



Exotic rocks in Týřov castle (Bohemia, Czech Republic): an insight in medieval construction technology

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The Týřov castle, constructed during reign of the Czech King Václav I. (Wenceslavs) (1230-1253), belongs to the oldest royal castles in Bohemia. The ruins of this castle offer excellent object for the study of material sources during medieval times. Since 1574, the castle has been claimed abandoned and ruined which means that it has not been affected by younger reconstruction. The prevalent construction material is represented by local rocks (volcanic rocks of Křivoklát-Rokycany belt belonging to lower Palaeozoic, partly also local conglomerates of Cambrian age). However, rather exotic rocks can be rarely found at several places in the walls. The character of these rocks corresponds to the geological units located at least 25-30 km out of the castle. Neither the sources nor the reason for the use of these rocks have been answered until now. The current work therefore focuses on the solving of above mentioned problems. The exotic rocks, untypical for local geology, are light-coloured limestones, marlstones and ochre arkoses. The presence of ashlar cut from these rocks can be explained either by reworking of stonemason elements or by use of waste material that has not been used for the burning of inorganic binders during construction of the castle. To solve this task, the macroscopic observation of selected parts of the walls was accompanied by systematic sampling of the material (rocks, mortars). These have been subjected to series of petrographic and analytical studies (optical microscopy of thin sections, X-ray diffraction, DTA/TG analysis, study of heavy minerals). Limestone samples were

also evaluated by several experts working in the area of a Lower Palaeozoic of the Barrandian zone.

The above mentioned studies facilitated determination of source localities (or areas) of studied rocks, but also provided new data on the composition of mortars used for the construction of Týřov castle. The studied limestones show high petrographic variability and cannot be attributed to a single locality. The rocks possess typical features of lower Palaeozoic rocks from the Barrandian zone, stratigraphically located at the lochkov/prag boundary (the belt of these rocks occur in the neighbourhoods of Damily, Tetín, Srbsko, but similar rocks can be found also in small tectonically driven islet near Źelezná and Hýskov). The marlstone (petrographically ranked to calcite-clayey silicites) exhibits numerous features that link them to Upper Cretaceous sediments of the Bohemian Cretaceous Basin outcropping close to Rakovněk (Džbán area). Studied arkoses are medium to coarse-grained clastic sedimentary rocks of Carboniferous origin coming from limnic (molasse) basin located also near Rakovněk (Kladno-Rakovněk basin). To solve the problem of the presence of exotic rocks in the Týřov castle, it was necessary to study composition of mortars. The X-ray diffraction analyses of binders confirmed dominance of calcite (due to carbonatation of lime putty). Minor amounts of hydraulic phases support hypothesis that the castle builders added some additives to calcitic limestones (their non-hydraulic character was confirmed by analytical study of larger pieces of burnt limestones preserved in the mortar) to improve the properties of the binder and to prepare hydraulic mixture. The Upper Cretaceous marlstones were probably used to fulfil this goal.