Mineralogical and petrographical study of Celtic household ceramics from Bratislava`s oppidum (Slovakia)

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Introduction

During younger La Tene period, the rise of Celtic fortified centre (oppidum) in Bratislava`s surrounding was related to the migration of Celtic tribes in Central Danubian area. The possition of oppidum on the crossroads of trade channes crossing Alps and Carpathians was of great strategic and economic importance. This importance is documented by discovering numerous finds of artefacts and objects associated with craftworks. Except of ceramic fragments and pottery klins, numerous fragments of metal-working (slags, refractory ceramics) and coinage industry (dosing plates) has been found (Pieta & Zachar in Štefanovičová (eds.), 1993; Čambal, 2004).

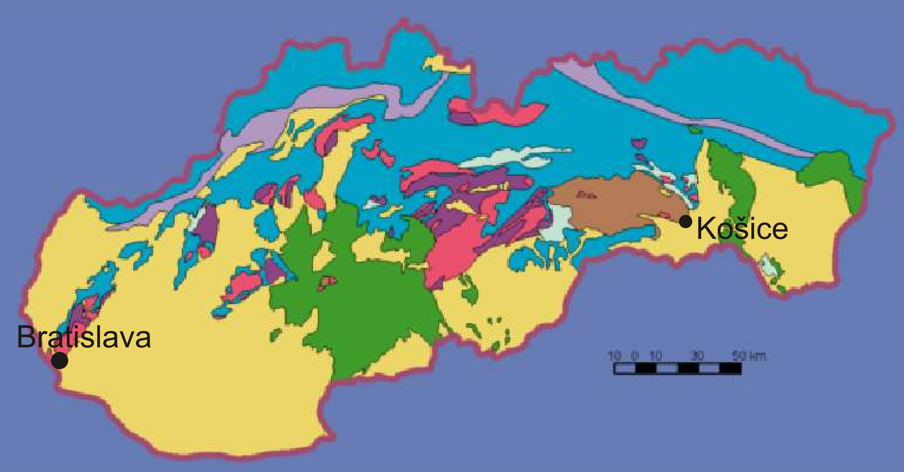

Fig. 1: Geographical position of Bratislava.

Fig. 2.: Selection of reconstructed vessels from Bratislava`s oppidum.

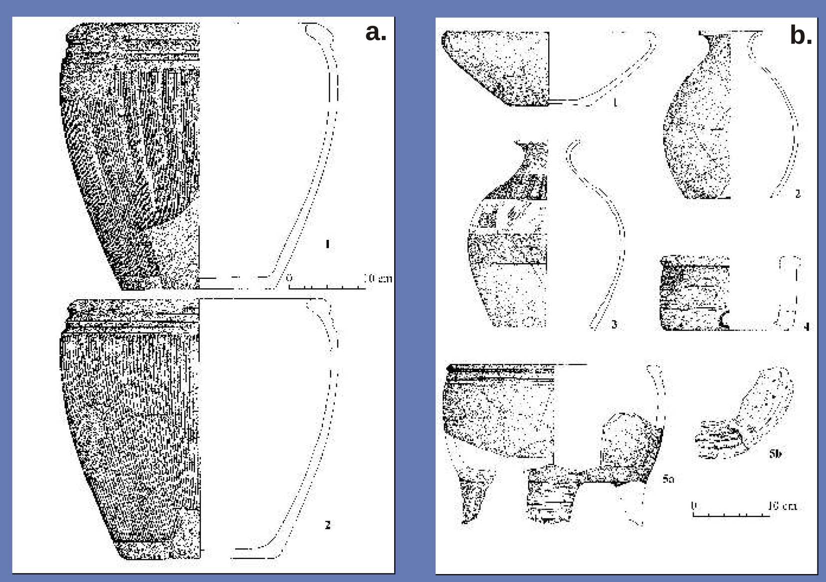

Fig. 3. *a.* sketchs of situlas with characteristic parallel combed decoration. *b.* sketchs of bowls, jars with narrow necks with characteristic horizontal red - white painting and tripods

Archaeological characterisation of Celtic ceramic

According to their purpose it is possible to devide the Celtic ceramics from Bratislava`s oppidum in two basic groups. The first group includes technical ceramics as dosing plates or refractory crucibles. The second group includes household ceramics as various types of situlas with typical parallel carved decoration, various types of jars with narrow neck and characteristic white and red horizontal painting. Further conical bowls and tripods are typical in ceramic inventory. For both groups, the presence of graphite temper is characteristic.

Macroscopic observation and granulometric composition

Based upon the macroscopic observations, the selected samples were divided in to the thin (1 - 2 mm) and thick (10 - 15 mm) walled ceramics.The thin walled ceramics belong to the field of semi fine to fine ceramics and the thick walled ceramics belong to the field of coarse ceramics according to modified Wenthwoth`s classification (Ionescu & Ghergari, 2002). These results are also in good correlation with macroscopic and microscopic observations, where in thick walled ceramics the temper is easily observable at macroscopic scale and bimodal distribution of temper is observable in thin sections. In thin walled ceramis the temper is observable only in thin sections with unimodal distribution.

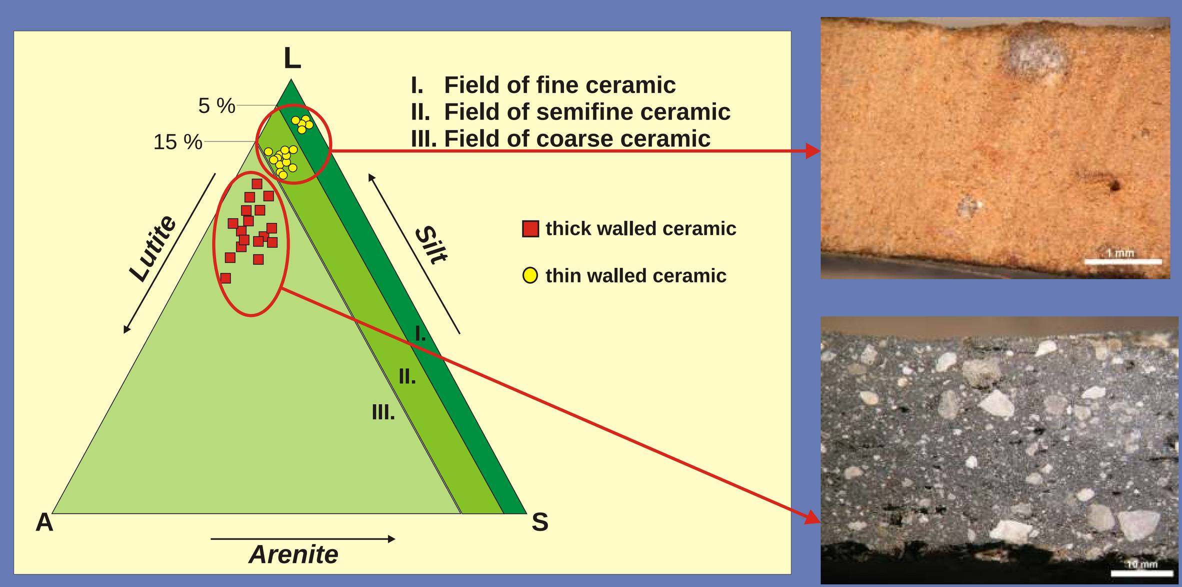

Fig. 4.: Modified Wentworth`s granulometric classification for ceramics. Obtained data are in good correlation with macroscopic and microscopic observations.

Mineralogical and petrographical composition

The mineralogical and petrographical comopsition is very variable in all samples, therefore according to the identified composition two groups of thin walled and two groups of thick walled ceramics were distinguished

Thin walled ceramics

The two groups of thin walled ceramics were further distinguished according to the presence or absence of calcite crystaloclasts or limestone lithoclasts. Occasionally the remnants of fossils were observed in ceramics with calcite whereas in ceramic without calcite crystaloclasts the granitic lithoclasts are prevailing.

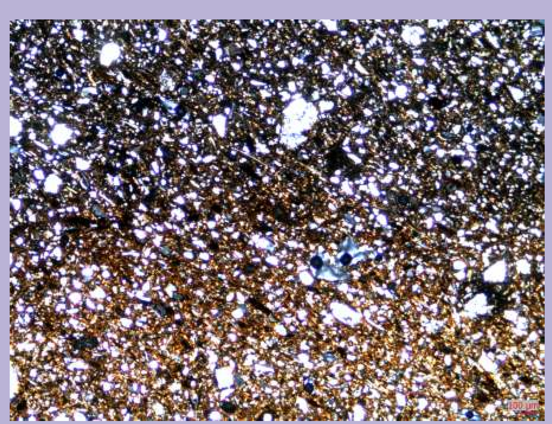

Fig.7.: Presence of granitic lithoclasts in thin walled ceramics without the calcite crystaloclasts or limestone lithoclasts.

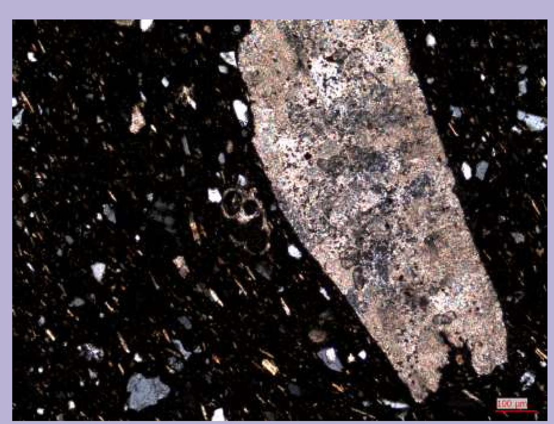

Fig. 8.: Lithoclasts of micritic limestones and fragments of fossil in thin walled ceramic.

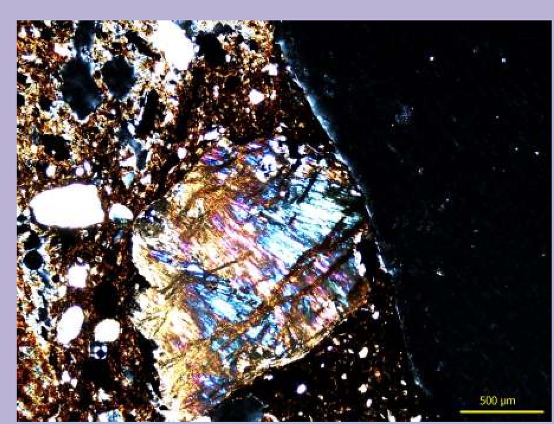

Fig.5.: Crystaloclasts of sillimanite in thick walled ceramic.

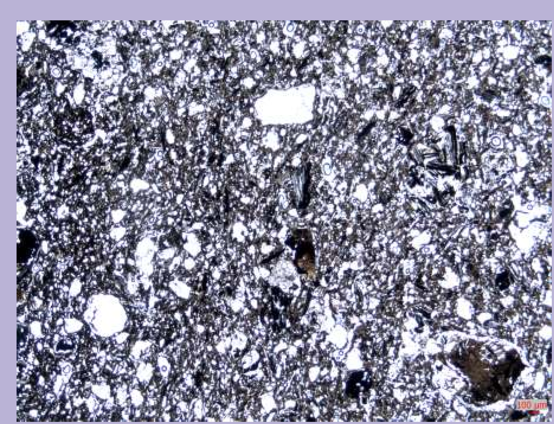

Fig. 6.: Purposefully added graphitic temper in thick walled ceramics.

Thick walled ceramics

The presence of graphite temper is characteristic for the thick walled ceramics. Based upon the content of other minerals, two goups of thick walled ceramics have been identified. For the first group is characteristic the presence of graphite and calcite crystaloclasts. For the second group is characteristic presence of graphite and sillimanite crystaloclasts and also the presence of quartzitic and biotitic gneisses lithoclasts

Forming techniques

Forming techniques were derived from the texture of matrix and spatial distribution of temper. The thin walled ceramics were wheel-throwed (strongly ordered temper and parallel texture of matrix) and the thick walled ceramic were made either by modellin techniques or by wheel-fashioning technique (weak circular arrangement of temper and chaotic texture of matrix.

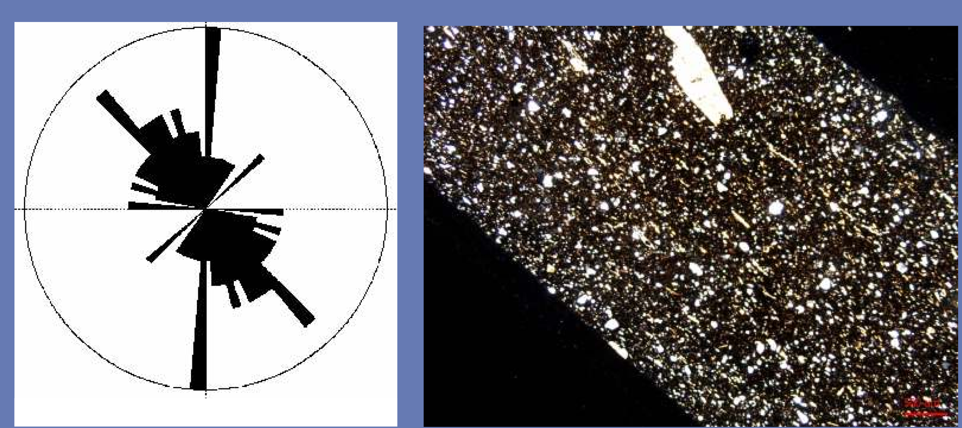

Fig.9.: *a.* spatial analyse of thin walled ceramics.*b.* strongly orientated texture of matrix and parallel orientated temper with unimodal distribution.

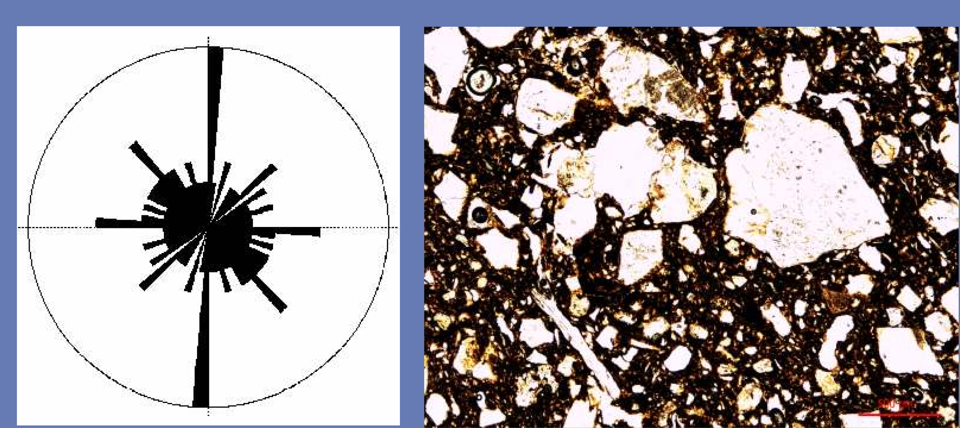

Fig.10.: *a.* spatial analyse of thick walled ceramics.*b.* chaotic texture of matrix and chaotic oriented temper with bimodal distribution

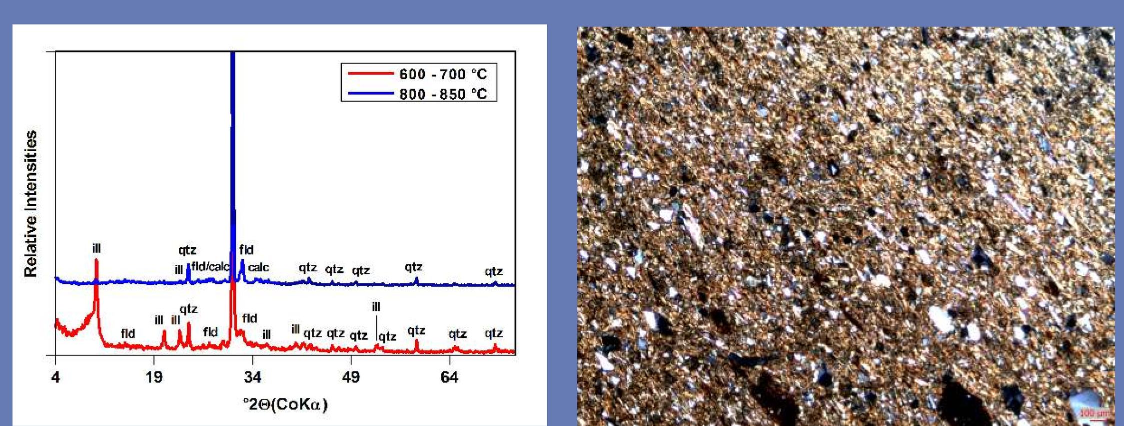

Fig. 11. *a.* XRD pattern of thin walled ceramics. The firing temperature is different for the same type of vessels (jars with narrow necks). *b.* Strongly anisotropic matrix of relatively low fired vessel (600-700°C)

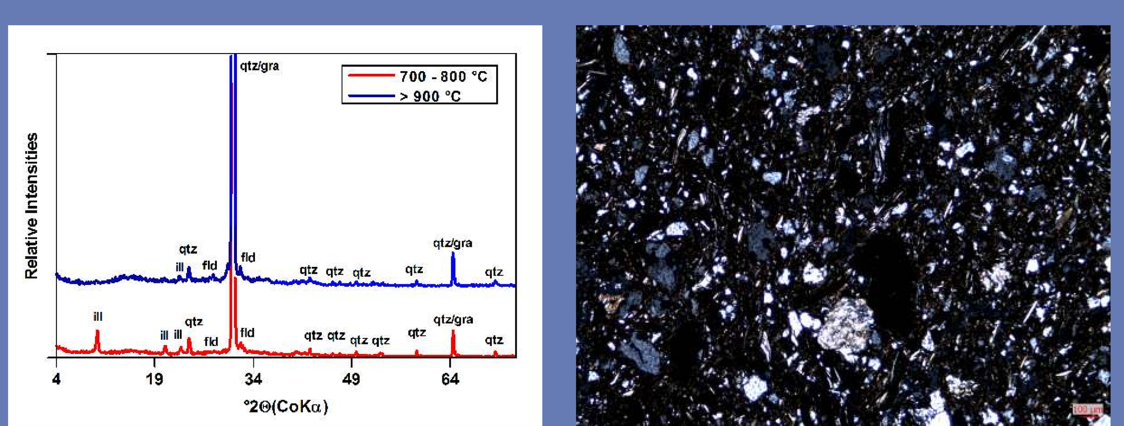

Fig. 12. *a.* XRD pattern of thick walled ceramics. Characteristic for the XRD patterns is diminishing of relative intensities of clay minerals. This fact refers to higher firing temperatures *b.* strongly isotropic matrix refers to highthermal treatment of ceramic (over 900 °C)

Firing temperature

The firing temperature was determined based upon the changes of the mineral phases as noticed in thin sections and as well as in the PXRD patterns, compared with references data (e.g. Cultrone et al., 2001). Firing temperature for thin walled ceramics reached 600 - 700 °C (anisotropic matrix, well observable illite peaks) and 800 - 850 °C (fast isotropic matrix and presence of calcite). The thick walled ceramics with graphite temper were fired at 700 - 800 °C (diminishing of clay minerals in XRD patterns) and over 900 °C (isotropic matrix and absence of clay minerals in XRD patterns).

Raw material provenance

Clayish material for the thin walled ceramics was extracted from two different sources as in the composition of analysed ceramics remnants of fossils and granitic temper has been identified. The ceramic with fossil remnants and limestone lithoclasts was made from badenian marine clays of Devín formation. Ceramis with granitic lithoclasts were most probably made from fluvial sediments of river Danube.

In the case of thick walled ceramics the graphite temper could come from the southern part of Bohemia Massif, where graphite deposits occur as fragments of minerals and rocks (sillimanite, gneisses) characteristic for mentioned area were identified. Problematic still remains ceramics with identified graphite and calcite. In this case the graphite deposits of Moravia could come into the account.

References:
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