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GEOARCHAEOLOGICAL STUDIES ON LATE BRONZE AGE CERAMICS FROM TRANSYLVANIA (ROMANIA)

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Eleven fragments of Late Bronze Age (1400-1200 B.C.) ceramic bowls, cups, pots, plates, found in the northwestern part of the Transylvanian Basin (Romania), were studied. Macroscopic observations were completed with polarized light microscopy on thin sections, X-Ray powder diffraction, thermal, SEM and EPR (Electron Paramagnetic Resonance) analyses. The study of the ceramic fragments focused on the phase compounds identification and the thermal changes due to the firing. The data obtained by various methods supported the classification of the ceramics, the identification of raw materials, their sources, as well as the modelling techniques and firing conditions.

The ceramics is constituted basically of a lutitic-siltic matrix with combined, crystalline and amorphous fabric, exhibiting different degrees of sintering and vitrification. In the matrix, variable amounts of igneous, metamorphic and sedimentary lithoclasts, various crystalloclasts, potshards (ceramoclasts) and bioclasts are present.

The granulometry of the ceramics reflects the prevalence of the coarse category (with more than 15% arenite grains) compared with the semi-fine one (between 5-15% arenite).

The ceramic body is in general porous, due both to the elongated or irregular-shaped pores and to the micro-fissures. The porosity is the result of a careless kneading and modelling, combined with fast drying and short but high-T firing.

Based on the arrangement of the lamellar minerals inside the ceramic body, three main structure types were identified: a) an arrangement in rows parallel to the wall surface; b) a chaotic arrangement; c) a mixted structure, with both oriented and chaotic arrangements in the same sample. All these are results of hand-made pottery.

The microscopic observations as well as the thermal, X-ray powder diffraction and SEM analyses point to a series of changes due to the firing, marked by melting-diffusion-recrystallization processes. The first is the thermal alteration of the clayish matrix, which forms a rigid body, where the particles are sticked together by sintering-melting processes. Some clasts reveal advanced fissuring due to the thermal shock. Fe migrated from the clayish matrix into the softened rims of quartz grains. Parts of feldpar clasts became isotropic and the glassy, amorphous melt intruded into the cracks. After the firing, the kaolinitic clay gave an almost isotropic matrix, comprising amorphous metakaolinite while the kaolinitic-illitic clay changed into a birefringent mass. New phases formed, such as glass, gehlenite, or hematite.

The firing temperatures were estimated at 800-1000; rarely up to 1100°C.

The mineralogical and petrological composition indicates that the raw materials (kaolinitic and kaolinitic-illitic clays and sandy temper) come from the clays outcropping in the surroundings of the site where the fragments were found.