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# Dark soil on sand dunes as a result of terrain levelling and tillage at the early medieval settlement of Mikulčice, Moravia

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## Abstract

At the early medieval Great Moravian site of Mikulčice-Valy (8th-10th century AD), a metre-thick set of anthropogenic horizons of dark colour mixed with sand from the local dunes were found during rescue archaeological excavations. Archaeologists usually consider similar finds to be cultural layers because they are full of artifacts and ecofacts. It is the question if such general interpretation is sufficient. In order to reveal the formation processes of this humus-rich horizons in detail, the physico-chemical analyses, micromorphological analysis together with archaeological interpretation were carried out. Based on micromorphological analysis, it is clear that this is not only a cultural layer, but rather a Dark Earth that is physico-chemically influenced by the formation and gradual anthropogenic mixing with sand dunes.

## Introduction

Dark soil horizons full of anthropogenic residues such as charcoal, bones, pottery fragments, coprolites are distributed all over the world. They are found in tropical Amazonia and Africa as well as in temperate Europe<sup>1,2,3,4</sup>. These soils can also be located as buried soils and are thus the subject of study by archaeologists<sup>5,6</sup>. The problem is that their classification is not stable in the scientific disciplines. In the case of soils sciences, we talk about anthropogenic soils, which are further classified, in the case of archaeology referred as cultural layers<sup>7</sup>. This is also the case in this study, where apparent cultural layers turned out to be buried anthropogenic soils.

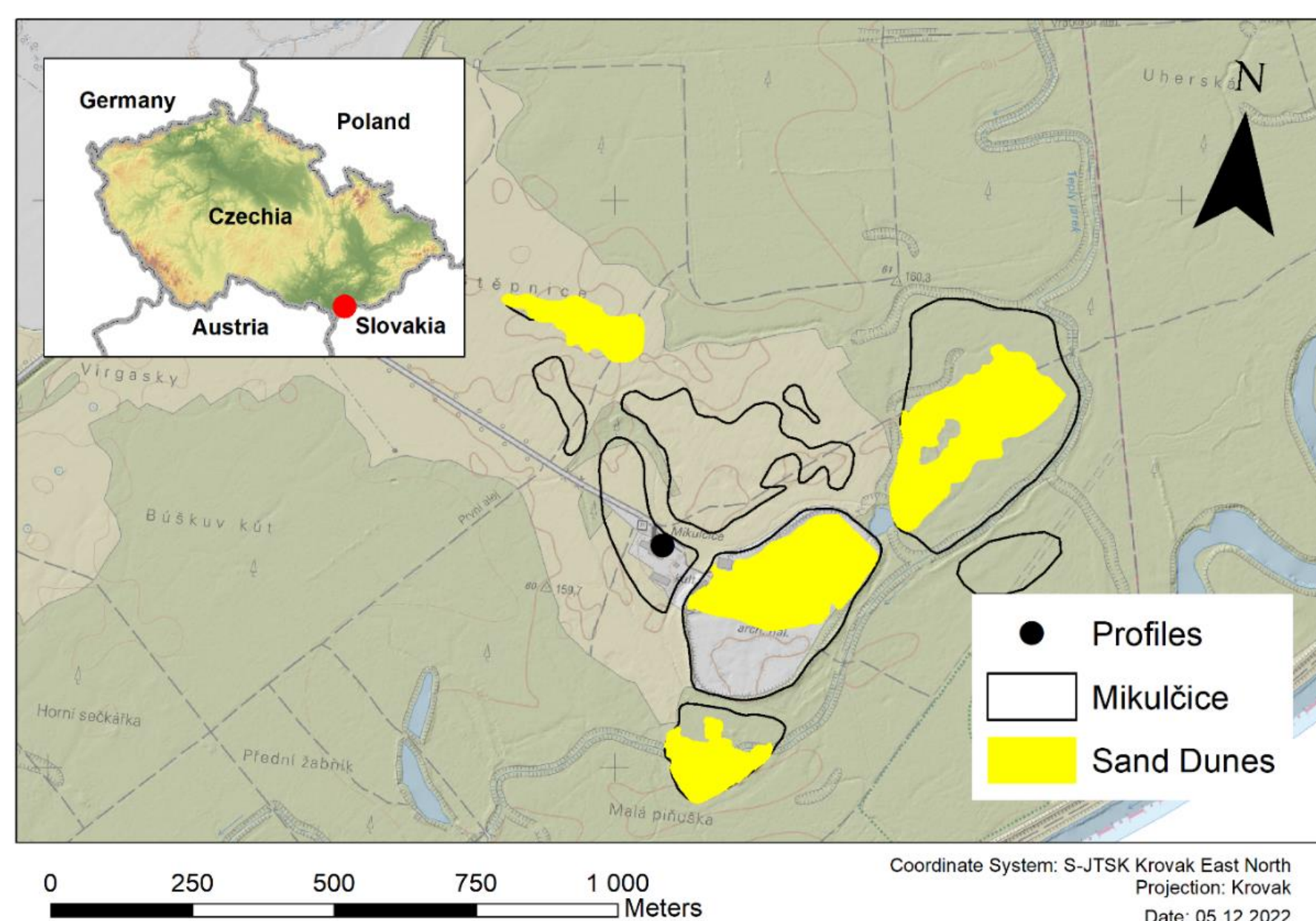


Figure 1. Location of the site Mikulčice in south Moravia

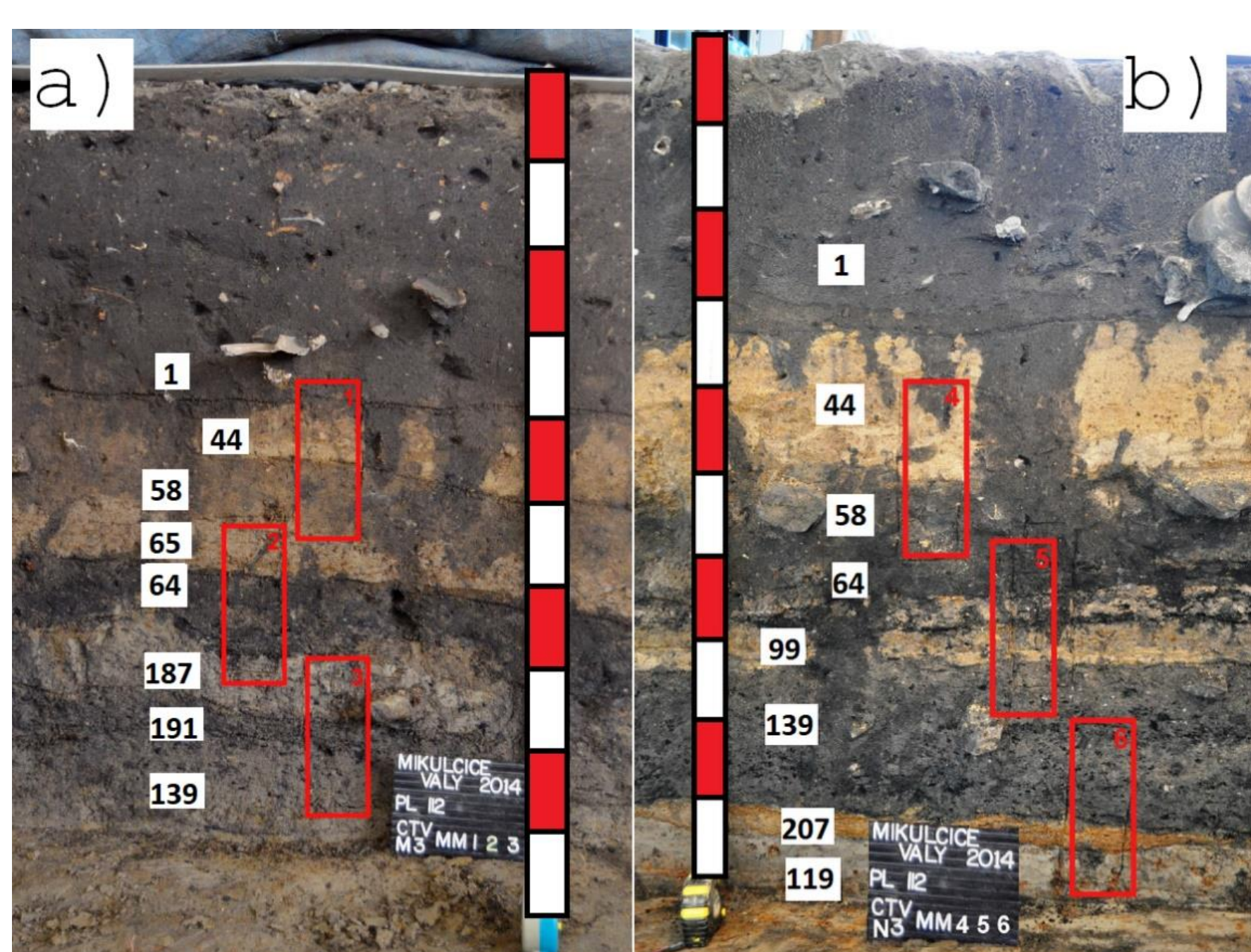


Figure 2. The yellow-coloured sandy layers are the terrain levelling. On the other hand, the dark layers are of purely anthropogenic origin.

## Study site

Mikulčice site belongs among several important centres of Great Moravia. It is located approximately 3 km southeast of the village of Mikulčice on the border with Slovakia (Figure 1). The area of the site is approximately 10 ha and is surrounded by ramparts. The importance of the centre is underscored by the discovery of the palace, 12 churches and a large burial ground. That is why the site was the centre of the nobility of the time. The sediments represent one of the environmental archives dated to the early medieval period (8 – 9th century AD). The area studied in this study has exceptional importance for the understanding of the background of the site and is represented by the set of dark and yellow sandy layers reaching thickness approximately of 1 meter.

## Results

The macroscopical observation of studied sections revealed a number of horizons differing by colour and grain size (Figure 2). Their micromorphological observation showed, that the lighter horizons are composed mainly of pure sand (B), while the dark horizons are composed of sandy loam, rich of anthropogenic residues (A). High bioturbation together with kitchen waste and excremental features are significant mainly for the dark horizons. These correspond to the organic infills of the houses and should represent former floors as obvious from the archaeological excavation plans. The light horizons represent the phase of surface levelling. These layers are usually very depleted. The lower parts of the sections represent former surfaces of wet environment of alluvial plain (C).

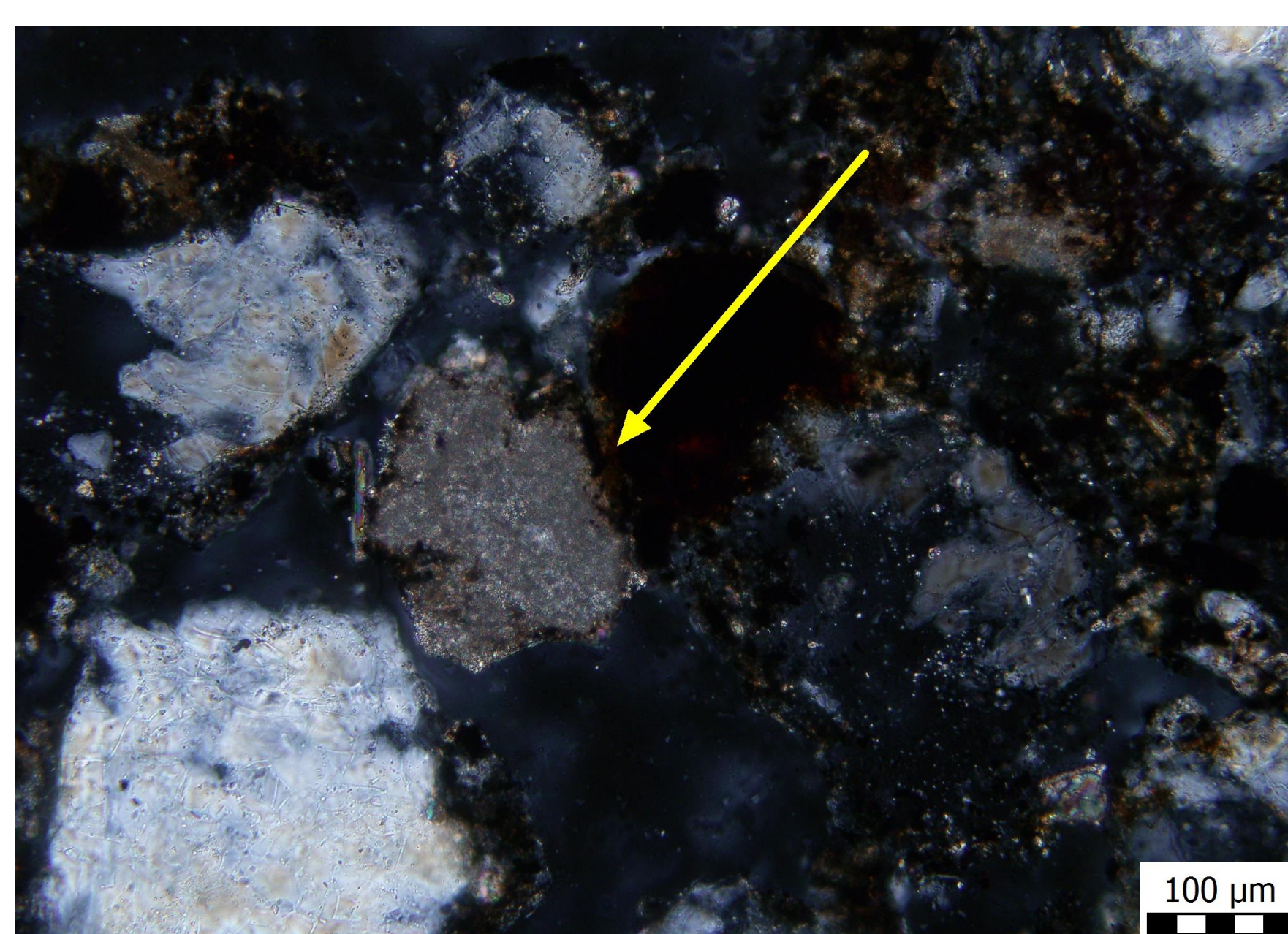
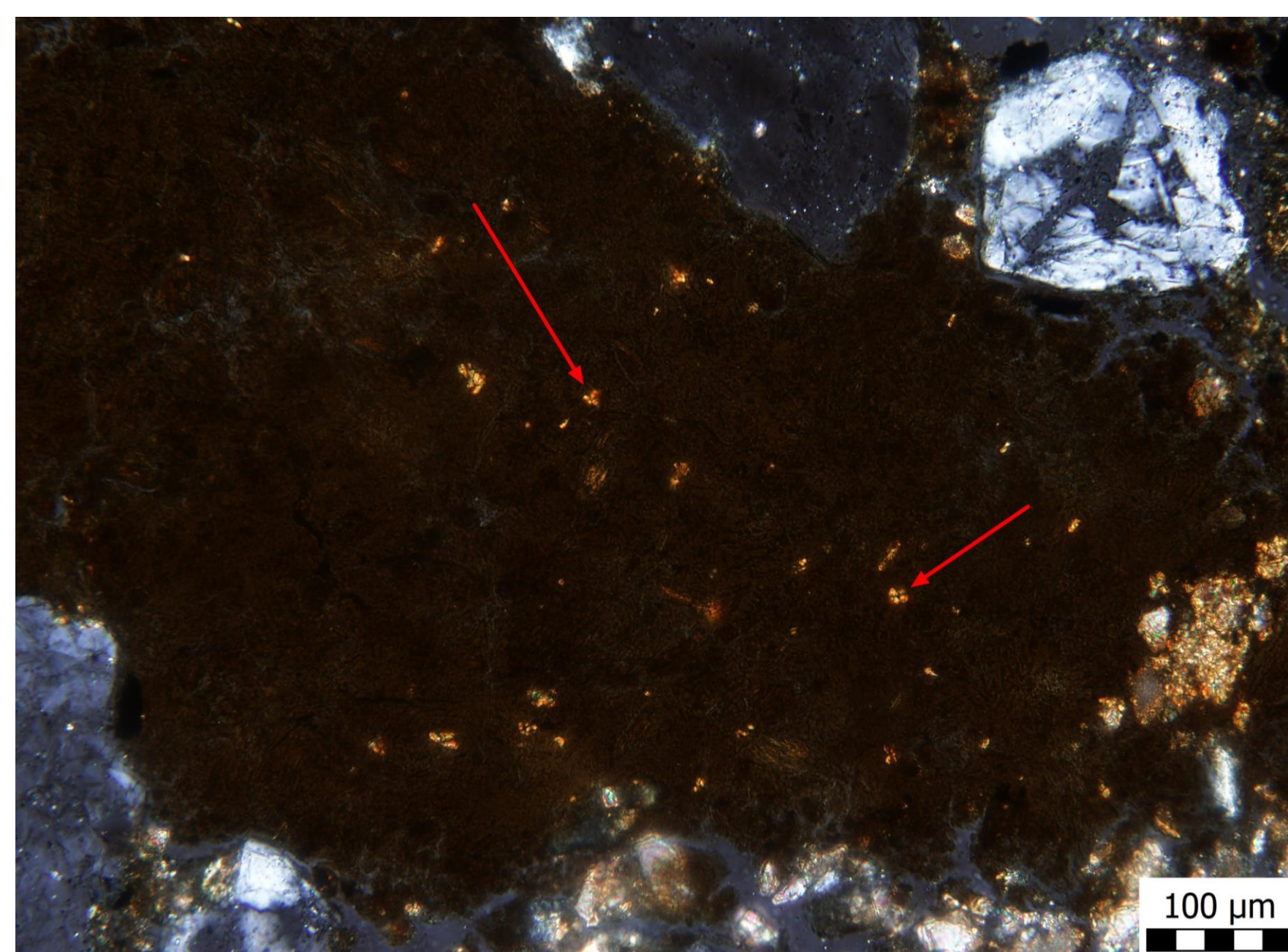


Figure 3. Faecal spherulites  
Fragment of construction material (mortar?)

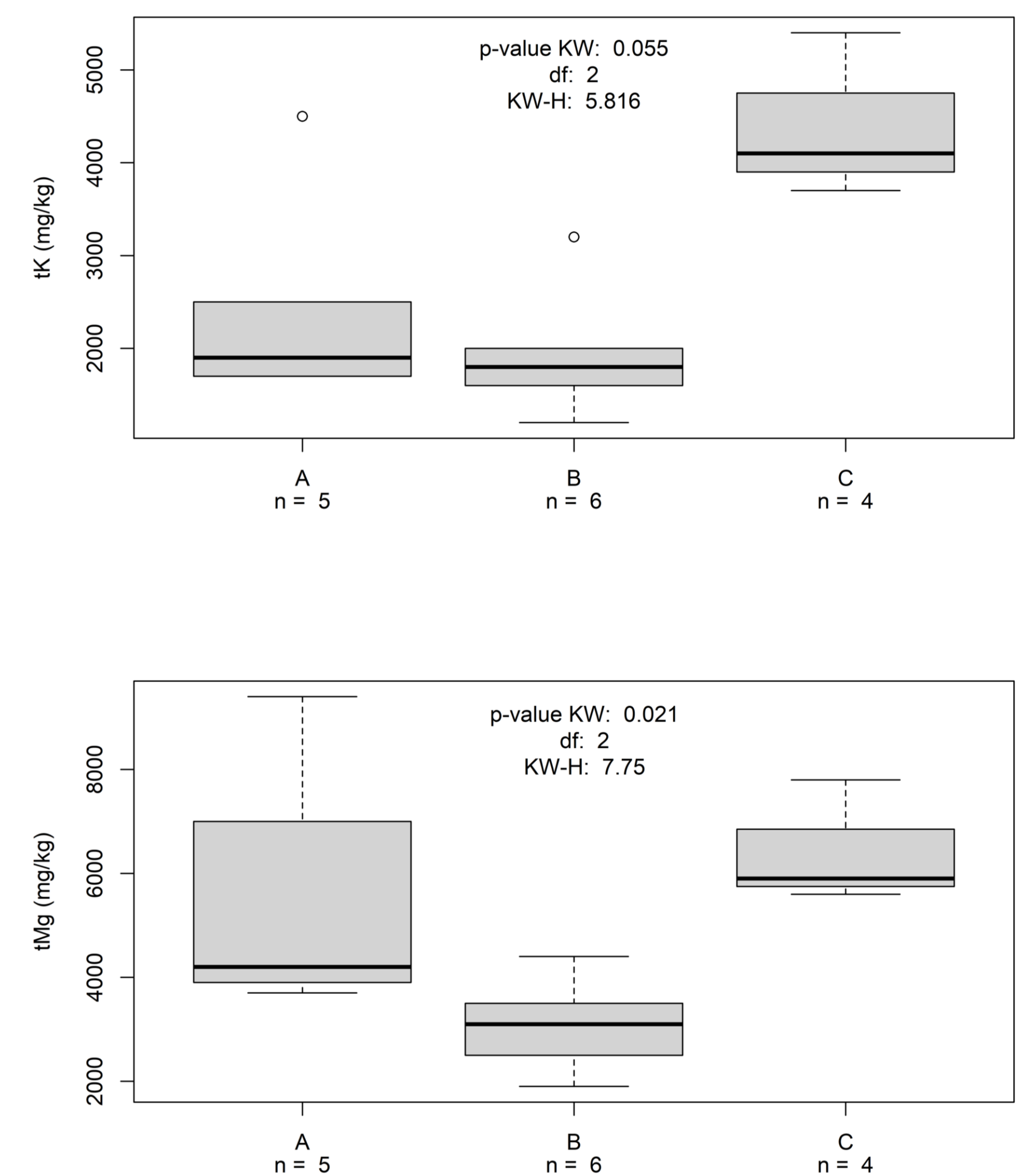


Figure 4. Chemical analysis determined: dark layer (A), sandy layer (B) is often without the human influence (depleted), geological substrate of alluvial plain (C).

## Discussion

Remnants of kitchen waste (e.g. fish bones, charcoal), building material (mortar), ceramics, but also herbivore excrements and oak wood (house structures) were observed in the micromorphological samples. This accumulation of residues associated with trampling led to the formation of anthropogenic dark layers.

An important finding is that the properties of this anthropogenic soil are influenced by the grain composition of layer B (sandy layer), which had the influence on the character of layer A (dark layer).

The layers A and B were gradually mixed by natural and human induced processes (bioturbation, sedimentation, clay translocation). It is thus another site where the settlement processes of the most complex settlement of that time can be traced.

## Conclusions

This research contributes to the debate on anthropogenic soil formation in Europe<sup>6,7</sup>.

A forthcoming study describes Dark Earth formation processes in order to understand settlement strategies.

It seems that this part of the settlement of Mikulčice was levelled using the local sand. New houses were built again on this modified surface and this process was repeated several times. Over time, dark layers full of charcoal, kitchen waste and construction material were mixed with these sandy layers, creating an anthropogenic soil similar to Dark Earth. This is the first example of this kind in the Czech Republic, describing in detail.

Finally, this is another example where one can talk not only about a cultural layer, but rather about an anthropogenic soil that can be classified as Dark Earth.

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