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How were the ditches filled? Sedimentological and micromorphological classification of formation processes within graben-like archaeological objects



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ABSTRACT

The ways of infilling archaeological objects are among the most common questions given to geoarchaeologists. Convenient subjects for the study of formation processes of archaeological terrain features (contexts) are V-shaped ditches. Their infilling is usually lithologically and texturally considerably variable with regular morphology and special archaeological context. The V-shaped ditches are known only from two chronologically, culturally distinctive periods. In first case there are ditches of “rondels” from the Late Neolithic Period, in the second case we are dealing with the fortification ditches of the Roman temporary camps.

On the basis of sedimentological and consequently micromorphological study, processes were differentiated in the formation of studied infillings. In Neolithic rondels, two parts of infillings were noted. The lower one typically has straight thin bedded layers, originating due to processes connected with vegetation ingrowth and erosion of the rampart. The upper part of the infilling is usually homogenous, and originated during the human caused grading of the surrounding area. During this phase, remains of rampart constructions were most probably destroyed. The basic type of deposition – especially visible in case of rondels – is lateral planar wash with phases of bioturbation, running pedogenesis on the edges of ditches, or stagnating water. The second main featuring process is mass movement slumping, particularly of upper faces of sloped sides. This process often happens naturally, mainly due to erosion, presence of water, and vegetation. The most distinctive postsedimentary processes determined within the rondel infilling were bioturbation, accumulation of carbonates and movement of clay minerals caused by soil leaching. In the V-shaped ditches of the Roman temporary camps, it was possible to microscopically trace similar records documenting coarse particle sedimentation at the base of ditches, although this layer is not continuous through the whole width. It indicates the direction from which it was transported. They are remains of intentionally redeposited ramparts. The upper parts are marked by increasing humification and bioturbation as a result of ditch infilling emergence. However, it is possible to trace similar formation processes in both groups of studied V-shaped ditches and to define a basic classification. Prevailing textural and structural features are distinctively different between the groups, due to geological subsoil conditions, hydrological regime and depth of the ditches.

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1. Introduction

The way that archaeological objects were infilled is a frequent question, but usually also hard to answer if the infilling does not contain typical textural features. One of the useful methodological tools which might explain more about the formation processes is micromorphology (Goldberg et al., 1993; Barham and Macphail, 1995; Matthews et al., 1997; Courty, 2001). This approach can also answer various questions such as connections with the past climate or human impact on the landscape (Goldberg and Macphail, 2006; Macphail and Goldberg, 2010; Leopold et al., 2011; Milek, 2012). The graben-like ditch infillings are usually lithologically and texturally considerably variable, and have regular shapes and relatively specific archaeological context, which was the reason why this type of archaeological structure was chosen for this study dealing mainly with formation processes detected by micromorphology.

Graben-like ditches in the context of Central Europe alluvial landscapes represent a type of archaeological structure typical only for two cultural periods. The older one represents the Central European Neolithic period, especially its later phases (4900–4500 BC) represented by STK – Stroked pottery culture. The most typical monumental subsurface feature of this period is called a “rondel” in the Czech environment (Pavlů, 1982; Podborský, 1988, 1999; terms used in the literature include Kreisgrabenanlage, circular ditches, circular enclosures, and woodhenges). Those objects are typically situated on the edges of river valleys. A “classic” Late Neolithic rondel is typically considered as a complex of one or several, more or less round ditches with a characteristic sharp profile, and one or more circular concentric channels inside the space demarcated by the ditch with the smallest diameter (Fig. 1). Maximum diameter of such objects is 30–240 m, the width of ditches varies between 1.5 and 14 m, and their depth is usually between 1 and 4.5 m (Řídký et al., 2012). The sedimentary infillings of rondel ditches usually look similar (Fig. 2). The lower part is in most cases bedded, with the thickness of individual thin layers varying from mm to cm, while the upper part of the infilling is more or less homogenous (Zeman and Havlíček, 1988). Válek et al. (2013) and Lisá et al. (2013) suggested the main formation processes of the rondel infillings



Fig. 2. Infilling of the rondel ditch with the micromorphology sampling positions; Těšetice-Kyjovice, Southern Moravia (Photo P. Lisý).

were mainly washouts for the lower part of the infillings and collapse induced by humans for the upper part of the infilling. The large volumes of material excavated from the ditch suggests the presence of earthwork near the ditch, which might be a source of the material for the infilling (Kovárník and Mangel, 2013; Lenneis, 1977; Modderman, 1983; Němejcová-Pavůková, 1986; Neugebauer, 1986; Oliva, 2004; Válek et al., 2013; Lisá et al., 2013), but there are also authors suggesting that earthworks were not present (Trnka, 1986; Podborský, 1988). Kovárník and Mangel (2013) and Vokolek (1963) described one of the rondel structures near Trebovčice with preserved earthworks located particularly on the outer side of the ditch. Earthwork ramparts' presence inside the rondel or outside the ditches, as well as processes in the origin of the ditch infillings, are still discussed (Lisá et al., 2013).

The second group of the archaeological features within the region of interest, where the V-shaped ditches are a typical phenomenon, represent camps of the Roman army. The V-shaped ditches, the so-called “Spitzgraben” (Fig. 3), are a symptomatic

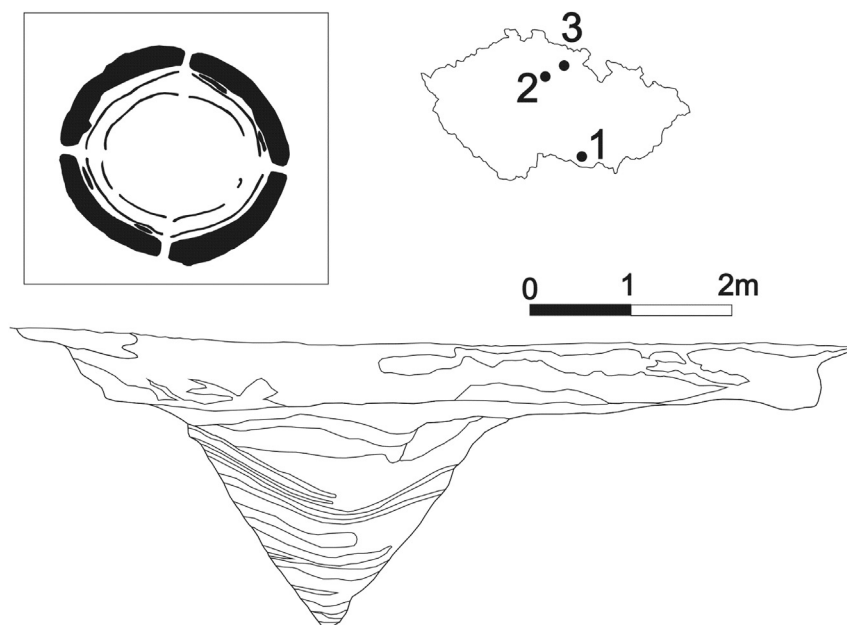


Fig. 1. Typical example of the rondel structure and its ditch infilling; Těšetice-Kyjovice, Southern Moravia.

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