

THE MINERALOGY OF THE NEOLITHIC CERAMICS FROM UNGURULUI CAVE (SUNCUIUS, ROMANIA)

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The paper presents the mineralogical features of the remnants of Neolithic pottery found in clayish deposits covering the floor of the Ungurului Cave, located on the left side of Crisului Gorge (Apuseni Mts.). From archaeological and mineralogical points of view, the ceramics from Ungurului Cave is similar to the ceramics of same age, also found in the western part of Transylvania, at Salca-Oradea, Piscolt-Carei, Zauan-Zalau (the archaeological characterization belongs to C. Ghemis from Oradea Museum).

The colour of the ceramic body varies from reddish-yellow to red, brown or reddish-brown. Granulometrically, the ceramics is mainly of semifine, rarely coarse and fine type.

The fabric of the ceramic body (observed in thin sections) is microcrystalline-amorphous, reflected by a highly transformed clay matrix, which contains different clasts. The clasts belong either to the raw materials or were added as temper (sands).

The clasts are represented by:

- lithoclasts (fragments of andesites, quartzites, quartzitic schists, granodiorites, garnet mica schists, rhyolites and volcanic glass);
- crystalloclasts (quartz, feldspars, biotite, muscovite as well as epidote-zoisite, calcite, zircon, garnet, titanite, tourmaline and amphiboles);
- ceramoclasts (potsherds).

Vegetal remnants (transformed into carbon) were also identified.

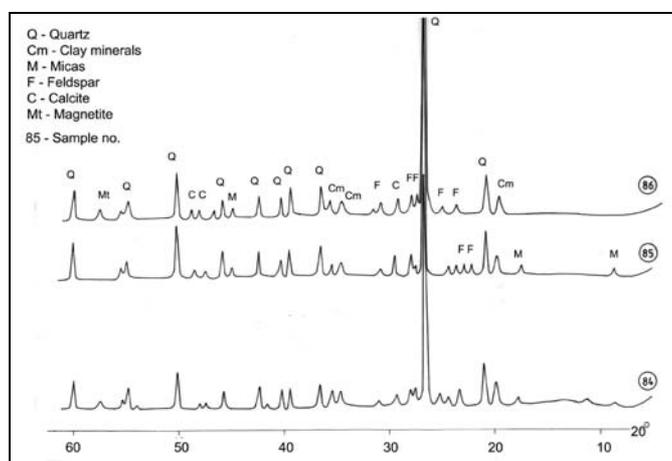
The changes of the mineral compounds during the firing are mainly of middle-to-high temperature type, as: sinterizing, partial melting, recrystallizations, and changes of the optical features. The clay minerals melted partially and generated amorphous material or even supported some recrystallizations. The iron oxides and hydroxides formed magnetite and hematite. The birefringence of clay minerals changed as a function of the temperature of firing.

In cross section, the ceramic wall presents in general a bi-layered texture, marked by an outer layer (lighter colour; oxidizing firing) and an inner layer (darker colour; reducing firing).

The arrangement of the lamellar minerals (micas, clay minerals) inside the ceramic wall gives the structure, which can be:

- oriented, with the minerals arranged in rows parallel to the ceramic body surface;
- non-oriented, with the minerals randomly arranged.

The surface of the pottery was smoothed and covered with a coloured slip, prepared from clay and calcite. SEM studies identified the presence of kaolinite, illite and illite/montmorillonite.



X-ray diffractometry reveals the presence of clay minerals, quartz, calcite, feldspar, micas, magnetite (see figure). The changes noticed in the X-ray pattern for clay minerals, as well as microscopic studies, allow us to conclude that the firing temperature for the Neolithic ceramics was around 800°C (half-opened pits).

At least three sources of raw materials were used:

- a Jurassic kaolinitic clay from Suncuius deposits;
- a Neogene kaolinitic-illitic clay with tuffs fragments (from Borod Basin);
- soil formed on metamorphic rocks (Piatra Craiului area).