorite) and metamorphical one (gneiss) could be collected from river beds where they appear as fragments from the rock outcroppings surrounding the Transylvanian Depression.

Archaeologically speaking, we must mention from the start that this type of lithic material appeared solely in the perimeter of the iron workshop, mostly in the area where the grinders and crushers were located. We do not know whether this type of rocks played any part in metallurgical processes, rather they were used in ceramic fabrication because they contain mica. It is possible they were gathered by non-specialists who noticed the luster of the mica spangles, to be further selected by specialists.

The meteorite (Pl. II/1) is a unique presence in the Romanian prehistoric environment, but the connection between meteorites and metallurgy is well known[3].

[2] Geological map 1968, Cluj sheet, sc. 1:200.000, Geological Institute, Bucharest.

[3] M. Eliade, Forgerons et alchimistes (Romanian version - Făurari și alchimiști) București 2008, p. 17-25, with bibliography.

In order to establish the provenience of the meteorite from the iron workshop from Palatca we have two options. The easier one is to include this piece in the meteor cloud that fell in 1882 in Mociu area and the second one is to give it an unknown origin, much older (at least prehistoric). In solving this dilemma we must take into account the following points of view:

1. Meteorites from the 1882 meteor cloud were found in the areas near Mociu, Chesău, Coasta, Tăușeni, Bărăi, Vaida-Cămăraș[4] (Pl. II/3), but this does not mean we can exclude the presence of a meteorite from the same phenomena in areas near to the above-mentioned ones, such as Palatca.

2. By comparing macroscopically the meteorites from Mociu to the one from Palatca we notice they do not resemble much. Comparative microscopically analysis done on the meteorites from Mociu and Bărăi are limited just to the mineral composition and indicate the presence of many ferrous meteorites. Seeing that the percentage of *olivine and pyroxenes* in the meteorite from Palatca differs from those from Mociu and Bărăi we could assume it is part of a previous meteorite.

3. The coincidence would be great indeed for a meteorite from the Mociu cloud to fall in a prehistoric settlement, in an iron workshop and at the right depth (-0.50 m).

4. Archaeological investigations did not reveal any traces of soil burning in the place where the meteorite was discovered (Pl. II/2), taking into account that the space had been thoroughly searched due to the metal detector signaling a piece containing metal. The piece was found in yellow clayey soil, thus very sensitive to burning marks.

5. The Palatca meteorite shows clear traces of breaking at the two ends and on one side. They can be interpreted as usage marks, as long as they cannot be connected to the impact with the soil (the piece was found in clayey soil) or any other celestial bodies during its descent.

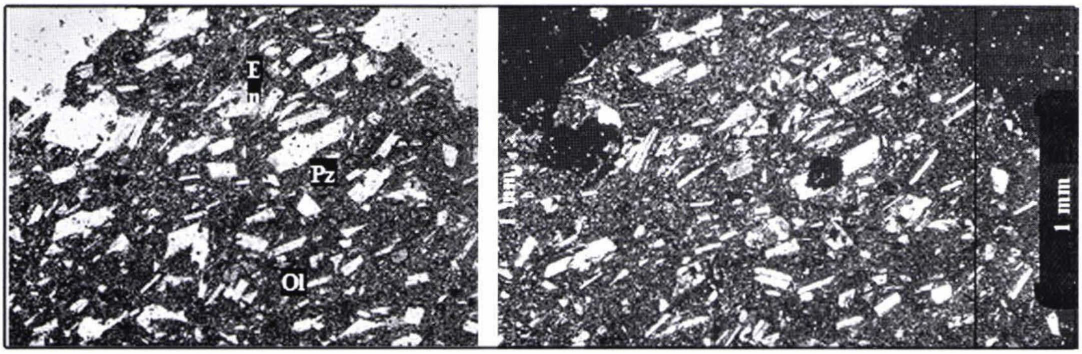
6. By taking into account all these arguments we consider that the meteorite from Palatca was discovered in prehistoric time and was used due to its toughness and weight as a hammer, crusher in the late Bronze Age.

Marcel Benea
Faculty of Biology and Geology,
"Babeș-Bolyai" University, Cluj-Napoca
marcel.benea@ubbcluj.ro

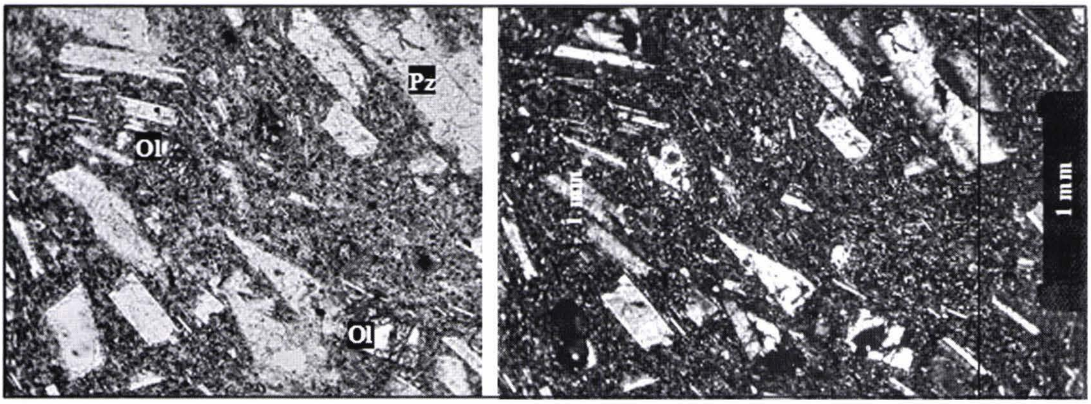
Luminița Săsăran
National History Museum of Transylvania, Cluj-Napoca
hrineac@yahoo.com

Mihai Rotea
National History Museum of Transylvania, Cluj-Napoca
rotea_mihai@yahoo.com

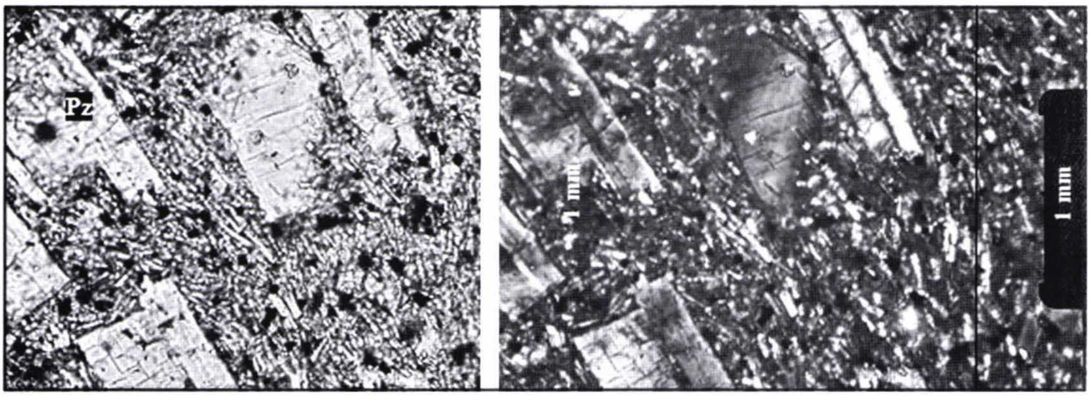
[4] I. Al. Maxim, Meteoriți și materiale meteoritice din România (Notă preliminară la Catalogul meteoriților din România), Studia Univ. Babeș-Bolyai, Geologie-Geografie, 1, Cluj 1968, p. 3-6.



1



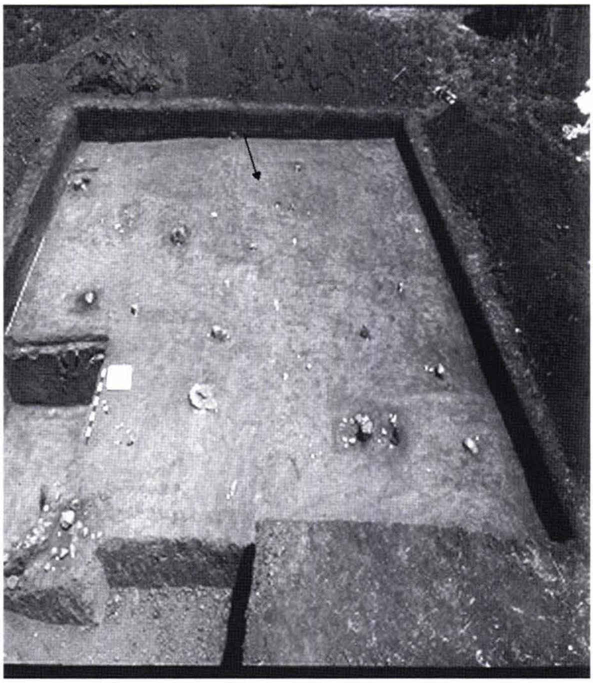
2



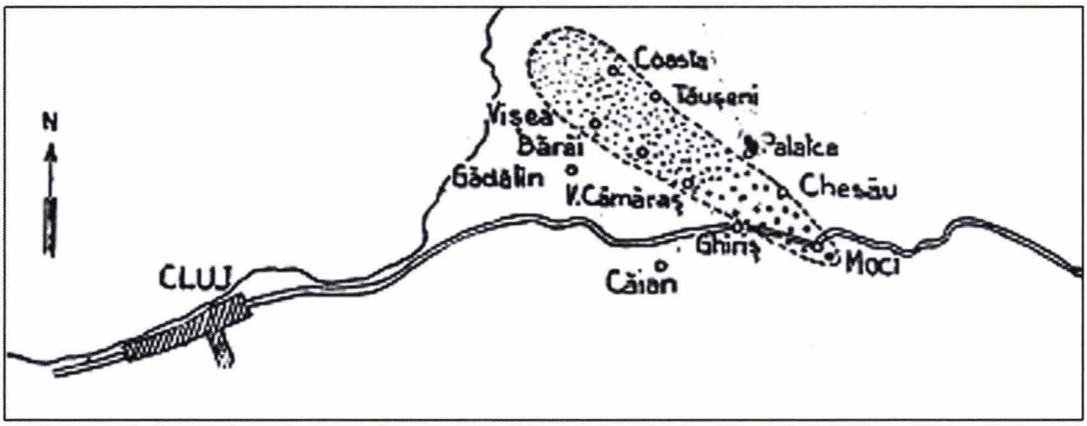
3

Pl. I. 1. Enstatite crystals (En), Plagioclase feldspars (Pz) and olivine (Ol); 1N (left), N+ (right); **2.** Plagioclase feldspars crystals (Pz) and olivine (Ol); 1N (left), N+ (right); **3.** Plagioclase feldspars crystals (Pz) with polysynthetic twins; 1N (left), N+ (right).

1



2



3

Pl. II. 1. Meteorite from Palatca (photo M. Rotea); **2.** place of discovery of the meteotite (photo M. Rotea); **3.** surface spreading of the meteorite fragments from Moci (after V. Stanciu, E. Stoicovici, *Meteoriţii din România*, Revista Muzeului de Mineralogie şi Geologie VII, 1-2, Cluj, 1940, p. 8).