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Charcoal analyses as an environmental tool for the study of Early Medieval sunken houses infills in Roztoky near Prague, Czech Republic

Jan Novák [a], Lenka Lisá [b,*], Petr Pokorný [c,d], Martin Kuna [c]

[a] Department of Botany, Faculty of Science, University of South Bohemia, Branišovská 31, 370 05 České Budějovice, Czech Republic
[b] Institute of Geology of the Academy of Sciences of the Czech Republic, v.v.i., Rozvojova 269, 165 00 Praha 6, Czech Republic
[c] Institute of Archaeology of the Academy of Sciences of the Czech Republic, v.v.i., Letenská 4, 118 01 Praha 1, Czech Republic
[d] Center for Theoretical Studies, Charles University in Prague and the Academy of Sciences of the Czech Republic, Jilská 1, 110 00 Praha 1, Czech Republic

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ABSTRACT

The research was focused on the testing of possible information value of charcoal analysis from infills of archaeological objects, when methodologically different approaches are used in the combination with the micromorphological and pollen-analytical approach. The case study site chosen for this type of study is the unique Early Medieval settlement at Roztoky, Czech Republic. The comparative study includes the infills of 20 pithouses from the extensive settlement comprising about 750 (323 excavated) such archaeological structures situated along the left bank of Vltava River close to what today is the city of Prague. A combination of three anthracological outcomes (the number of charcoal fragments, the anthracomass, and the qualitative frequency of charcoal species) proves to be a powerful tool in determining the vegetation pattern in the surrounding landscape. The study revealed a major effect of post-depositional processes and quantification methods on the final anthracological interpretation. A modification of the anthracological record in different layers was traced in order to assess the applicability of sedimentology and micromorphology in the interpreting of the primary use and ending of the objects found. The reliability of anthracological interpretations are then compared with the results of micromorphological analyses and with regional vegetation patterns interpreted from pollen analyses of an off-site pollen profile.

1. Introduction

One of the key questions, often discussed in final archaeological interpretations, is the information value of the infills of archaeological features. The composition of these infills has been long discussed in studies focused on the construction technology and the purpose of archaeological features, their usage, and the reasons of their abandonment (Dolukhanov, 1996, Simpson et al., 1999; Einarsson, 2008). Usually, the subdivision into horizons within the studied features was based on a combination of visual attributes, archaeological or archaeobotanical remains.

Organic matter has a high information value in archaeological record. One of the usually best preserved organic remains, connected with humans since the Palaeolithic, is charcoal. Wood charcoal analysis provides site-related information on the species occurrence and the woodland composition and, as such, becomes an integral part of archaeological research, especially when a combination with pollen analysis is possible (Asouti and Austin, 2005; Nelle et al., 2010). Charcoal fragments found in archaeological deposits usually represent either firewood remains or burned vestiges of structural timber resulting from catastrophic conflagrations (Chabal, 1992; Dufraisse, 2008). Firewood collection provenance is generally interpreted to be completed in the area close to the settlement with all species gathered proportionally according to their occurrence in the surroundings (Asouti and Austin, 2005). In addition to societal factors and combustion processes, post-depositional agents are very important filters between the vegetation and the charcoal assemblage (Théry-Parisot et al., 2010).

Another important methodological tool used in the study of composition of archaeological features is micromorphology in archaeological context (Courty et al., 1989; Goldberg et al., 2001; Goldberg and Macphail, 2006). Micromorphological investigation is primarily based on the coarse fraction, matrix, voids, organic material and features typical of sedimentary and post-sedimentary

* Corresponding author. Tel.: +420 607706585; fax: +420 220922670.
E-mail addresses: prourou@gmail.com (J. Novák), lisa@gli.cas.cz (L. Lisá), pokorny@arup.cas.cz (P. Pokorný), kuna@arup.cas.cz (M. Kuna).

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processes (Courty et al., 1989) and, in combination with charcoal analysis and other geochemical data, provides a complex information about the studied layers (Goldberg et al., 2001; Goldberg and Macphail, 2006).

The subject of our research is the Early Medieval settlement agglomeration dated to the 6th and 7th century AD, discovered at Roztoky near Prague. The unusually high number of the Early Medieval sunken houses, the estimated time span of the settlement existence of 150 years, and its location on the floor of a deep, canyon-like valley is unique in the whole area of the Prague-Korčak (also the Prague-type) culture (Sedov, 1982; Gojda, 1991; Dolukhanov, 1996, Kuna and Profantová, 2005). This settlement represents a puzzle considering the enormous number of house remains and its specific interpretation. A combination of three complementary methods – charcoal analysis in context of micromorphology and pollen analysis, which are not a standard approach in archaeo-environmental research yet, may contribute to a better understanding of the character of the surrounding landscape. We attempt to answer the following questions: How is the anthracological record modified by post-depositional processes in different layers? What does the anthracological record in context of sedimentology or micromorphology say about the use, abandonment and decay of the studied objects? We will also discuss the reliability of the combined methods used.

2. Study area

2.1. Early Medieval settlement at Roztoky near Prague

The Early Medieval settlement discovered during the last twenty years in the close vicinity of Roztoky near Prague (settlement with the estimated number of more than 750 sunken houses accumulated over the period of 120–150 years) (Fig. 1) is unique to the whole area of the Slavic spread (Kuna and Profantová, 2005). The site is located on the floor of the deep Vltava River canyon, where sunken features interpreted as sunken houses were discovered. These findings belong to the so-called Prague-type culture which is usually believed to represent the earliest Slavic populations that moved into the Central Europe from the East. Although some relatively large sites have been reported from the surrounding countries – for instance, Germany (Krüger, 1967), Poland (Parczewski, 1989), Ukraine (Baran, 1988), Moldova (Zeman, 1976; Teodor, 1994) and Romania (Dolinescu-Ferche, 1992) – the Roztoky settlement site is larger than any other site of this culture known so far. However, it is characterized by a very short period of use (120–150 years; Curta, 2008), which complicates a comparison with similar localities, but provides excellent conditions for studying this unique site.

2.2. The geographical and archaeological context

The studied settlement is situated in the Vltava River canyon on a fluvial terrace separating rocky slopes of the valley from the stream (Fig. 1). The terrace is only 120 m wide and the level of the Early Medieval settlement is at present situated 5 m above mean water level. Local Quaternary deposits are characterized by sandy loams and morphologically comprise an older river terrace level gently sloped toward the river channel. It is obvious from the study of sunken house infills that the location was situated well above the water level, being therefore rarely flooded during periodical flood events. The stratigraphy of sunken house infills shows no evidence of catastrophic events assignable to a repeated cycle of the destruction and building of the houses. The number of artefacts left on the floors of the sunken houses is not very high, suggesting that the houses were abandoned slowly and peacefully. Both the movable finds and architecture are basically similar to what we know from other sites of this period, the main explanation problem being the extremely high number of houses discovered (Kuna and Profantová, 2005).

3. Materials and methods

3.1. Charcoal analysis

In total, 101 anthracological samples from 20 sunken houses were analyzed and nearly 11,000 charcoal fragments were included into the final interpretations. Soil samples of 20–35 kg, rarely 50 kg were collected. The extractions of charcoal from the samples were subjected to the standard flotation procedure using staggered sieves with a mesh size of 0.25 mm. The charcoal analysis was performed only on fragments from the largest fraction (>2 mm). The charcoals were identified using an episcopic interference microscope (Nikon Eclipse 80i) with 200–500× magnification and the reference collection. The additional standard identification keys were also used (Schweingruber, 1990; Heiss, 2000).

The relative species abundance was expressed in the number of charcoal fragments (e.g., proposed by Delhon, 2006), charcoal anthracomass (e.g., Carcaillet and Thinon, 1996), and the qualitative

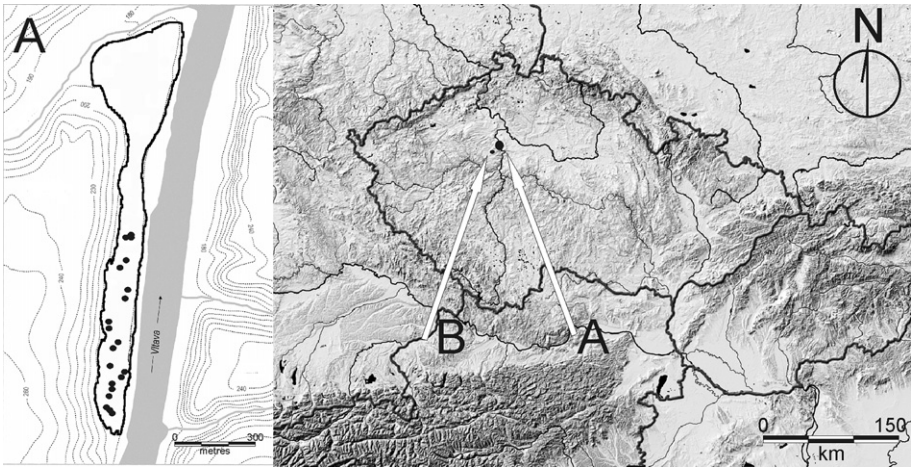

Fig. 1. Location of the Prague – Korčak site at Roztoky (20.6 ha) situated on the bottom of a canyon-like valley of the Vltava River, Czech Republic. Left part of the figure refers to the location of sampled sunken houses. Arrow A refers to the location of the studied site, arrow B refers to the pollen site "Bŕve".