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ANTLER SLEEVES FROM THE NEOLITHIC LAKE-DWELLING SITES OF SWITZERLAND (THE “SWISS COLLECTION” OF THE NATIONAL MUSEUM OF TATARSTAN REPUBLIC, KAZAN)

© 2017 D.G. Bugrov, M.Sh. Galimova

The article deals with assemblage of Neolithic antler tools – sleeves originated from the lake-dwelling sites of Switzerland, which are stored at National Museum of Tatarstan Republic. The morphological and technological analyses of 94 connecting devices between the wooden haft and stone axe or adze (sleeves) have been carried out by the authors. The typology scheme has been made. Four unequal groups were singled out: 1) elementary device with one mounting hole for the stone tool of adze or chisel function (1 instance); 2) a pick-axe shaped device with hafting hole (1); 3) sleeve of cylindrical shape with two holes (4 instances); 4) sleeve with one mounting hole (88). The last one consists of 4 types depending on the presence or absence of clear-cut hafting part and functional or nonfunctional ledge as well as remnant of the burr. The authors consider some aspects of use-wear and technology of the production of Neolithic antler sleeves investigated, such as string-saw technique, according to the results of multidiscipline and experimental studies held by European researchers (Jorg Schibler et al.)

Keywords: archaeology, Neolithic, Switzerland, lake-dwelling sites, antler sleeve, morphology, types, technology, string-saw technique.

Introduction

Appearance of so called “Swiss collection” in archaeological gatherings of National Museum of Tatarstan Republic in Kazan is connected with the name of N.F. Vysotskiy (1843–1922). Being a surgeon, professor of Kazan University, active member of Society for Archaeology, History and Ethnography and Director of the Society’s Museum during 1910–1914 he was a famous archaeologist and antiquarian, well known in Kazan and Russia. Because of his great interest in the Stone Age he succeeded in gathering the most representative collection of prehistoric artifacts from Kazan and Vyatka provinces as well as from France and Switzerland.

During the civil war in 1918 his collection was seriously damaged by

the soldiers. After professor’s death his unique collection was divided into two parts: one part (over 300 tools of stone, bone and antler) was left to Kazan State University (present-day Museum of Archaeology) and the other was transferred to Central Museum of the Tatar Republic (present-day National Museum of Tatarstan Republic). Collection of antler artifacts from the University Museum of archaeology unfortunately remains out of our sight.

“Swiss collection” in Tatarstan National Museum consists of 261 tools made of stone (axes, adzes, chisels), bone (adzes, chisels, awls, polishers etc.) and antler (sleeves). A part of these artifacts was probably obtained by prof. Vysotskiy in 1882 and was originated from the lake-dwelling sites revealed on the shores of Lake Neuchatel. But the main part of

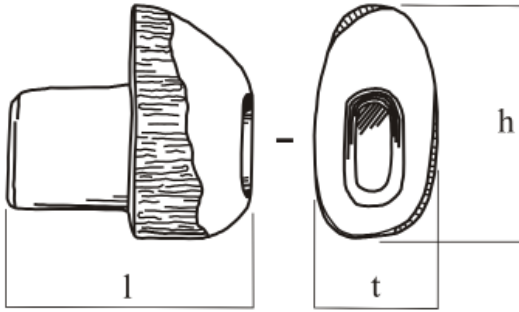


Fig. 1. Scheme of sleeve measurements (in millimeters):
l = length, h = height,
t = thickness.

the assemblage under study is thought to be found on the Robbenshausen settlement near Lake Boden. However, there are not any records confirming this fact. Unfortunately now we have not any good opportunities to connect reliably the majority of the tools under study with some Neolithic settlement in Switzerland.

History of the study of prehistoric antler implements in Switzerland has more than 150 years. Since the mid-nineteenth century, Neolithic-Bronze Age artifacts were regularly gathered on the shores of the lakes of the Swiss plateau. Since 1868, owing to the extensive reclamation works, the level of a number of lakes (including Lake Neuchatel) fell by more than 2.5 meters. For this reason the remains of ancient pile dwellings with countless findings were discovered. During this period, many thousands of expressive artifacts of stone, bone and antler were collected for sale, without regard to their chronological and cultural context (Памсейер, 2001. С. 168). Apparently, collection of N.F. Vysotskiy was gathered from such finds.

Materials, methods and objectives

By now there are 94 whole and fragmented connecting devices (sleeves) at our disposal. As a result of studying this complex carried out by the archaeozoologist Olga G. Bogatkina,

all of them were made from the antlers of adult individuals of red deer (*Cervus elaphus*) (Bogatkina, 2010). Practically all of them were damaged in the historical past as well as during their storage. Therefore, the authors were able to measure only 64 antler sleeves (tabl. 1). However, our morphological study covered almost all antler tools.

Due to the lack of accurate geographic and chronological attribution for the “Swiss collection”, the authors first created their own morphological classification and typology of sleeves. In the second stage of research, the previous multidisciplinary studies held by European researchers were taken into account. First and foremost, we should mention paleo-environmental and technological study of Neolithic antler tools from lake-dwelling sites in Switzerland, conducted by Jörg Schibler and his co-authors (Schibler, 1981; Schibler, 2001; Schibler et al., 1997; Choyke, Schibler, 2007). In the process of identifying and reconstruction some aspects of manufacturing technology and the use of the sleeves, the authors also took into consideration the results of complex studies of the Mesolithic and Neolithic antler tools from Eastern Europe, carried out by Mickle G. Zhilin (Zhilin, 2001; Zhilin, 2001a; Zhilin et al., 2002). Accordingly, the authors set themselves the following objectives: to systematize and to at-

Table 1.

Sleeves measurements (millimeters), type and presence of destructions

n°	Museum's code	length	height	thickness	type	destructions
1	KП-5368/1-1	92,5	83	47,6	4.3-4	
2	KП-5368/1-2	74	80,1	40,1	4.1	
3	KП-5368/1-3	80	57,2	38,5	4.1	
4	KП-5368/1-4	78,5	73,5	44,5	4.2	
5	KП-5368/1-5	84	58	41,5	4.2	
6	KП-5368/1-6	98,5	87	39	4.3	
7	KП-5368/1-7	92	80	47,5	4.2	
8	KП-5368/1-8	90,1	86	47,5	4.3	
9	KП-5368/1-9	79	62	45	4.2	
10	KП-5368/1-10	75	61,2	45	4.1	
11	KП-5368/1-11	66,5	58*	38,5	4.1	*missing fragment
12	KП-5368/1-12	83,5	72	37	4.3	
13	KП-5368/1-13	75	60	40		
14	KП-5368/1-14	70	72	39	4.1	
15	KП-5368/1-15	82,5	86	39	4.2	
16	KП-5368/1-16	87	75,5	34,5	4.2	
17	KП-5368/1-17	72	53	41,1	4.2	
18	KП-5368/1-18	64	73,6	48,2	4.3	
19	KП-5368/1-19	76,5	74	49	4.3	
20	KП-5368/1-20	91,5	67	48	4.1	
21	KП-5368/1-21	85,5	77	51	4.3	
22	KП-5368/1-22	84	80	41	4.3	
23	KП-5368/1-23	82,5	92	44	4.3	
24	KП-5368/1-24	93	71,5	47,6	4.2	
25	KП-5368/1-25	65	62,1	42,8	4.2	
26	KП-5368/1-26	64,5	66	38	4.2	
27	KП-5368/1-27	64	64	34*	4.1	*missing fragment
28	KП-5368/1-28	93,5	89,5	50		
29	KП-5368/1-29	81	83,5	42,2	4.3	
30	KП-5368/1-30	84	93	51	4.3-4	
31	KП-5368/1-31	85,5	84	42,1	4.1	
32	KП-5368/1-32	102,1	78,6	44	4.2	
33	KП-5368/1-33	93,5	88,5	56	4.3	
34	KП-5368/1-34	97,5	87	55,5	4.3	
35	KП-5368/1-35	82,5	82,1	49	4.2	
36	KП-5368/1-36	80	80	47,5	4.3	
37	KП-5368/1-37	80	59	46	4.2	
38	KП-5368/1-38	89,5	77	42,2	4.3	
39	KП-5368/1-39	94	96,5	52,2	4.3	
40	KП-5368/1-40	80	88,1	49	4.3	
41	KП-5368/1-41	86	68	50	4.2	
42	KП-5368/1-42	92	68	43	4.1	
43	KП-5368/1-43	82	70	50	4.2-3	
44	KП-5368/1-44	73	70	42,5	4.1	
45	KП-5368/1-45	83	59	38	4.1	
46	KП-5368/1-46	77	64	34	4.2	
47	KП-5368/1-47	83,5	71,5	39	4.2	
48	KП-5368/1-48	78,5	73	39	4.2-3	
49	KП-5368/1-49	91,2	80,5	56,3	4.3	
50	KП-5368/1-50	88	95,2	45,4	4.3	
51	KП-5368/1-51	88	66	46,6	4.1	
52	KП-5368/1-52	83,5	42,5	37,5	4.2	
53	KП-5368/1-56	62,3	78	40,8	4.1	
54	KП-5368/1-57	55,5*	62,5	21,1*	4.1	*missing half (1/2)
55	KП-5368/1-58	51	65	42*	4.1	*missing half (1/2)
56	KП-5368/1-95	67,5	90,6	19,7*	4.2-3	*missing half (1/2)
57	KП-5368/1-96	86	89,4	42,6	4.3	
58	KП-5368/1-100	65,3	60	27*	4.1	*missing half (1/2)
59	KП-5368/1-101	80,5	45	39,1	4.2	
60	KП-5368/1-102	83,5	58	47	4.2	
61	KП-5368/1-103	74	59	45,8	4.2	
62	KП-5368/1-104	94	64	39	4.2	
63	KП-5368/1-105	93	76,9	42	4.2	
64	KП-5368/1-106	110,1	75	47,8	4.2	

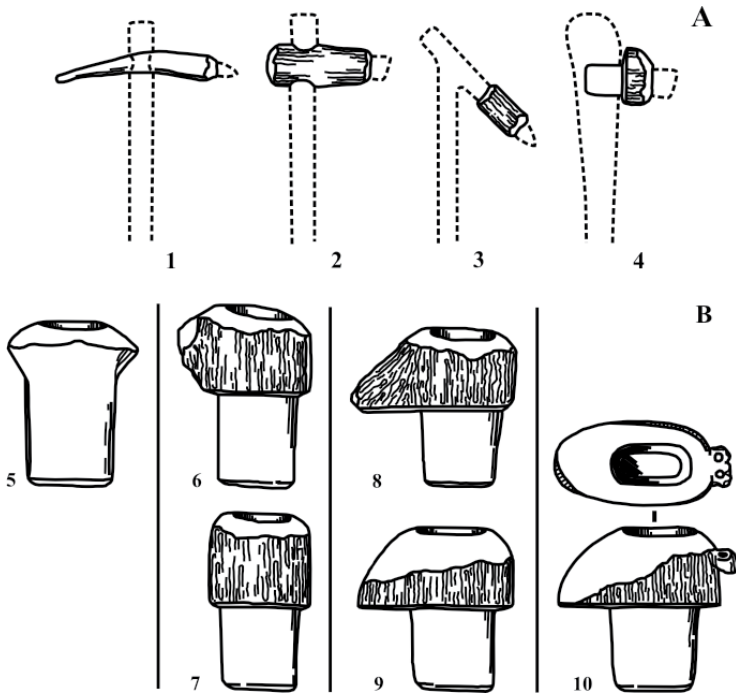


Fig. 2. Different types of connecting devices from the “Swiss collection”: 1–4 – four groups of the devices (sleeves); 5–10 – types of the sleeves united into the fourth group: 5 – type 1; 6,7 – type 2 (two variants); 8,9 – type 3 (two variants); 10 – type 4 (two planes).

tribute, in terms of function, chronology and technology of the little-known group of antler artifacts from “Swiss collection” stored in the National Museum of Tatarstan Republic in Kazan.

Connecting and cushioning devices between the wooden haft and the stone axe or adze (also known as “sleeves”) made from antler have been studied in details from the assemblages of the Neolithic lake shore sites of Switzerland. The results of these long-term archaeozoological, environmental, typological and functional investigations have been proved by J. Schibler (2001) during his antler sleeves experimental production. This multidisciplinary research has been finished with reconstruction of the Neolithic economy, changes of climatic and natural resources, production of stone and bone tools (Schibler et al. 1997).

Dynamics of these processes within the Neolithic societies in Switzerland has been verified by great number of the absolute data from 4300 to 2400 cal. BC. In the result, it has been found that the maximum use of antler artifacts (primarily due to the mass usage by the Neolithic population of the sleeves for stone axes from the antler of a red deer) occurred during the late stage of this period since 3100 BC (Choyke, Schibler, 2007. P. 54).

Sleeves as intermediate piece between wooden handle and stone axe or adze were intended for extending the service life of the tool. Antler sleeve prevented splitting the handle and damage of valuable stone tool because antler was more elastic material than wood, therefore antler device softened the impact from a blow. Thus, the



Fig. 3. Connecting devices of the singular groups 1–2 and group 3: 1 – a pick-axe shaped device with hafting hole (group 2); 2 – elementary device with one mounting hole for the stone tool of adze or chisel function (group 1); 3 – sleeve of cylindrical shape with two holes (group 3).

invention and widespread use of the sleeves were a significant innovation that seems to become an impetus to the improvement of antler processing technology (Choyke, Schibler, 2007). The main features of these products from antler are: 1) mounting hole for stone blade of chopping tool located at the working end of the sleeve, 2) hafting hole for handle or shaft located at medial part of the sleeve or near to the sleeve's butt end (Zhilin, 2001a. P. 163).

Typological classification of the assemblage under study gives us an opportunity to make some observations concerning technology of the sleeves production and repair as well as its function and accommodation. The achievements of functional and technological investigations of bone and antler tools of

the Mesolithic/Neolithic (Zhilin, 2001a; Schibler, 2001; Choyke, Schibler, 2007) have been taken into consideration by the authors who attempted to trace the process of manufacture and repair the sleeves of the “Swiss collection”. It should be said that manufacturing, working and hafting traces are difficult to be distinguished from the traces of post-depositional surface modification. Due to above mentioned functional and technological studies based on use-wear analysis and experimental practice, we have an opportunity to consider some aspects of sleeves production and repair.

Morphology and types

The scheme of measurements made by the authors on the sleeves is shown in fig. 1. Majority of the sleeves analyzed were purposed to the use with axes

Fig. 4. Sleeves of group 4, type 1 – with one mounting hole and without clear-cut hafting part: 1 – sleeve of trapezoidal shape; 2 – sleeve with fragment of stone axe.



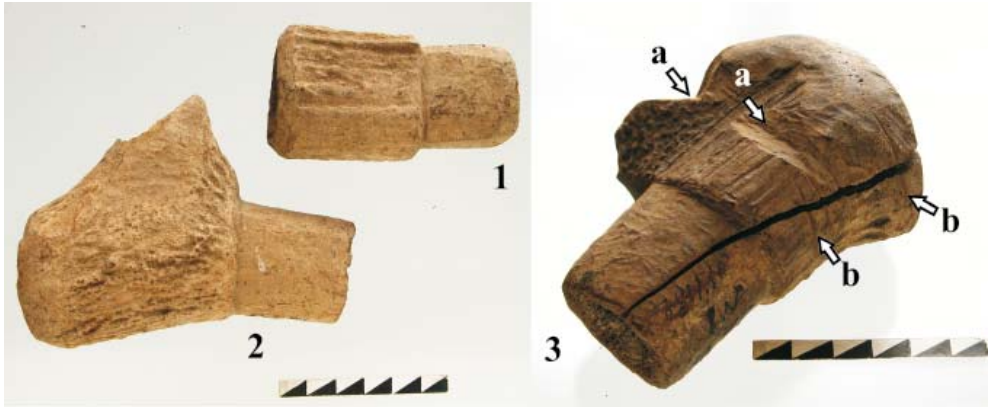


Fig. 5. Sleeves of group 4, type 2 – with one mounting hole and clear cut hafting part: 1 – without ledge on working part; 2, 3 – with nonfunctional ledge on working part (3 – with traces of repair attempts on working part: a – cutting notches; b – grooves).

judging by the vertically oriented mount hole. Only few samples demonstrate horizontally oriented mounting hole for adzes. Despite the damage of many sleeves, almost all of them were thrown to our morphological study. As a result of morphological classification performed by the authors themselves, established typology was, overall, similar to the typologies created by Jörg Schibler (1981) and Peter J Suter (Suter, 1981; Hafner & Suter, 2004. P. 41, fig. 3–4).

Assemblage of the antler devices under study has been divided into four unequal groups (fig. 2: 1–4): the first and the second singular groups are represented by only one accommodation piece for adze. The third group includes four sleeves of elementary cylindrical shape with two holes; the fourth group unites the rest amount of sleeves with one hole (88 specimens) (fig. 2: 5–10).

Group 1 – elementary device with one mounting hole for the stone blade of adze or chisel function, which was probably manufactured from antler tine (fig. 3: 2). The narrow end of the blade apparently was inserted into the hole at the upper end of the handle.

Group 2 – a pick-axe shaped device made from section of the antler beam with mounting hole, and transverse hafting hole at the proximal end (fig. 3: 1). Distal (working) end of it was damaged, so it is possible, that this tool was not the sleeve, but antler hammer (Schlenker, 1994).

Group 3 – bilateral sleeves of a simple cylindrical shape made from the section of antler beam or large tine with two holes at the both ends of the tool (fig. 3: 3)

Group 4 – sleeves with the mount hole for the stone blade at the working end and with more or less impressed hafting part designed for mounting into the handle. The cross-section of shafting part of all these tools is rectangular with flatted ridges. The authors suggest divide this group of the sleeves into four types depending of the presence of clear-cut hafting part, ledge (functional or nonfunctional) on the working part and special indentation remnant of the antler burr (fig. 2: 5–10).

Type 4.1 is represented by 21 sleeves (19 unbroken tools and two fragments). They are characterized by trapezoidal



Fig. 6. Sleeve of group 4, type 3 with clear-cut hafting part and functional ledge: a – indentation part of the burr on the opposite side of working part, b – traces of repair attempts on working part (the grooves probably made by string-saw technique).

shape, one mounting hole and absence of clear-cut hafting part (fig. 4: 1). Besides, there is a sample of special interest among them. This is a sleeve with fragment of narrow stone axe preserved in the mountain hole (fig. 4: 2). Many sleeves of the first type have a ledge which looks like a beak. Average proportion of the working and hafting parts are 1.5:1, 1:1 or 1:1.5.

Type 4.2 consists of 20 sleeves with one mounting hole, and clear-cut hafting part (19 tools and one fragment) (fig. 5). A half of them are supplementary characterized with non-functional ledge (remnant of antler burr) (fig. 5: 2, 3). Proportion of working and hafting parts is 1.5:1 in majority of the cases and 2:1 and 1:1 in few cases. Two sleeves of this type demonstrate the grooves and cutting notches on the working part (fig. 5: 3). These cut-marks seem to be traces of attempts to repair the cracked part.

Type 4.3 includes 34 tools and 3 fragments of L-shape with intensively clear-cut ledge which was certainly used as support (fig. 6). The sleeves of this type often carry another ledge on the opposite side of working part. This ledge

seems to be a special indentation remnant of antler burr (fig. 6: a). The question of function of this remnant becomes clear after studying the following (4.4) type of sleeves. Transversal grooves are visible on the wide and obtuse bottom of some tools of the type 4.3. Use-wear study showed that this grooves may be regarded as the traces of string-saw technique (fig. 6: b). The causes of occurrence the damages on the sleeves working part during usage and the methods of its repairing have been analyzed in detail by J. Schibler (2001). In our cases a string-saw technique appears to be applied alongside with sawing or cutting by means of stone blade. Proportions of working and hafting parts in this group are 1.5:1 or 1: 2. Apparently the sleeves were shortened because of repeated sharpening the stone blade. This has been considered a characteristic feature of the later stage of Lacustrian Age in Switzerland (Schibler, 2001. P. 50).

Type 4.4 is distinguished among the sleeves with clear-cut hafting part and functional ledge because of presence an impressive group of the sleeves (ten specimens) which are characterized



Fig. 7. Sleeve of group 4, type 4 with clear-cut hafting part, functional ledge and indentation remnant of the burr on working part: a – two narrow artificial holes intended for attachment the remnant to the handle.

with denticulate ledge mentioned above (fig. 7). This indentation remnant of antler burr is regarded by the authors to be preserved especially for auxiliary attachment to the haft. The ledge was probably planed in order to drill natural tiny hollows to make them wider (fig. 7: a). The remnants of cord found by the authors inside of two those holes give our supposition reliable proving. The indentation remnants with two widened holes are prevailing among the sleeves of this type. The opposite ledge on the working part of these sleeves may be functional or non-functional. In some cases the working part was shortened. There are the traces of string sawing attempts on the sleeves also.

Some aspects of use-wear and technology

Both the visual analysis and the microscope (stereo low power) were proved as useful for use-wear study of the tools made of bone and antler. Due to the fact that the tools are large and have a bad preservation of working and hafting edges and were desiccated during storage, the micro-traces of the production and usage are eclipsed on

the surface of the sleeves. Therefore, the overall use-wear picture of the tools under study is very complicated and difficult to interpret. In this regard the authors used predominantly macro-wear study. In many cases the traces of sleeves production, use and repair can be observed and interpreted even with the naked eye.

Recognition of hafting and working parts of the antler devices under study is not very difficult owing to clear morphological difference among these parts of tool. There is a significant difference in their use-wear traces also. Working end of the sleeve with mountain hole usually was thinned and planed on both sides in order to minimize abrasion. Planed surfaces were grinded and further polished transversally. The technology and use-wear features of this polishing process have been studied by M.G. Zhilin (2001). Probably in our case it was used a typical hide polishing with abrasive material. These polishing traces are often covered with longitudinal and oblique striations left from utilization of axe or adze in sleeve. Concerning the hafting part of the sleeves it is necessary

to stress that it was not grind and polished on purpose. There are the traces of removing the ridges, edge damage and “use retouch” on this part of the tools.

Eastern European sleeves of the Mesolithic/Neolithic Age made from elk antler differ considerably in their shape from the sleeves of Switzerland. Obviously, this difference is due to difference in the structure of antlers of elk and red deer from which the sleeves that we compare were made. However, the prehistoric technologies of detachment the antler and production antler tools were generally similar in the compared regions. Experimental and technological research carried by J. Schibler demonstrated the presence of two detachment techniques of red deer antler among the Neolithic inhabitants of Switzerland: by means of indentation technique and string-saw one (Schibler, 2001). Similar ways of elk antler processing were marked by M. G. Zhilin during his technological and experimental studies (Zhilin et al., 2002. P. 11). In particular some techniques for the sleeves production which have been reconstructed by J. Schibler and M.G. Zhilin are:

- punching through the hard layer of antler compacta and then cutting the hole or socket using bone or stone chisels;
- soaking before processing the antler in a brew in order to facilitate its processing;
- straighten by planing and easy grinding of the sleeve surface, further polishing of the planes of cut, sawing and fracture, as well as polishing the walls of the holes.

However, it is possible to notice some difference in sleeves manufacturing techniques reconstructed for the inhabitants of Neolithic lake-dwellings

of Switzerland and for the Mesolithic/Neolithic population of Eastern Europe.

For example, M. G. Zhilin mentions as a way to prepare the antler for processing not only soaking, and steaming (Zhilin, 2001). In order to form depressions and holes inside the sleeves J. Schibler assumes work with narrow chisel or a chisel made from split along the bones of the limbs of deer or domestic cattle (Schibler, 2001). Meanwhile, according to M. G. Zhilin, extraction of the antler spongy substance by Mesolithic population of the Eastern Baltic and the Upper Volga region were made by the incisors of the beaver jaws, the findings of which are not uncommon in the sites (Zhilin, 2001a. P. 163–172). In addition, M. G. Zhilin marks traces of flint burins in the dense areas of the antler walls. The researcher believes that the walls of the holes with traces of longitudinally cut then were polished with a wooden core and leather wrapped (Zhilin, 2001a. P. 168).

Conclusion

The study of antler sleeves from the “Swiss collection” allowed the authors to make some conclusions.

1. The technology of manufacturing antler tools practiced by inhabitants of the Neolithic lake-dwellings of Switzerland was highly developed. Sleeves from the “Swiss collection” are characterized with a variety of shapes and types. On the whole the shapes of the sleeves have a proportional limit of a square (70–90 x 70–90 mm) with sockets: 30–50 mm at length, 20–30 mm at width.

2. Most sleeves were designed for use with cutting stone blades of the axe type and have vertically oriented mounting holes. Only the individual tools that are

designed, apparently, for adzes, show horizontally oriented holes.

3. It is probable that assemblage of various small chopping tools made of antler and stone presented in “Swiss collection” was connected with production of the sleeves, if we take into consideration the sizes of these tools and wear-traces on their surfaces from bone- and antler-working.

4. The sleeves morphology and use-wear demonstrate high standardization methods applied by the experienced inhabitants of lake-shore settlements. The sleeves from the collection under study demonstrate the techniques of intentional design of functional and non-functional ledges (remnants of the burr). A specific technical method applied to sleeves with such a remnant was the drilling of holes for mounting to the sleeve to handle. There are also clear technical evidence of attempted repair the sleeves – presence cut-marks, cutting notches and the grooves, probably made in the technique of string sawing.

5. According to complex paleo-environmental research performed by J. Shibley the authors suggest that the age of the collection can be assumed with period between 3800 and 3600 cal. BC when there has been intensification in

the hunting of red deer on the territory of Switzerland. This is evidenced by the cropped proportions of some of the sleeves related to their extreme deterioration.

6. To compare the sleeves under study with singular finds of the sleeves from the Mesolithic/Neolithic sites of Eastern Europe, we have to admit a small number and morphological monotony of the last ones. Few antler sleeves found in the Crimea, South-East of Baltic region, Upper and Lower parts of the Volga valley are represented by one simple type of sleeves. This type belongs to the second group distinguished by the authors (fig. 3: 1). It worth being noticed that this fact concerns not only the sleeves produced on elk’s antler but on red deer’s one.

7. Perspectives of further investigation lie in paying attention to correlation between the sleeves and assemblage of stone and antler tools from the “Swiss collection”. The exhaustive publication of this assemblage of pre-historic artifacts is waiting for its time. Besides we can’t but mention that there is an urgent necessity in collection restoration that will be a good guarantee of future successful researches in its turn.

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РОГОВЫЕ МУФТЫ ИЗ НЕОЛИТИЧЕСКИХ ОЗЕРНЫХ ПОСЕЛЕНИЙ ШВЕЙЦАРИИ («ШВЕЙЦАРСКАЯ КОЛЛЕКЦИЯ НАЦИОНАЛЬНОГО МУЗЕЯ РЕСПУБЛИКИ ТАТАРСТАН»)

Д.Г. Бугров, М.Ш. Галимова

В статье рассмотрено собрание неолитических роговых муфт, происходящих из озерных поселений Швейцарии, которое хранится в Национальном музее Республики Татарстан. Авторами проведен морфологический анализ 94 муфт – переходников между деревянной рукоятью и каменным рубящим орудием. Выделены 4 неравнозначные морфологические группы муфт: 1) элементарный переходник с одним отверстием для каменного орудия типа тесла или долота (1 экз.); 2) переходник типа рубящего орудия с отверстием для рукояти (1 экз.); 3) муфты цилиндрической формы с двумя отверстиями (4 экз.); 4) муфты с одним отверстием (88 экз.). В последней группе выделены четыре типа муфт в зависимости от присутствия или отсутствия четко выраженного насада, выступа (функционального или нефункционального), а также остатков розетки рога (иногда с отверстиями). Рассмотрены некоторые аспекты технологии производства и ремонта муфт, в том числе технический прием шнурового пиления, а также проведено сравнение с результатами междисциплинарного изучения муфт, проведенных европейскими исследователями (Йорг Шиблер и др.).

Ключевые слова: археология, неолит, Швейцария, озерные поселения, роговая муфта, морфология, типы, технология, шнуровое пиление.

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