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Edited by

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CHAPTER FORTY FOUR

ALL THE SAME, ALL DIFFERENT! MESOLITHIC AND NEOLITHIC "45° BEVELLED BONE TOOLS" FROM ZAMOSTJE 2 (MOSCOW, RUSSIA)

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Abstract

Zamostje 2 is a river bank site located in the region of Serguei Possad (Russia). The Zamostje 2 settlement has been excavated by Vladimir

Lozovski and Olga Lozovskaya since 1989. This site is composed of occupations from the late Mesolithic to the middle Neolithic. Although no habitat structures were discovered, structures and many artefacts dealing with fishing practices have been found there. Our attention was drawn to a particular typological set of bone artefacts from Zamostje: narrow transverse-lateral bevel ended tools with sides invariably composing an angle of 45°. The functional study of around forty pieces had allowed a match with wood working (Лозовская 1997). However, the variability in the breaks and the distribution of use-wear patterns means that kinematics could not be apparently cleared. From these first results and with the help of target experiments, we carried out the use-wear analysis of all the collection that numbers more than one hundred "45° bevelled bone tools". We expected to specify their function and their connections with structures dealing with fishing at Zamostje.

Keywords: Bone tools, woodworking, use-wear analysis, experimentation, Mesolithic and Neolithic of the Russian plain.

1. Introduction

The site of Zamostje 2 is located in the Dubna valley, around 110 km to the northeast of Moscow (Fig. 1). This riverbank site was excavated under the direction of V. Lozovski during the 1990s and then by O. V. Lozovskaya for the last two years, 2010-2011. Its chronological sequence extends from the 6th to the 5th millennia BC, from the late Mesolithic to the middle Neolithic (Лозовский 2003). While no habitat structures were found, structures and artefacts dealing with fishing practices were discovered, including fish-traps made from long and thin wooden rods (made from pine). A large quantity of fish remains was recovered in the occupation levels. According to some estimations, the ichthyological remains represent 64% of all the fauna consumed (Chaix 2003). Tools associated with halieutic activities are also numerous: harpoons, fish hooks (Maigrot et al. 2014), bone knives used for scaling fishes (Clemente et al. 2002; Клемеите and Гиря 2003), pine bark floats, etc. Among the thousands of bone tools from Zamostje 2, there is a specific typological group called "45° bevelled tools". In 1997, Olga Lozovskaya published a traceological study of around forty of them (Лозовская 1997). She proposed to associate their use to wood working without understanding their kinematics or their real technical function. Indeed, morphology of those tools constitutes a well-defined typological group. At the same time, the variability of their use-wear patterns is very impressive. In order to understand their use, we carried out experiments that are focused on wood working, and to analyze, from the traceological point of view, all the collection.

Fig. 1: Location of the site of Zamostje 2.

2. Presentation of the corpus

At Zamostje, the bone assemblage includes one hundred and thirty-six 45° bevelled tools. This name was chosen because the angle formed by the lateral bevel is always nearly 45° (Fig. 2). We observed grooving marks bordering the shaping of the desired angle in one case (Fig. 3: 1). The lower side, called “plateforme”, is flat shaped by scraping (Fig. 3: 3). The upper side, called “contre-plateforme”, is rounded by scraping (Fig. 3: 2). The “contre-plateforme” (average length 32 mm) is always longer than the “plateforme” (average length 26 mm). The convex edge is very thin, between 5 and 7 mm. 45° bevelled tools are mostly made from elk bone (a metapodial split in half or a whole ulna), only two specimens have been produced from elk antler. Those implements, which are characterized by specific morphology and standardized shaping processes, are common to Mesolithic and Neolithic levels.

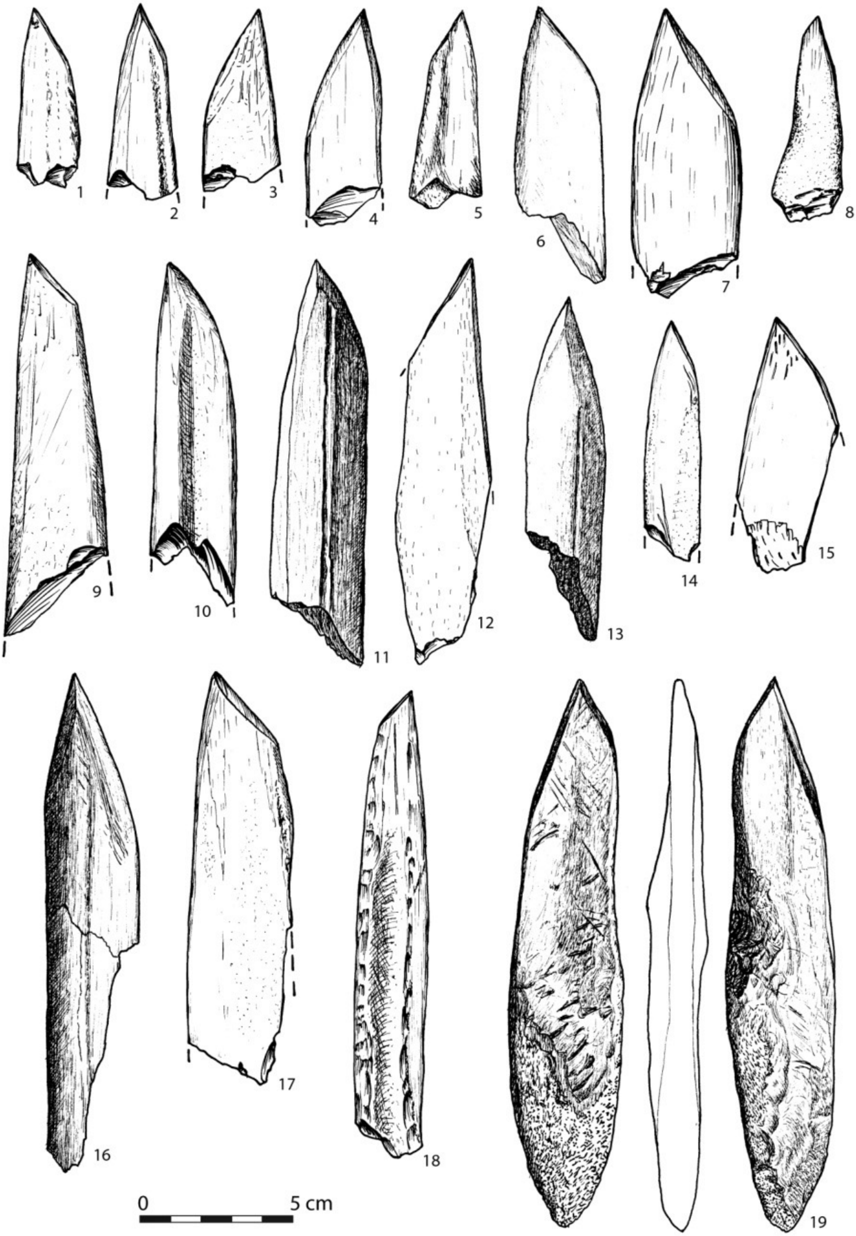

Fig. 2: 45° beveled bone tools from Zamostje 2. Drawings: O. Lozovskaya.

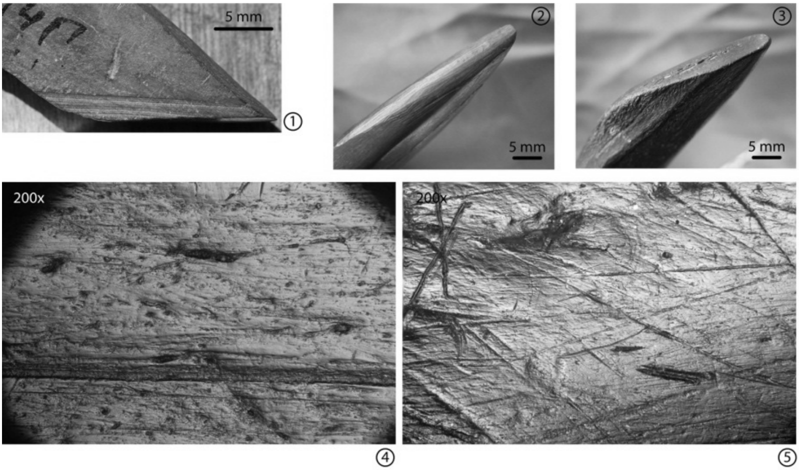

Fig. 3: Close up of 45° beveled bone tools from Zamostje 2. 1-3: technical traces; 4-5: use-wear traces. Photographs 1, 4 & 5: Y. Maigrot, 2 & 3: O. Lozovskaya

Around 90% of the 45° bone tools are broken. Transversal fractures are the more numerous. We have recorded 50 tools with this damage, which could affect distal or mesial parts (Fig. 2: 1 to 5). Forty-one tools show oblique fractures (Fig. 2: 6, 9, 13), and sixteen present longitudinal fractures (Fig. 2: 12). And well, a few of them are characterized by a combination of breaks: longitudinal and oblique fractures or transverse and oblique fractures (Fig. 2: 15, 17). Most of them present a more or less developed rounding of the active part. Usually, the tip of the edge shows little flakes located on the "contre-plateforme" side.

Complete tools are scarce (n=14; Fig. 2: 18 and 19). They are quite long for bone implements: their average length is more than 122 mm. Some of them show a proximal part with compacted bone and flakes, which indicates that they have been probably used by indirect percussion. Others show a shaping by retouch of their proximal part, which suggests that they could have been hafted.

From the micro-wear point of view, archaeological traces are always very close to experimental wear observed on bone tools used for working wood (Maigrot 2003; Van Gijn 2005). However, we have noticed variability in the distribution more and less invasive of the traces, but also in some use-wear patterns. Under the metallographic microscope, we can generally observe a smoothed and quite flat topography, a shining surface with intrusive micro-polish, and numerous pits and cracks. This surface could be affected by thin, long and continuous striations, parallel between

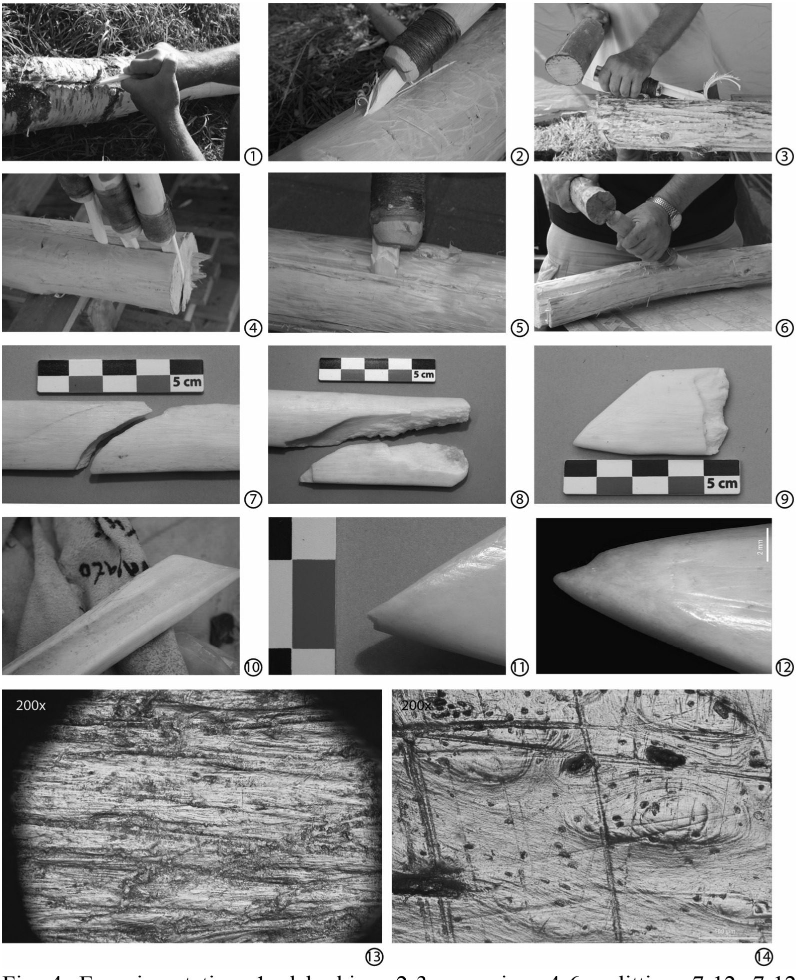

Fig. 4: Experimentation. 1: debarking; 2-3: grooving; 4-6: splitting; 7-12: 7-12: breaks and rounding; 13-14: micro-wear traces. Photographs 1, 3, 7-11, 13 & 14: Y. Maigrot, 2: E. Gyria, 4-6 & 12: I. Clemente.

them and perpendicular to the edge (Fig. 3: 4). They indicate a transverse movement, but mainly, striations are very wide and crossed suggesting a multidirectional gesture (Fig. 3: 5). 45° bone tools have been used on wood, but the question is: what for?

3. Experimentation and use-wear analysis

To try to answer this question and to understand the technical function of those tools, we decided to carry out experiments. We prepared several 45° bone tools, hafted or not. Regarding their specific morphology and the previous traceological results, we have focused our experimentation on removing bark, grooving and splitting wood.

Experimental 45° tools were used to remove bark from fresh birch and pine for one to two hours (Fig. 4: 1). After their use, edges show a characteristic indented macroscopic rounding (Fig. 4: 12). We have never observed this kind of modification on the active part of Mesolithic and Neolithic tools. At high magnification, the surface of experimental tools appears striated, bright and above all rounded. Traces resulting in debarking wood do not fit with archaeological use-wears.

Concerning to wood grooving (Fig. 4: 2 and 3), we used hafted and un-hafted experimental bone tools to work, in indirect percussion, birch (fresh) and pine (fresh and dry). We employed different hammers: from wood, antler and stone. The proximal basis of un-hafted tools appears crushed and flaked, attesting to the use of an experimental soft hammer, from wood or antler. These stigmas have been recorded on all complete tools from Zamostje. On the other hand, in the archaeological sample, we have never observed the huge damage resulting from the experimental use of a stone hammer (Fig. 4: 8). During our experiments and with deep grooving, the active part of some tools has been accidentally broken transversally. Such breaks have been observed in 45° bevelled bone from Zamostje. After use, all experimental edges show micro-flakes on the “contre-plateforme” side, as the archaeological cases. Under the metallographic microscope, experimental used surfaces appear quite flat with a bright polish and parallel striations (Fig. 4: 13). Similar traces have been also observed on a few Mesolithic and Neolithic tools, which have been probably used to groove wood.

Lastly, we have used experimental 45° bevelled bones to split pine and birch, in order to extract wood blanks and long rods (Fig. 4: 4 to 6). Experimental implements have been used until breakage and, if not, for 3 hours. All the tools were hafted and employed by indirect percussion with a soft hammer. Breaks mainly appeared during splitting wood. Transverse breaks resulting from fracture by flexion were the more numerous (Fig. 4: 5 and 9). Like archaeological samples, they have affected the distal and mesial part just at the limit of the haft. The second kind of fracture obtained is oblique (Fig. 4: 7). This damage resulting from lateral percussion applied to unblock bone tools deeply wedged in the wood. No longitudinal breaks, as we have observed on some archaeological pieces, have been obtained during our experiments. But one experimental tool shows a longitudinal hairline fracture in its lower side (Fig. 4: 10). All the edges are rounded and present micro-flakes, in particular on the "contre-plateforme" side (Fig. 4: 11). Splitting wood produces the more invasive use-wear. Traces could be observed on the "plateforme" and the "contre-plateforme", but also on the upper and lower side of the active part. Experimental use-wear patterns show some differences between pine and birch. In the case of birch, the surface is flatter than for pine, and the striations are thinner and less deep. Archaeological use-wear traces seem closer to pine working than birch working (Fig. 4: 14). Use-wear resulting from splitting pine affected most of the 45° bevelled bone tools from Zamostje.

4. Discussion

45° bevelled bone tools have a specific morphology. Due to their formal standardization, they constitute a strong typological category which is easy to recognize. From the technological point of view, we can also note a strong standardization and, specially, in the shaping processes of the active part. This standardization contrasts with use-wear patterns. Use-wear analysis shows that tools have probably been used for working wood and mostly by indirect percussion, with a soft hammer. Distribution and characteristics of traces suggest different kinematics and so different functioning: grooving and splitting wood. The design of 45° bevelled bone tools, which are long and thin, perfectly fits within both purposes. And further, cases of traceological overlap exist but are not so frequent.

In our opinion, 45° bevelled tools were employed at different steps of the "chaîne opératoire" dealing with wood production. Considering the archaeological context, their use could be linked to fish trap manufacture involving long pine rods. They could have been used to extract long wooden rods by grooving then splitting, and were broken at different steps. This proposition could explain the variability in the use-wear patterns: fractures, distribution of the traces and organization of the striations.

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