Quaternary International xxx (2016) 1–16

Contents lists available at ScienceDirect

Quaternary International

journal homepage: www.elsevier.com/locate/quaint

Neanderthal's microlithic tool production and use, the case of Tata (Hungary)

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ARTICLE INFO

Article history:
Available online xxx

Keywords:
Tata
Stone tools
Techno-typology
Function
Form
Microlithism

ABSTRACT

Several Western and Central European archaeological sites from the Marine Isotopic Stage (MIS) 5 to 3 yielded microlithic assemblages made by Neanderthals. The European Prehistory lacks a thorough study of these small artifacts to understand their meaning, potential function and to investigate Neanderthal capabilities, behaviours and conception of their tool kit. We propose here to describe the microlithic artifacts from Tata (Hungary) using both typo-technological and functional (usewear analysis) approaches to understand how and what for these tools were made and used. The results show that these stone artifacts were produced using two main reduction sequences. The overall outline of the tools was probably not of great interest for the users which rather looked for artifacts with at least one sharp edge opposite a back. Usewear analysis allowed identification of different activities such as scrapping, cutting, or sawing hard or softer materials. The smallest artifacts may not have been the most used artifacts and that several tools may also have been hafted. The reason why so small artifacts were produced remains unknown. The Neanderthal world (supposedly related to these microlithic sites in Central Europe) was probably developed through multiple techno-morphological solutions.

1. Introduction

Into the Neanderthal world, between 400 ka and around 40 ka in Europe, some lithic artifacts are odd by their small size (less than 20–30 mm long) and are described as microlithic. These small tool kits have been ignored for a long time and considered as by-products or due to low availability of the raw material. However, more and more small artifacts are being discovered in archaeological assemblages and represent sometimes the whole lithic component. The sites which yielded such assemblages are spread in a large area in Western and Central Europe and are dated from MIS 5 to 3 (from 130 ka to 24 ka) (Lozek, 1954; Prozek, 1958; Behm-Blanke, 1960; Kaminska et al., 1993; Stepanchuk, 1994; Moncel, 1996a, 1996b; Liubin, 1998; Moncel and Neruda, 2000; Ranov, 2001; Dibble and McPherron, 2006; Ciesla and Valde-Nowak, in press). Numerous sites in Central Europe, for instance Tata in Hungary, yielded assemblages of microlithic artifacts dated to MIS 5. These assemblages have been called Taubachian to highlight their originality (Schäfer, 1981; Wagner, 1981; Valoch, 1988). Microlithic assemblages were also found in earlier sites dated from MIS 11 to 6 (from 427 ka to 130 ka) such as Vértesszőlős (MIS 9) in Hungary (Kretzoi and Dobosi, 1990; Burdukiewicz and Ronen, 2003), but also Bilzingsleben in Germany (Burdukiewicz et al., 1979; Mania et al., 1980; Mania, 1988; Pasda, 2012) and Trzebnica in Poland (Burdukiewicz et al., 1994). In most of the Western European lithic series, only part of the production is very small, explaining why these microlithic components have been ignored for a long time. The study of the reduction processes showed that these artifacts were voluntarily produced with a small size (e.g. Payre and Abri du Maras, France: Hardy and Moncel, 2011; Moncel et al., 2014; Baena et al., in press; Abric Romaní, Spain: Vaquero, 2008; Vaquero et al., 2012, 2015; La Polledrara, Italy: Bietti and Grimaldi, 1996; Anzidei et al., 2012). Moreover, the production of small artifacts is also observed in the Levant at 1 Ma (Goren-Inbar, 1988; Marder et al., 1998; Zaidner, 2013).

In Central Europe, even if there is no consensus about the creation of a specific cultural group named "Taubachian"

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http://dx.doi.org/10.1016/j.quaint.2015.09.102
1040-6182/

(Collins, 1969; Valoch, 1977, 1984), the microlithic assemblages share some common characteristics (e.g. Moncel and Neruda, 2000; Moncel, 2004; Moncel and Rivals, 2011): the use of small pebbles of various rocks, the "non-Levallois" technology, the average size of the flakes of less than 30 mm, the presence of many broken flakes, the lack of flat retouch and of bifacial tools (except in Tata), the prevalence of side-scrapers, denticulates, notches and micro-choppers, and the presence of bone retouchers (Valoch, 1984). In addition, the settlements are often related to hot water springs (travertine formations; see Ciesla and Valde-Nowak, in press), caves and river banks. However, even if temperate and large forest environment seem more frequent, they are not always associated with these sites. The fauna is various but the assemblages are often composed of one or two great herbivores such as deer, horses, rhinoceros, and elephants. The analysis of fauna remains suggests that some of these animals were hunted in favorable areas located near a spring (Bradlund, 1999).

Despite these few elements, sometimes still debated, these microlithic industries are still not well understood. To date, it cannot be described as distinctive in stone traditions related to temperate periods and forested landscapes with a large use of wooden tools, or as differences in subsistence strategies (Richter, 2006). It is likely that the only real element that allows to group together the Taubachian sites is the size of their stone artifacts (Moncel, 2000, 2003b). The geological analyses showed that this small size was not due to a lack of stones in the surroundings. Collecting small size raw material was voluntary. Typo-technological studies of the flakes and small nucleus as well as several reassembling confirmed the wish of Neanderthal to produce such flakes (Vértes, 1964; Dobosi, 2000). So, as proposed by Moncel (2004: 111), it could be "another technological world, intentionally microlithic, with certainly another conception of the tool kit" (see also Moncel, 2003b). Usewear analysis revealed the use of small flakes for butchery activities in Abric Romaní (Spain) (Martínez, 2008), but it remains unclear as very few studies have been carried out on these tools, often neglected.

How were used these tools and what for? How could these small tools be held by Neanderthal hands? European Prehistory lacks a thorough study of these small artifacts to understand their potential function and to investigate Neanderthal capabilities, behaviors, and conception of their tool kit. We propose here to describe the microlithic artifacts from Tata (Hungary) (Vértes, 1964) using both typo-technological and functional (usewear analysis) approaches.

2. The site of Tata (Hungary)

2.1. Research history

Tata-Porhanyó (see Dobosi, 2013) is the oldest known locality in Hungary where a Palaeolithic site were discovered. It was first mentioned by the English traveller R. Townson in 1797 who reported remains of "*elephant*" (Vértes, 1964: 10). Later, the calcareous tuff of Tata was described by Schafarzik (1904) and served as locality for collecting fossil bones. The palaeontological site became an archaeological locality in 1909 when Tivadar Kormos found chert flakes associated with the bones of elephant and rhinoceros, 7–8 m below the surface in a 60 cm thick layer of sand (Kormos, 1912).

Forty-eight years later, teachers of the Tata Secondary School, I. Skoflek and V. Budó, discovered the continuation of the site reported by Kormos in the western wall of the abandoned quarry. In 1958–1959, László Vértes excavated more than 2000 stone artifacts and other abundant remains (Vértes, 1964). Since, the section left by László Vértes was destroyed by natural weathering and deliberate destruction, and the cavity was filled with litter. Between 1995 and 2001, Viola Dobosi (Hungarian National Museum) and Julianna Kisné Cseh (Kuny Domokos Museum) initiated new excavations. The study of the discovered material is still in progress, but around 3400 retouched stone tools and more than 40,000 pieces of debris, flakes and unworked fragments were found from Tata.

2.2. Geological context

The site of Tata is located in the northern part of the Transdanubian Mid-Mountain range (Fig. 1). The area consists of freshwater limestone deposited in layers of several meters thick in the Gerecse and Buda mountains foothills and on the adjacent river terraces. Three levels can be separated on the basis of the altitude of the current calcareous tuff cover. The calcareous tuffs of 240–205 m a.s.l. are not likely to yield archaeological finds. Middle Pleistocene layers are found around 180–190 m a.s.l. and correspond to the layers of the Vértesszőlős Lower Palaeolithic site. Finally, the site of Tata was found in Upper Pleistocene calcareous tuff layers (MIS 5) located around 150 m a.s.l.

When spring activity and calcareous tuff formation decreased, the more or less dry tetarata basins of 6–8 m diameter, surrounded by vertical walls, offered ideal circumstances for settlement. Sometimes, several habitable tetarata basins can be observed if the calcareous tuff remained undisturbed. At Vértesszőlős, remains of two such basins were excavated in situ, and several more were observed, but already altered by quarrying.

Local and distant raw material sources for radiolarite, quartz, and quartzite were accessible. Pebble deposits from older terraces, gravel from the contemporary river bed and embedded layers of radiolarite from the Gerecse Mountains were available. Other outcrops were probably also available in the Bakony mountains, particularly for radiolarite. Therefore, humans from Tata may have used local outcrops, locally collected transported raw materials or moved to more distant outcrops (Szentgál in the Bakony mountains for example). Currently, the exact origin of the raw material used in Tata remains uncertain (Biró, 2004).

2.3. Flora

Around 1500 macrofossil specimens were collected from the calcareous tuff (wall of the quarry and boreholes) and consist of leafs, stems and crops from the period both preceding and following the site formation. Samples of pollen and charcoal were also collected from the layers of the archaeological finds. Based on the palaeobotanical evidence, the lowermost layer can be related to the second half of the Riss-Würm interglacial period (with Celtis). The climate changed gradually from a warmer temperature than today with mild winters to a period of cold steppe vegetation. In the vicinity of the site, an equal proportion of conifers (Pinus, *Abies*, *Larix–Picea*) and deciduous trees (*Betula*, *Quercus*, *Fagus*, *Carpinus*) was found. The overall floral composition shows a climate similar or slightly colder than today (Járai-Komlódi et al., 1964: 85). However, at Tata (and the other calcareous tuff formation localities), we should take into account the equalizing and compensating effect of the warm springs and lakes on the micro-environment.

2.4. Fauna

The rich and diverse malaco-fauna comprised 60 species: 1 clam, 16 water- and 43 terrestrial snails. It supports the botanical results, as the interglacial fauna under the cultural layer can be related to the Riss-Würm period. The cultural layer itself is related to Würm I and refers to a drier and colder period than the previous (interglacial) period; the sylvan species are missing (Krolopp, 1964).

Please cite this article in press as: Borel, A., et al., Neanderthal's microlithic tool production and use, the case of Tata (Hungary), Quaternary International (2016), http://dx.doi.org/10.1016/j.quaint.2015.09.102