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Bison rib artefacts from the Upper Paleolithic settlement of Anetovka 2 (Ukraine)

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Abstract. The Upper Paleolithic (Last Glacial Maximum) settlement of bison hunters from Anetovka 2 is located on the southwestern outskirts of Anetovka village, Domanevsky district, Nikolaev region (Ukraine). During the excavation, we investigated more than 1500 m^2 of the area of the settlement. Over 1.5 million flint tools, and about 0.5 million of animal bone fragments were recovered. This article deals with hitherto poorly studied artefacts in the form of blades made of bison ribs. As an artefact class, these were understudied, until now. A high level of standardization and additional surface treatment indicates their deliberate production. The manufacturing process of such type of artefacts has been tested experimentally. Using flint tools and wooden wedges, we made a series of blades from large ungulates' ribs. The experiment confirmed that it is possible to make blades from bison ribs. These artefacts, therefore, have considerable heuristic potential, because some issues of the production technology and the functionality of this group of artefacts currently remain an open question.
Keywords: Northwestern Black Sea region, Upper Paleolithic, Epigravettian, Anetovka 2, products from ribs.

Artefactele din coaste de bizon din stațiunea paleolitică superioară Anetovka 2. Așezarea paleolitică superioară (Ultimul Maxim Glaciar) a vânătorilor de bizoni Anetovka 2 este situată la periferia de sud-vest a satului Anetovka, districtul Domanevsky, regiunea Nikolaev (Ucraina). În timpul săpăturilor arheologice au fost cercetați peste 1500 m^2 din suprafața așezării. Au fost găsite peste 1,5 milioane de instrumente de silex și circa 0,5 milioane de fragmente de oase de animale. Articolul de față se referă la produsele slab studiate până în prezent și anume, la lamele realizate din coaste de bizon. Gradul ridicat de standardizare și tratarea suplimentară a suprafeței acestor lame indică producția intenționată a acestora. Procesul de fabricație a acestui tip de artefacte a fost testat experimental. Folosind unelte de silex și pană de lemn, s-au realizat o serie de lame din coaste de ungulate mari. Acest experiment a confirmat posibilitatea confecționării lamelor din coaste de bizon. Aceste artefacte au, așadar, un important potențial euristic, deoarece unele aspecte ale tehnologiei de producție și funcționalitatea acestui grup de artefacte rămân în continuare o întrebare deschisă.
Cuvinte cheie: Nord-vestul Mării Negre, paleolitic superior, Epigravetian, Anetovka 2, produse din coaste.

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The Upper Paleolithic settlement of Anetovka 2 was discovered in 1978 and has been systematically investigated since. It is located on the right bank of the Bakshala River, a right side tributary of the Southern Bug, on the southwestern outskirts of Anetovka village, Domanevsky district, Nikolaev region (**Fig. 1, A**) (Smolyaninova 1989, p. 119; 1990, p. 34; Stanko, Smolyaninova 1985; Stanko *et alii* 1989). The settlement is framed between 18000-19000 BP, dates obtained from radiocarbon dating of bone fragments, which corresponds to the Last Glacial Maximum (uncalibrated radiocarbon dates: 18040±150 LE 2424; 19088±980 LE 4610; 19170±120 LE 2947) (Svezhentsev, Popov 1993, p. 500; Stanko 1996, p. 133; 1997, p. 25). Anetovka 2 can be characterized as a long-term, year-round camp of bison hunters, the nature of which is confirmed by its faunal assemblages (Bibikova, Starkin 1989, p. 129-131; Stanko *et alii* 1981, p. 5-17; Stanko 1997, p. 25; Stanko *et alii* 1989, p. 22).

During the excavation, we investigated over 1500 m^2 of the settlement area, recovering more than 1.5 million flint tools, and about 0.5 million fragments of animal bones. In general, the Anetovka 2 flint complex (**Fig. 1, B**) belongs to the Epigravettian (Pistruil 2012, p. 10-14), and is characterised by the presence of a complete flint reduction sequence, from the initial opening of pebbles and cores to finished tools (Stanko 1996, p. 133; 1997, p. 25).

On the investigated area of the settlement, V. N. Stanko (Stanko 1997, p. 25) identified three structurally and functionally different features: flint and fauna microfeatures (in the southeastern section); bison carcass butchery microfeatures (western section); and production features, consisting mainly of microconcentrations of flint artefacts (pebbles, debitage, cores, flakes, secondary treatment tools, anvil stones, abraded pieces, and hard hammers, found north of the macroconcentration). These are currently under study (*e.g.* Glavenchuk 2003-2004, p. 206-227; 2007, p. 100-110; Glavenchuk *et alii* 2014, p. 119-124). Among the faunal remains, bison bones (*Bison priscus deminutus* Gromova 1935) predominate (~98%). In addition to these, remains of reindeer (mainly antlers), saiga, horse, and other species are also present in smaller numbers (Bibikova, Starkin 1989, p. 129-130).

The collection of bone artefacts from Anetovka 2 is very extensive and diverse. It consists of typologically different points made of reindeer antlers, borers, smoothers, and non-utilitarian items (decoration items, mostly pendants). The main materials for the production of tools were reindeer antler and bison bone (Ahmetgaleeva 2012; Stanko *et alii* 1989, p. 68-81). Earlier, several previous works have considered the process by which blanks and manufacturing products were obtained from this raw material (*e.g.* Ahmetgaleeva 2012, p. 187-192). Both tubular and flat bison bones, particularly ribs, were selected to make tools from. The latter are particularly interesting as they have been previously poorly known as raw material.

At Anetovka 2, however, as on other similar settlements from the south of the East European Plain, some researchers have noted that the faunal material is highly fragmented. First, this is associated with the recovery of bone marrow. In the flat bones, however, bone marrow is absent; additionally, in most of the studied blades, the inner side of the bison rib was cleaned of the spongy mass. Since, as a result, we managed to find traces of scraping after examining the blades under a microscope, we can assume that the spongy mass was intentionally removed. This led us to suspect a deliberate production of tools specifically from bison ribs in the settlement of Anetovka 2. Moreover, the ribs of large mammals (mammoth, deer, horse), and the horn and tubular bone, were used by hunter-gatherers in various production processes (*e.g.* Gromadova 2012; Rodionov 2015, p. 111-115). As part of the archaeological program of study, we removed 9-10 microhorizons of the cultural layer from the production area in squares КП/13-25, in which we identified 62 fragments of bison ribs. These appear to derive from a specific item; a blade made of the lateral (*facies externa*) and medial (*facies interna*) parts of the ribs (**Fig. 2, A, B**). Since the blades are made of the middle part of the rib body, they possess an almost straight profile. On the blades from the lateral part of the rib, on the inner side, there is a kind of 'cornice' – the result of cutting off the medial part of the rib. The width of the cornice-bearing blades varies from 1 to 2.2 cm. The most common blades are 1.3-1.8 cm wide. As blades were found mainly in fragmentary state, we cannot accurately indicate the length of the original products; we only note that the length of these fragments, as surviving, ranges from 0.8 to 11 cm (**Fig. 2, A**). Besides, the collection contains blades made of the medial part of the rib (**Fig. 2, B**).

Judging by the available material, the bison rib blades served as a blank for the tools called "blades with oblique ends" (of which 19 specimens have been identified) (**Fig. 2, C**). This type of tool possesses a blade with an angled cutting end. The opposite end of most blades was broken in antiquity. However, several blades were recovered having both ends processed, suggesting that all blades originally had two obliquely processed ends. The length of the blades with two beveled ends (sub-trapezoidal in shape) is 4.6 and 4.2 cm. Angled and oblique ends range from 30° to 40°, and some blades have a rounded end (**Fig. 2, D**). Overall, bison rib blades have a high enough degree of standardization to suggest that they were a deliberate and well-defined tool class. We were able to identify microwear traces under the microscope, allowing us, in our opinion, to reconstruct the production technology of this type of tool. The experiment presented below is an attempt to simulate such steps of making blades from a bison rib.

We used cattle ribs for the experimental program. As we detected traces of sawing at the ends of the blades, it is logical to assume that the first operation was to cut the body of the rib off of the sternal and vertebral ends. An unretouched flint

blade, without secondary modification, seems to have served for this, involving perhaps some 14 minutes of sawing action. In the next experiment, the operation was carried out with five blades, and the cutting time decreased by half. To facilitate the work process, during the whole experiment, the rib was soaked in water, making the bone softer and easier to process.

The next stage of manufacturing was the preparation of a preform for knapping a blade. We created a longitudinal groove along the cranial margin using a sharp angle of an unretouched flint blade (**Fig. 2, E**). As in the first case, the operating time was measured; work time with a single tool was 45 minutes. A second blade, cut with 4 tools, took 32 minutes to complete. It should be pointed out that traces of groove cutting were not observable on all of the studied blades, although some had traces of breaks.

Our last operation was the separation of the blade itself. With the help of wooden wedges, it was removed from the prepared rib (**Fig. 2, F**). It turned out that this is the hardest part of the procedure, and our first attempts to do this were unsuccessful. It turned out that in the process of separating the blade, it does not completely detach from the wet bone, but breaks. To remedy this, the rib was dried before separation. To facilitate the separation of the blade, the caudal edge of the rib was treated by an abrasive (sandstone). At first, flint blades were used as wedges. During the experiment we found out, however, that flint is unsuitable for such an operation; it is too brittle and it frequently broke, contrary to expectation. The wedges made of wood proved much better. In general, it took 40-50 minutes to produce one blade; with an equipment of 9-12 flint tools and several wooden wedges. The manufacture of each subsequent blade required less time, and the quality of the products improved. The technology we propose is not unique to the Upper Paleolithic at Anetovka 2; similar techniques can be observed in the treatment of horn and tubular bones (Ahmetgaleeva 2012, p. 187-192).

In the archeological literature, we found other examples of the use of bison ribs for tool manufacture. Thus an article dedicated to the excavation of the prehistoric village in the Oahe Reservoir area (Dakota) describes fragments of large, long bones and ribs that often have one rounded and smoothed end (Wood, Woolworth 1964, p. 45, fig. 20, b). According to its author, the high polish on these ends suggests they were used for rubbing a soft, resilient material, possibly hide. Another group of tools presented by pieces of large ribs, cut into rectangular forms, and smoothly polished, bearing a small slot created at one end for the removal of the cancellous tissue. This type of tool seems to have functioned as a knife handle (Wood, Woolworth 1964, p. 118, fig. 20, b).

Carl F. Miller has also noted knife handles made from segments of bison rib. These were grooved along one edge deep enough to allow for the insertion of a

stone knife blade (Miller 1964, p. 215 pl. 36, b). These items are very similar to the examples from Anetovka 2, so we can make a cautious interpretation, given this morphological similarity, that the Anetovka 2 examples were also used as knife handles for flint knives.

The materials discussed here seem promising for further study, as some issues of their production technology and the functional purpose of this group of products remain open at present. We hope that these issues can be resolved in the future with the application of experimental and traceological research methods.

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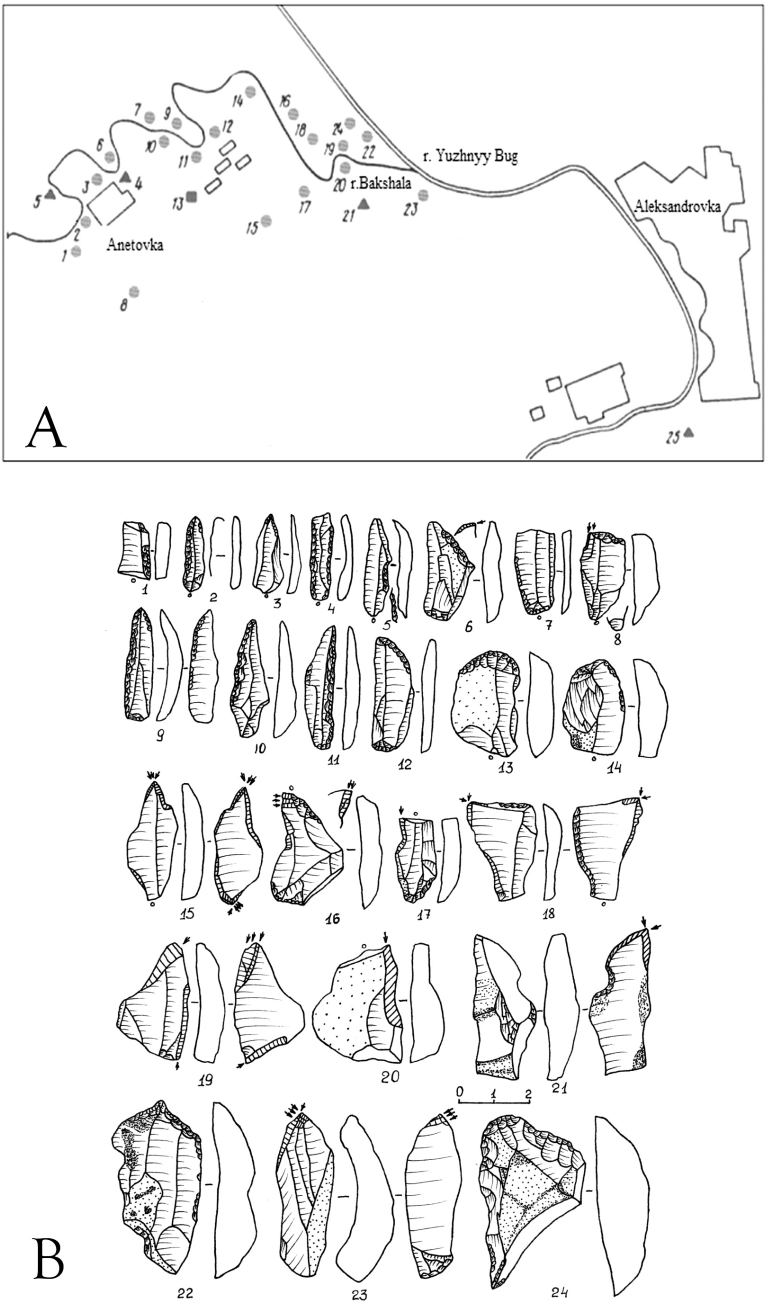

Fig. 1. The Upper Palaeolithic settlement of Anetovka 2. A – distribution of Palaeolithic settlements in the Bakshaly river valley; B – flint inventory of Anetovka 2 settlement
Fig. 1. Stațiunea paleolitică superioară Anetovka 2. A – schema așezărilor paleolitice din valea râului Bakshaly; B – inventarul de silex al așezării Anetovka 2

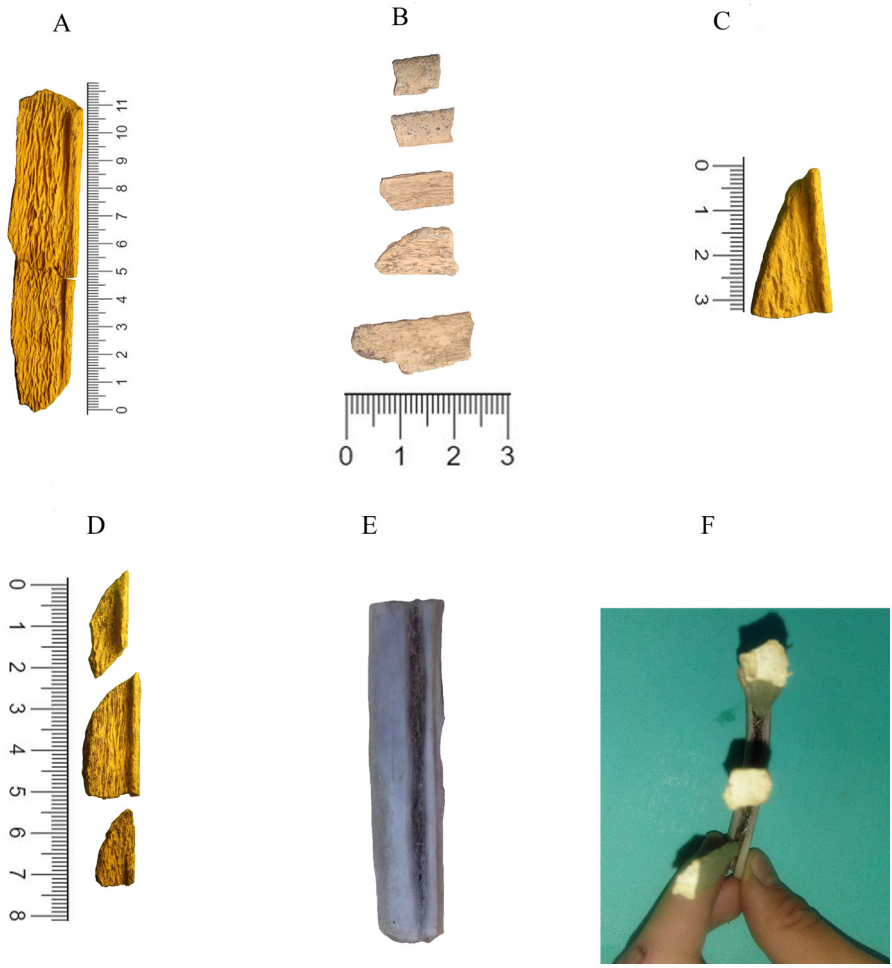

Fig. 2. Bison rib products from the Upper Paleolithic Anetovka 2 settlement. A – blade made on the lateral part of the bison rib "with cornice"; B – fragments of blades from the medial part of the bison rib; C – blade with beveled end; D – blades with rounded end; E – experimental blade with a longitudinal groove along the cranial margin; F – the blade removal process

Fig. 2. Produse din coaste de bizon din aşezarea paleolitică superioară Anetovka 2. A – lamă din partea laterală a coastei de bizon "cu o cornişă"; B – fragmente de lame din partea mediană a coastei de bizon; C – lamă cu capăt teşit; D – lame cu capăt rotunjit; E – lamă experimentală cu canelură longitudinală de-a lungul marginii cefalice; F – procesul de îndepărtare a lamei