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THE USE-WEAR ANALYSIS OF SOME KNAPPED STONE TOOLS FROM THE PRECUCUTENI SETTLEMENT OF ISAIIA–BALTA POPII, IAȘI COUNTY, ROMANIA

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Abstract. The lithic tools were analysed by combining the high power and the low power. The use wear analysis revealed some activities like harvesting cereals and hide working. There were also discovered some use traces made by some material(s) on the nature of which we cannot pronounce yet.

Keywords: Precucuteni culture, use-wear analysis, stone tools, lithic assemblage, hide processing.

1. Introduction

Use-wear analysis is a relatively new field in Romanian archaeology, and we consider necessary a brief history of the method. In the 19th and the first half of the 20th century, interpretations of the possible use of the prehistoric tools were mainly based on ethnographical comparisons. Also, in the same period Spurell made observations on what is now called sickle gloss (Spurell 1892, 53–59). The work that made the difference was Semenov's Pervobitnaya tekhnika (1957), later translated into English as Prehistoric Technology (Semenov 1964). Through his work, Semenov became the precursor of the modern use-wear analysis of stone and bone tools. Based on his own experiments, on ethnographic analogies, and on microscopic analysis, Semenov approached most of the aspects of a complete study of lithic analysis. Semenov's work was the impulse that the study of lithics needed to overcome the positivist phase that was bogging down the discipline. Developed because of the Marxist interest for the study of production techniques in ancient societies (Plisson 1988, 148), Semenov's traceological method had a great impact on world archaeology, especially in the United States and Europe, where the method later developed in other cultural and scientific contexts. The '70s and the '80s were the periods that brought the development of the method and also the (nowadays almost forgotten) fake dichotomy of low power approach vs. high power approach. Odell's (1977), Keely's (1980), Vaughan's (1985), and Anderson-Gerfaud's (1980) work also fed the growing optimism on the possibility of use-wear analysis to interpret the real use of the tools discovered in archaeological excavations. After the failure of the blind tests from London and Tübingen, the analysts became aware of the mistakes they made, leading to a more mature and balanced form of the method (Jensen 1988, 59). In addition to the classic optical microscopy (stereo and reflected light microscopy) other types of microscopy—including electron microscopy, atomic force microscopy, laser profilometry, laser scanning confocal microscopy—and different methods of quantifying polish with image analysis were proposed by different studies (Beyries et al., 1988; Evans and Donahue 2008; González-Urquijo and Ibáñ-Estévez 2003; Grace 1989; Knutsson 1988; Kimball et al., 1995; Stemp and Stemp 2001). But no matter what was the technical choice of the analyst, the base of the method still remains experimentation, and a large collection of experiments allows the quantification of all use-wear variables for establishing patterns of traces, as van den Dries and van Gijn have demonstrated (van den Dries and van Gijn 1997).

At the time Semenov made his method well known, Romanian archaeology already proclaimed its tributariness to the Marxist ideology (and the interest for tools of production was axiomatic in the new embraced ideology). But the method developed by the Russian school had no followers in our country (for the failure of Marxism in Romanian archaeology see Anghelinu 2003). Unfortunately, even after 1989, an interest for use-wear analysis did not appear. The first archaeologists who tried to make some use-wear observations on a lithic assemblage were Bodi (2005, 2010), and later Boghian and his research team (2011).

2. Methods

Our use-wear analysis was done in the Laboratory for Artefact Studies from the Faculty of Archaeology, Leiden, Netherlands. We want to
thank to Annelou van Gijn, Annemieke Verbaas, and Virginia Garcia Diaz for helping us interpret the use-wear from the tools. All the photographs presenting the microscopic use-wear from the tools were made in the Laboratory for Artefact Studies.

The use-wear features we considered are those described by Keely (1980), Vaughan (1985) and van Gijn (1989): edge removal, edge rounding, polish and striations. Thus, we combined the low power with high power using a stereomicroscope and a reflected light microscope.

Our discourse might seem useless, because of the low number of the pieces subjected to analysis (ca. 3% of the lithic assemblage), and because the pieces were randomly selected, without any real criteria. But these are the results of the first analysed pieces of the whole assemblage from the Precucutenian site of Isaiia, Iași County, Romania, and the paper hereby is just a preliminary analysis.

The early Chalcolithic (Precucuteni culture) settlement from Isaiia–Balta Popii is situated on the first non-floodable terrace of the Jijia River, near its confluence with the Prut River. The site is very well known in the archaeological literature for some of its spectacular finds (for more information on the site see Ursulescu and Tencariu 2006). Because the site is multi-layered we would like to state from the beginning that only the Precucutenian lithic assemblage was the target of the analysis. The Precucutenian lithic assemblage excavated from the site comprises 829 pieces. The raw material used for tools was the so called Prut flint (a very fine grained flint), which could have been collected, as nodules, from the banks of the Prut River. The nodules were gathered from the banks (the distance from the settlement to the raw material being somewhere from 5km to 15km) and brought in the settlement where they were knapped. As a result, the lithic assemblage discovered at Isaiia comprises cores, cortical flakes (entame flakes and flakes with different percentages of cortex on their surface), flakes of different morphology, nodules brought in the settlement but never worked, and, of course, plein débitage blades.

Our analysis had the purpose of determining the kinetics of the tools, the material on which they were used, and the hafting (if it was the case). The analysed sample is composed of seven endscrapers, seven unretouched blades and a retouched one, three scrapers, a trapeze, and a borer. The pieces come from all three of the site's Precucutenian levels.

After their discovery, the lithic pieces were cleaned with citric acid, labelled with a white paste (from zinc oxide, water and polyvinyl acetate) on which it was written with a pen, measured with a metallic beam compass, and finally drawn. Because of the post-excavation treatment, some traces could be observed on the pieces. Although we tried to clean the white mark-paste (which obstructed the surface of the tools) with acetone, not the entire surface of the pieces was entirely cleaned, some paste still adhering to the surface (Figure 1/a); also the scratches from the metallic beam compass are visible on the edges (Figure 1/b). Also affecting the surface and the edges is the graphite from the pencil used for drawing the tools (Figure 1/c).

From the first Precucutenian level from Isaiia we analysed an endscraper (inv. no. ID419—Figure 2/e) and a scraper (ID505—Figure 2/c) from dwelling L8A, as well as an unretouched blade discovered near the dwelling (ID497), a scraper from pit 48 (ID753), and from the cultural layer, without belonging to an archaeological complex, a mesial fragment of a blade with visible sickle gloss (ID690—Figure 3/a), an endscraper (ID755—Figure 2/a), and a microlithic trapeze (ID657).

3. Results

The microlithic trapeze (ID657) is one of the three such items discovered in the settlement (as a side note, we mention that the total number of microliths discovered in the contemporaneous settlements belonging to the same culture is low). The examined trapeze displays only fatigue wear, but no abrasive wear (as defined by Dockall 1997). So, for the moment, we abstain from advancing any interpretation of the use of the trapeze.

The microscopic analysis of the scrapers and endscrapers from the first level of habitation suggests a possible interpretation of their use as hide scrapers. The use-wear from these tools has the same characteristics as the experimental ones used for hide scraping. One of the scrapers (ID755—Figure 2/a) has a visible polish, macroscopically resembling sickle gloss; when seen at the microscope, the polish is of the same kind as the one developed from scraping hide with mineral additives.

The mesial fragment from an unretouched blade (ID690—Figure 3/a) with sickle gloss on both edges, was indeed used for harvesting cereals. The palynological analysis for the Isaiia site showed that domestic cereals were cultivated in the hinterland of
the settlement (Bodi et al., 2011). As we stated before, the use traces can be found on both of the tool's edges. They indicate a prolonged use of the tool, probably until it became ineffective, judging from the heavy edge removal and rounding. The fragment was inserted into a sickle, probably a Karanovo type sickle (as experimentally reconstructed by Skakun 1993, fig. 3).

The other unretouched blade from the first level (ID497) is a fragmentary one, without its distal end. The analysis of the microscopic wear indicates a use on longitudinal movements (cutting, sawing) on a material on the origin of which we cannot pronounce yet. As these kinds of traces appear on other blades from the settlement, we think that a short presentation is necessary: the edge removals are mainly hinge, bifacial, the edge rounding is not so well developed, and the polish (which has the same appearance on both of the surfaces of the cutting edge) is animal and also plant like. All the blades that have these kind of use-wear (we called this unknown wear trace 1-UT1) have a very sharp edge. Because we haven't managed to reproduce all the traits of use-wear described above, we prefer to refrain from any other interpretation.

From the second level of the Precucutenian settlement we chose, for the microscopic analysis, an endscraper (ID650—Figure 2/d) and an unretouched blade (ID697—Figure 3/e) discovered in dwelling L7, an unretouched blade fragment (ID276—Figure 3/b) and a borer (ID725—Figure 2/g) related to dwelling L8, a retouched blade (ID727—Figure 3/d), and an endscraper (ID831) (with no use traces) from the cultural layer.

The endscrapers from this level were used (except for the one with no traces) for hide scraping. The unretouched blade fragment from dwelling L8 (ID276) has use traces on both edges. The sickle gloss from one of the edges, seen at the metallurgical microscope, resembles the polish developed from harvesting cereals. But the other edge of the blade has the characteristics of hide working (the directionality being both transversal and longitudinal). This edge was broke, probably for a better insertion in the sickle. The borer (ID725) was probably used for boring hides, as the use-wear suggests; also its right edge has microscopic wear resembling with that from the experimental hide scraping. The other blades from the second level have the same unknown traces, on both edges.

From the last Precucutenian level from Isaiia we analysed three unretouched blades, three endscrapers, and one scraper.

Two of the blades (ID158—Figure 3/g, ID291—Figure 3/f) were found in dwelling L6, are both unretouched, and have the same UT1, pretty heavily developed. One blade (ID158—Figure 3/g) was used with only one edge, while both of the edges of the other (ID291—Figure 3/f) were used. The third blade (ID600—Figure 3/e), also presenting UT1...
Figure 2. Hide processing tools from the site of Isaiia–Balta Popii: a. ID755 (200×); b. ID210 (200×); c. ID500 (200×); d. ID650 (200×); e. ID419; f. ID737; g. ID725; h. ID450.
Figure 3. Blades from the site of Isaiia–Balta Popii used for cereal harvesting: a. ID690 (200×) cereal harvesting and hide processing; b. (ID276) (200×) unknown material; c. ID697 (200×); d. ID727; e. ID600 (200×) (incision on the blade seen at a metallurgical microscope -200×); f. ID291; g. ID158.
discovered in the cultural layer, has on both sides two incisions (also macroscopically visible) that go over the tool in a transversal–oblique direction. The same kind of incisions, having the same disposal on the tool, was also identified on another blade with a visible *sickle gloss* on one of the edges. The nature of these incisions is unknown; they are clearly not excavation accidents, nor caused by metal tools.

The scraper (ID210—Figure 2/b) and endscrapers (ID450—Figure 2/h, ID737—Figure 2/f, ID839) from the last level were all used for hide scraping, and some of them, as seen in the figures, had more than one active part.

4. Interpretation

The use-wear analysis of the twenty tools from the Precucutenian levels of the Isaiaia–Balta Popii site revealed some of the economic and subsistence activities that the people which lived in this settlement engaged in.

We now know for sure that the people from this settlement used not only the meat of the hunted or domesticated animals, but also their hides. Since hide is a perishable material, is very unlikely to ever find it through archaeological excavation in Precucutenian or Cucutenian sites. But having the testimony, on stone tools, that skins were indeed processed, we now can talk about hide processing in the Precucutenian site from Isaiaia. Nine of the ten scrapers (including endscrapers) analysed were used for hide processing, alongside a borer and a blade from the same assemblage. Because we cannot reconstitute all the stages of hide processing only by analysing the archaeological material, ethnographic and experimental data could provide the rest of the necessary information. We know that the skin can be processed while still fresh or dried, after skinning the animal, or after a period in which the skin stayed in water (Butură 1978). Depending on the requested final product, the skins will be, or not, dehaired. After skinning the animal, defleshing of the skin is necessary, as is the removal of the *subcuticus* (van Gijn 1989). Dehairing is usuusally done after defleshing and after the skin undergone bacterial processes or was kept in an alkaline agent which will ease the pulling away/epilation of the hair: urine (Clemente-Conte 2005, 43), ash (van Gijn 2010, 80), calcium lime (Butură 1978, 402). After dehairing, the skin is dried or put in some vegetal substances that react with the collagen (van Gijn 2010); in Romanian ethnography, the use of juices made from alder, oak or holm bark is cited (Butură 1978). After drying, the skins must be thinned and their surface made uniform with the help of additives such as animal fat, fish oil (Butură 1978), animal brain or liver (van Gijn 2010). We can also presume that the skin was waterproofed and treated with different agents against rotting.

The existence in the lithic assemblage from Isaiaia of an endscraper used in hide processing with mineral additives must not surprise us, because mineral additives can be used in defleshing and cleaning the skins (being abrasive), or could be used in colouring the skins. The analysis of just one endscraper used for hide scraping with mineral additives does not necessarily mean that cleaning skins with mineral additives was a common technique in the Precucutenian site. Only the analysis of the whole lithic assemblage from the site will show us what the real importance of hide processing in the economic life of the settlement was. Also, we must not forget that in hide processing not only flint tools were involved, but also bone, antler, or wood tools.

The estimated number of domestic animals from the settlement is pretty high, to which we add the hunted animals (Haimovici 2004). Having only a preliminary analysis on such a small assemblage, we cannot talk yet about the importance of hide processing in the settlement and whether the hides were also traded.

Another aspect of the life of the Precucutenian inhabitants from Isaiaia, documented by the use-wear traces, is agriculture. We want to draw attention on the problem of blades interpreted as sickle insertions. Although the two blades with *sickle gloss* were indeed used for harvesting cereals, this does not necessary mean that all the tools with visible *sickle gloss* from the site were used in the same way. A macroscopically visible polish can also be the result of using a tool on other siliceous plants, ceramics, sods, jet, or hide with mineral additives as was the case earlier. We posit that both of the blade fragments believed to have been employed in harvesting cereals were used as sickle insertion, most probably of the Karanovo type.

Although the sample under scrutiny is small, it nonetheless brought to our attention some problems, which have never occurred before, concerning the settlement from Isaiaia. Firstly, a question is what was the extent of the hide processing activity that took place here? Were they processing hide only for their own use, or even for trade? Secondly, was the use of mineral additives in hide processing a frequent occurrence, and if it was, in what stage of the hide manufacturing process did it take place, and
what minerals were used? The presence of red mineral spots on a core from the same site could give us a clue, but until further investigation is conducted, we prefer to refrain from any conclusions. Because the analysed sample is small, we could not establish whether other materials were used by the Precucutenian community from Isiaia. For example, we did not analyse any tool that can be put into connexion with wood, bone, antler, or plant processing (except cereals). A lot of the objects that prehistoric people had in their houses or used in different moment of their existence were probably made from perishable materials. These artefacts did not resist the passing of time, but we might find out about their processing from the analysis of lithic tools. The world of the prehistoric man was more complex than we can see it through the archaeo logical finds; unfortunately, we will never know if the beautiful Cucutenian statuettes made from clay had wooden correspondents, or if they were surpassed in terms of the importance placed on them, by the wooden objects that have not survived to this day. But if time and fire destroyed the objects fashioned from wood, bark, fibres, or hide, the traces of their processing are still present on the lithic tools their creators used.

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