ROE DEER ANTLER AS A RAW MATERIAL IN THE HUNNO-SARMATIAN PERIOD IN THE NORTHERN ALTAI

Asta de corzo como materia prima en el Período Huno-Sármata en el norte de Altái

ANDRIEY P. BORODOVSKYI *, KRZYSZTOF MICHALCZEWSKI ** and ŁUKASZ OLESZCZAK **

ABSTRACT Antler of *Cervidae* was an important part of the raw material base in traditional manufacturing in Northern Altai during the Hunno-Sarmatian period (the first half of the 1st millennium CE). Several seasonal migration routes of the roe deer cross this territory. The processing of roe deer antler during the Hunno-Sarmatian period is well documented at several archaeological sites in the inter-mountain valley of the lower Katun River. The assortment of antler products is composed *inter alia* of tools, composite bow elements, arrowheads and horse harnesses. The natural occurrence and high quantity of the specific antler material affects differences in the technology of manufacture. Generally, the assortment of antler items of the Hunno-Sarmatian period from the Northern Altai is typical of the broader region of Southern Siberia, Central Asia and the forest steppes of Eastern Europe.

Key words: Roe Deer, Antler, Hunno-Sarmatian Period, Northern Altai, Maima Culture.

RESUMEN El asta de cérvido ocupó un importante lugar como materia prima dentro del proceso de manufatura tradicional en la zona norte de Altái durante el Período Huno-Sármata (primera mitad del I milenio DC). Diversas rutas migratorias estacionales de corzos atraviesan este territorio. El procesamiento del asta de corzo durante el Período Huno-Sármata está bien documentado en varios yacimientos arqueológicos en el valle del curso bajo del Katun. El surtido de productos está compuesto, entre otros, por herramientas, elementos compuestos para arco, puntas de fleche y harneses de caballo. La

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occurrencia natural y gran cantidad de material específico de asta afecta a diferencias en la tecnología empleada para la manufactura. Generlmente, el conjunto de elementos de asta del Período Huno-Sármata del norte de Altái es típica de una región más amplia que abarca parte del sur de Siberia, Asia Central y las estepas boscosas del Este de Europa.

Palabras clave: Corzo, Asta, Período Huno-Sártama, Norte de Altái, Cultura Maima.

INTRODUCTION

Large-scale archaeological research beginning in the 1980s, has produced osteological data on roe deer from the entire set of archaeological complexes of Western Siberia, from the Bronze Age until the Middle Ages (Косинцев, 1981:39-43, 1988). Further research in Russia was primarily related to particular archaeological sites of a certain historical period (Молодин, Соболев, 1986:122; Матвеева, 1993:117; Гальченко, 1994:15; Киреев *et al*., 1994:90; Алехин *et al*., 1997:139; Васильев, Мартынович *et al*., 1999:322-323; Зах, 2000:35; Васильев, Бенеке *et al*., 2000:266-267). The main emphasis was on groups of osteological samples, which were used to reconstruct economic activity (correlation of the capacities of the manufacturing and appropriating economies). Roe deer antler as a raw material was not generally considered. This was partially because roe deer antler cannot be used as an accurate taxonomic indicator. In the specialists' opinion, recognizing the particular species of roe deer, which is diverse in broad regions of Eurasia, basing on their antlers is problematic (Европейская, 1992:42-43). However, the goal-oriented gathering of data on this type of material from asynchronous and diverse archaeological complexes, in the south of Western Siberia, allows one to hypothesise the possible social aspect of roe deer antler tool production (Бородовский, 1997:81-83). In spite of the wide use of roe deer antlers, petroglyphs depicting this animal are rare. This rarity can be explained by the fact that the home range of the roe deer (Собанский, 1992:121, fig. 11) -unlike the Siberian ibex, sheep, elk, red deer, and black-tailed gazelle- was more remote from the territories where most of the petroglyphs were created (Кубарев, Маточкин, 1992:62-63). However, within the home range of roe deer in the south of Western Siberia, various items were manufactured from this animal's antler, beginning in the Early Iron Age (Magometkul, Kamenny Mys, Bystrovka-1, Biisk-1) (Бородовский, 2007; Троицкая, Бородовский, 1994:64; Ткачев, 2000:27).

ARCHAEOLOGICAL CONTEXT

Within the framework of the Maima culture dated back to Hunno-Sarmatian period, fragments of roe deer antler points were used as tools in the Altai Mountains after slight modification (sharpening). For example, a pointed tool made from roe deer antler is known from the Cheremshanka hill fort of the Maima culture (fig. 1:1)

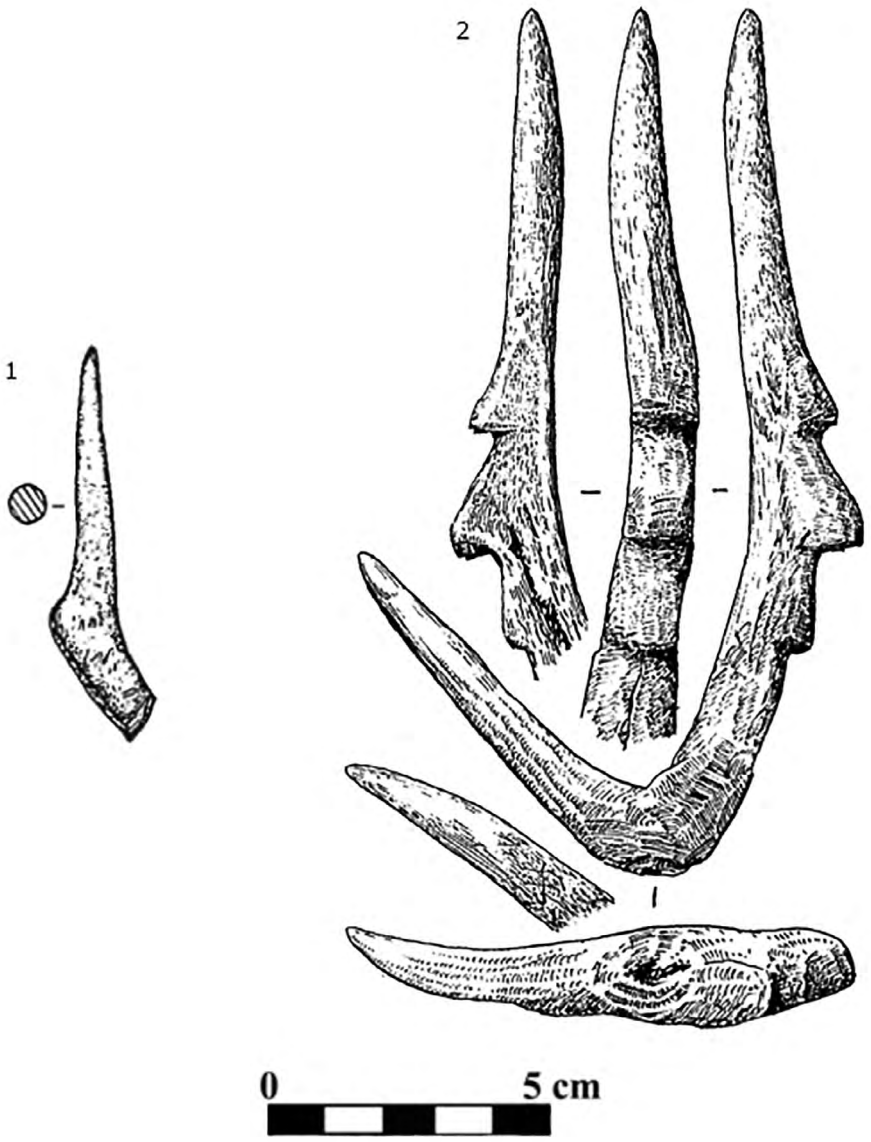

Fig. 1.—Pointed tool made from roe deer antler from Cheremshanka hill fort (1), Item of enigmatic function made from roe deer antler from the Tavdinskaya Cave (2). Both dated back to early Iron age.

(Киреев, 1991). According to the ethnographic data, the Tuvinians used a sharp roe deer antler point as a saddlery tool to widen holes in leather (Даржа, 2013:388).

Numerous items made from roe deer antler have been discovered in an array of cave complexes in the north of the Altai Mountains (the Tavdinskaya Grotto at the bottom of the Large Tavdinskaya Cave) (Кирюшин, Кирюшин *et al*., 2005:334).

Interpretation of one of these items (fig. 1:2) is ambiguous. There is a supposition that a carved part of the antler in the form of three protrusions is an anthropomorphic image from the knob of a shaman's wand. Antler shaman's wands are known in the traditional Altai mythology (Сагалаев, 2001:254). It is possible that this item could have been used when performing ritual actions in the Scythian time, when there was a sanctuary in Tavdinskaya Cave (Кирюшин, Кирюшин *et al*., 2005:334). On the other hand, it cannot be excluded that this item might represent part of a complex headgear from the Pazyryk period.

One tool made from an entire roe deer antler (fig. 2.) was discovered in close proximity to the A.P. Okladnikov Cave (the Lower Anui River, village of

Fig. 2.—Tool from Sibiryachikha made from roe deer antler, probably used for softening thongs (early Iron Age).

Sibiryachikha). This item is manufactured from the shed antler of a juvenile animal with immature points and pearls on the beam (Бородовский, 1997:205, Tab. 44:8). The bottom part of the antler, near its burr, was probably actively used as a tool for softening thongs, leading to intense use-wear in the form of smoothing and polishing visible on the surface of the antler. Similar bone tools with the analogous use-wear and reconstruction of their function were described by S. A. Semenov (Семенов 1957:223, fig.104).

In the Denisova Cave (the Middle Anui), a hand plane[1] made from a roe deer antler beam was discovered (fig. 3.) (Деревянко, Молодин, 1994:49, fig. 43:6),

1. Hand plane made from roe deer antler found in Holocene layers of Denisova Cave has numerous analogies among ethnographic materials of many Siberian nations. It was used as a base for attaching the blade to the prepared cut slots. It was used for planning the roundish surfaces. Cut

Fig. 3.—Hand plane made from the roe deer antler beam from Denisova Cave (early Iron Age).

as well as a roe deer antler with a chopped off burr and point. In nearby Denisova Cave, in a grave in one of the mounds of the Scythian burial ground of Cherny Anui-3, an entire roe deer antler with fragments of skull bones was discovered, which could have been used as an agricultural implement (Бородовский, 1995:120).

It is noteworthy that the cave complexes of Northern Altai and settlements of the Maima culture belonging to the Hunno-Sarmatian period, where roe deer antler items are found, are located in close proximity to migration routes of this animal in the Upper Ob region. It is especially typical of the Tavdinskaya Cave neighbourhood, where two migration routes of roe deer still intersect today (Собанский, 1992:134, fig. 12), which makes this territory one of the most convenient for hunting. In addition, the Lower and Middle Katun Valley, which is not often snowbound, is the main wintering ground for roe deer. Judging by archaeological data, this region's hunting potential was noticed as early as the Neolithic (Кунгурова, 1997:5). According to A.V. Galchenko's data, most bones from the Neolithic layers of Tytkesken II belong to roe deer. Bones of game animals in the Holocene layers of Denisova Cave also derive primarily from roe deer (Деревянко, Молодин, 1994:172). Roe deer bones comprise approximately half of osteological assemblages at other Maima culture settlements (Maima I) of the Lower Katun mountainous valley (Соёнов, Константинов, 2014:282, fig. 43).

The archaeological materials of Northern Altai, therefore, quite vividly illustrate hunting activity targeted at migratory game, such as the roe deer (fig. 4). Seasonal hunting for *Cervidae* is indicated not only in the osteological remains from an array of sites (the Denisova Cave, the A.P. Okladnikov Cave, Tytkesken II Cave, settlements of Maima I, Chultukov Log-9, hill forts of Cheremshanka,

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slots of different depth made in the antler base for the knifes' blade allowed the accurate processing, from deep (initial) to final (thin). The copy of this hand plane was also experimentally reconstructed by one of the authors and successfully used for making the wooden shafts of arrows.

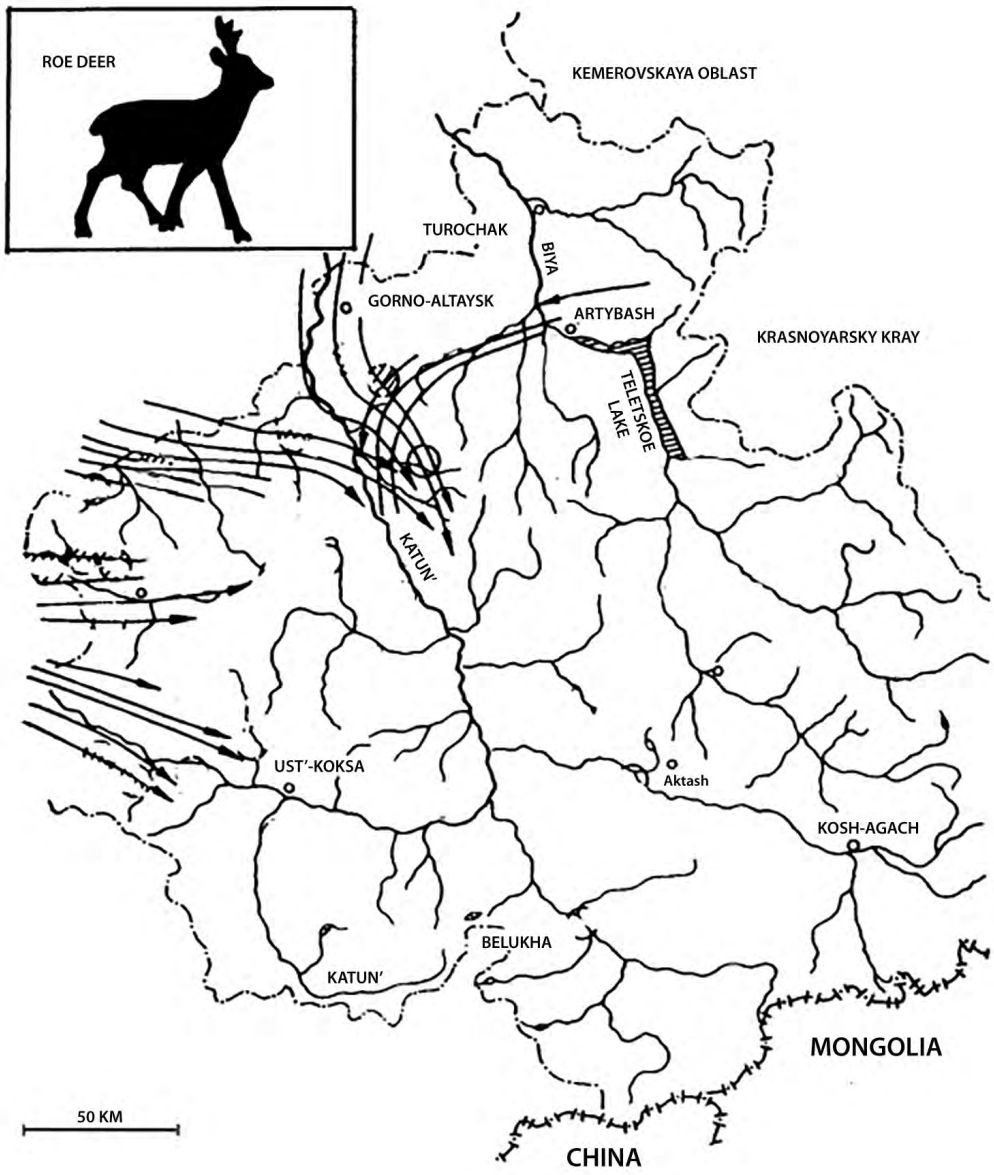

Fig. 4.—Migration routes of roe deer in Northern Altai. After G. G. Sobanskii 1992 (with authors' modifications).

Manzherok-3, a group of burial mounds of Berezovka, Cherny Anui-3), but also by artefacts[2]. In the Hunno-Sarmatian period these artefacts include various items such as tools, weapons, parts of harness, and ritual objects.

CHRONOLOGY

Material from caves -Denisova, A.P. Okladnikov, Tytkesken II, found in the Holocene layers, from settlements- Maima I, Chultukov Log-9, from hill forts of Manzherok-3 and Cheremshanka and burial mounds of Berezovka and Cherny Anui-3 elaborated here is generally dated back to early Iron Age. This period covers in the broadest sense whole first millennium BC. Some artifacts can be dated more precisely for Hunno-Sarmatian period (the first half of the 1st millennium CE). Dating was made on the base of stratigraphy, typological and comparison studies of the artifacts and pottery. More precise dating (including radiocarbon dates) is provided for a site excavated by us – Chultukov Log-9, described with details in the further part of this article.

RAW MATERIAL

Zooarchaeological research provided important information about contribution of roe deer at some of the elaborated sites. At Maima-1 settlement domestic animals bones contribution was - 89% and wild - 11%. Among the bones of the wild animals percentage contribution was as follows - 51% - roe deer, 11% - red deer, 24% - Asiatic wild ass, 6% - wild boar, 1% - badger and others. When it comes to the bones with the consumption marks: 56% - horse, 24% - cattle, 6% sheep, 5% - Asiatic wild ass, 4% red deer, 3% - roe deer, 1% - goat and 1% - wild boar. On the wild animal bones statistics of consumption marks were as follows: 39% - Asiatic wild ass, 33% - red deer, 22% - roe deer, 6% - wild boar. Listed statistics were summarized in the work of V. I. Soenov and N. A. Konstantinov (Соёнов, Константинов, 2014:282-291).

METHODOLOGY

Methodology of interpretation of roe deer antler as the raw material was based on the complex approach, including recognition of morphological, technological and archaeological characteristics. The main aim was to make an attempt to

2. This include only osteological material from the listed sites, items made from shed antlers (e.g. harnesses pieces) and roe deer antlers with skull fragments preserved. Bones of other species were not included in this sample.

reconstruct the algorithm, including the way how the material was obtained, the way of processing for half products and in further research to reconstruct sequences of making the range of items and their function (basing also on traceology and experimental methods).

PERTROGLYPHS AS THE SOURCE OF KNOWLEDGE ABOUT HUNTING

Petroglyphs are another source indicating the hunting of *Cervidae,* in the Altai Mountains. We draw attention, in this respect, to the rather ambiguous attempts at distinguishing petroglyphs of the Hunno-Sarmatian period (Соёнов, 2003 a, b:23-25), which are synchronous with the Maima culture of Northern Altai. The main arguments of such chronological attribution include parallels drawn between the Altai rock art and carvings in the Tashtyk style, discovered in the territory of the Minusinskaya hollow, and images of iron tiered arrowheads, one of the indicators of the Hunno-Sarmatian period (Грязнов, 1979, fig. 61:3; Леонтьев, Панкова, 2012:24). This type of arrowhead, however, was also present in the territory of Sayano-Altai even until ethnographic times (Даржа, 2013:54). Therefore, such images of arrowheads cannot legitimately be used for the narrow chronological dating of rock paintings. It can be used only as *terminus post quem*. One can specify the chronological attribution of rock art depicting tiered arrowheads if the following terms are fulfilled: first, a considerably detailed elaboration of pictures allowing one to define an arrowhead type and its chronology. Second, associated images of other items of military equipment must be present.

Nevertheless, the main approaches to hunting *Cervidae* in the Altai-Sayan region could be quite similar both in the Hunno-Sarmatian period and later up to the ethnographic time. According to the ethnographic data, the Tuvinians used what are known as whistling arrows when hunting red deer and roe deer with bows (Даржа, 2013:64). Such whistling arrows were shot to make an animal approach the hunter or stop (Даржа, 2013:65-385). An antler piece which might be a half-product of a whistling arrow was recorded on the settlement Chultukov Log-9 (fig. 5:1). It is a 7.5 cm long and approx. 1.5 cm wide cone made of antler, with a bulb at the base which was fashioned to make a whistle with 3 holes (Oleszczak *et al*., 2017:167). Dimensions of this item are corresponding with known whistling arrowheads with a whistle, e.g. from Ayrydash-1 cemetery[3] (fig. 5:2-3). Moreover, the half-product is initially sharpened from three sides same as other whistling arrowheads. In contrast to the bone, antler is the material which allows to create the sharp cone with the empty bulb-whistle at the bottom, because of its natural structure.

3. Most of the material from cemetery Ayrydash-1 (Middle Katun' River) is dated back to Hunno-Sarmatian period (Соёнов, Константинов, 2014:16). Chronology and location are analogical to Chultukov Log-9 settlement.

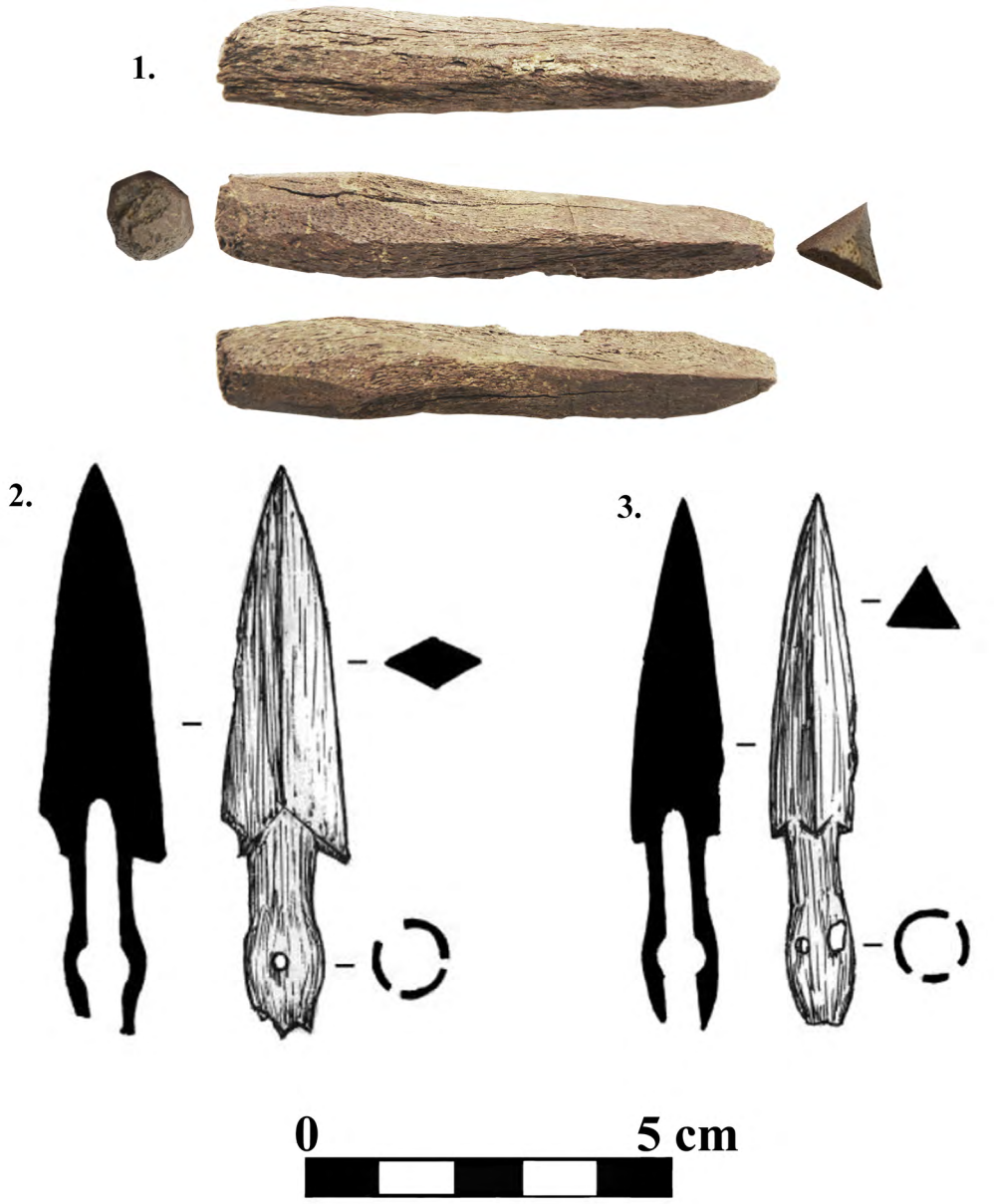

Fig. 5.—Possible half product of the whistling arrowhead from Chultukov Log-9 settlement (1); analogies of whistling arrowheads from Ayrydash-1 cemetery (2 and 3) (excavations of A. S. Surazakov; drawings from Соёнов and Константинов 2014:249, fig. 6:2,3) (all dated back to early Iron age/ Hunno-Saratian period).

The closest location in the northern Altai area of petroglyphs depicting hunting red deer with a bow and tiered arrowheads with holes is Myyuta-3. This site is located to the south of the Myyuta village in the Shebalino district of the Altai Republic on the Sema River (Бородовский, 2009; Бородовский, 2014). The depiction of arrows near the archers' waists corresponds to one of the methods of carrying arrows on a belt to facilitate convenience and speed of shooting (fig. 6:1,3). Arrows are seen in a similar location in medieval European images of the 13th century (in the Morgan Bible and the Rutland Psalter), as well as well as in pictures of medieval Japanese Yabusame mounted archers. In the Altai Mountains, carvings depicting figures of archers carrying arrows on their belts can be found among the early medieval images of Karakol Kalbak-Tash (Соёнов, 2003), Kalbak-Tash II (Кубарев Г.В., 2014), and Tsagan-Salaa IV in Mongolia (Кубарев В.Д., Цэвээндорж, 1996).

On the whole, the entire set of the Myyuta medieval carvings as well as the Kalbak-Tash II petroglyphs represent a typical hunting scene. The varying sizes of the archers' figures could also reflect their spatial location during hunting (in the foreground). It is quite possible that the depiction of a man next to a red deer in the Myyuta petroglyphs depicts a person butchering the prey after a successful hunt (fig. 6:2). Such an explanation opens perspectives in the sphere of chronological interpretation of petroglyphs depicting hunting scenes. First, these images could present a sequence of events during a hunting trip (lying in wait, rounding up, killing, and butchering). Secondly, the Myyuta and Kalbak-Tash medieval carvings could reflect the seasonal character of hunting assigned to a certain season of the year. The red deer hair depicted in the Myyuta and Kalbak-Tash petroglyphs could be one indicator of the seasonal character of hunting, as it is in autumn and winter that the red deer hair becomes long and thick, while the ossified antlers remain intact from October to December.

According to the ethnographic sources, archers in Tuva hunted red deer seasonally. From February to March red deer males became weaker due to rut and severe winter conditions and could hardly move in the mountains covered with wet and sinking snow. These factors allowed the Tuvinians to hunt red deer with

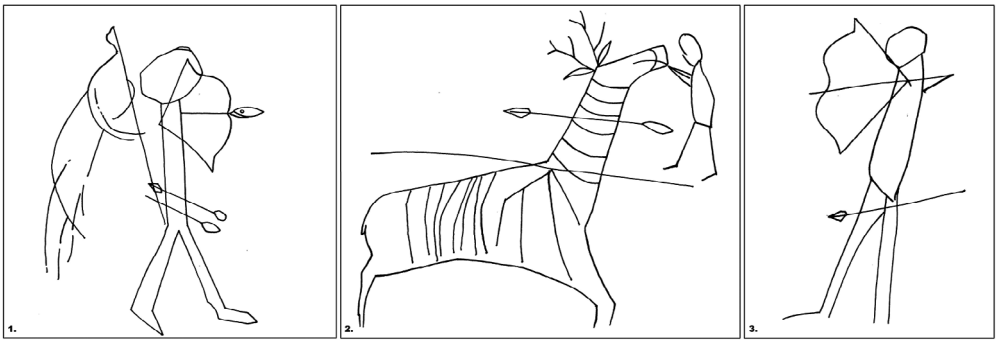

Fig. 6.—Petroglyphs from Myyuta.

the help of one large knife, exhausting the animal while following it in the deep snow (Даржа, 2013:359). Hunters were using this technique for grown, adult stags, which age was estimated basing on size and number of antler points. The chase could take from three to five days. At the end hunter approaches the animal in the calm manner, giving the impression that the pray would be able to escape. At first, red deer runs, then it is slowing down what allows even to bend the animal with lasso and lead back to the camp (Даржа, 2013:259-261).

Another important image depicted in the Myyuta carvings is a branched crown of red deer antlers (fig 6:2). It is noteworthy that according to the ethnographic data on the Tuvinians, a future trophy was selected based on the size of a deer's antlers. This is because the older the animal is, the more points the antlers have and the heavier they are. Moreover, hunting a young animal with immature antlers was a most effort-consuming and inefficient task. A red deer with large and heavy antlers became tired faster during a drive, making for easy prey (Даржа, 2013:359). One could also add that mature and branched red deer antlers were the most valuable raw material for the bone tool industry.

According to the ethnographic data for the Tuvinians, antler tanged arrowheads present in the settlement (Maima-1, hill fort of Cheremshanka, Chultukov Log-9, Manzherok-3) and burial (Manzherok-12) complexes of the Maima culture could have been used for roe deer hunting (Даржа, 2013:63). As mentioned above, this seasonal hunting considerably contributed to the unique character of the bone-carving raw material base of the Northern Altai in the Hunno-Sarmatian period, being one of its territorial and chronological peculiarities (Бородовский, 2007).

Antler was also used for manufacturing fittings (splints) of the Hun-type composite bow belonging to the Maima Culture. Such splints are usually found in the burial context. In the Maima culture sites in the Lower Katun intermountain valley, they were discovered both in burial mounds (Manzherok-12, Ust-Muny-1) and in settlements (Maima-1, Chultukov Log-9, the hill fort of Manzherok-3). The considerable quantity and tightly defined location of items in the cultural layer of the Chultukov Log-9 settlement allows us to suggest that composite bows were manufactured and repaired there using antler splints (Oleszczak *et al*., 2017:165).

RESEARCH AT CHULTUKOV LOG-9 SETTLEMENT

The settlement of Chultukov Log-9, currently one of the better studied sites of the Maima culture, lies in the Northern Altai, near Manzherok village, in the mountain valley of the Lower Katun River. It is situated approximately 400 m from the river bed and occupies an area of approximately 5000 m^2 on a small promontory at 379 m a.s.l. and elevated 85 m above the floodplain. It is protected by steep slopes from the west, north and north-east (Borodovskiy and Oleszczak, 2012; Oleszczak *et al*., 2017). The series of radiocarbon dates obtained from samples from the settlement indicates that it was occupied from the 3rd century until the first half of the 6th century AD – six of the eight analysed samples fall within this

time span (Borodovskiy *et al.,* 2017; Oleszczak *et al.,* 2017:155, Tab. 1.). The excavations conducted in 2012-2016 covered a total area of 220 m^2 and yielded 42 archaeological features. The exploration of the site produced a total of about 7,500 finds (including osteological material – approximately 4,800 fragments). Forty-two archaeological features were discovered during the excavations. Among them were hearths, pits, post-holes and dwellings of the semi-sunken floor type (features 7 and 35). The four hearths discovered at Chultukov Log-9 are of particular interest. Hearth 36 was distinguished by a regular, square outline (with sides about 1 meter long), and was well preserved. It had walls built from flat stone slabs set vertically. The fill within the walls was two-layered in cross section, with the lower layer consisting of clay baked to a red colour, and the upper one of compact ash. The fill yielded neither artefacts nor charcoals, and the same holds true for the other three hearths from this settlement. Hearth 30 was similar, though less well preserved, especially in respect to its northern wall. The other two hearths (features 3 and 4) were distinguished by their poor state of preservation and differed from the hearths typical of the Maima culture, such as features 30 and 36, as they contained no ash. They are also of smaller size and irregular shape, with fewer stones used in their construction (Borodovskiy and Oleszczak, 2012:98-101; Oleszczak *et al.,* 2017:160). The function of these hearths has not as yet been determined. In this context it is worth mentioning that traces of intensive processing of bone and antler were recorded near the hearths investigated in the Chultukov Log-9 settlement. Part of the roe deer skull with chop marks (fig. 7:1) and worked pieces of antler (fig. 7:2-5) were recorded in the close neighbourhood of hearth 36 and a pit house (ob. 35). Presumably this part of the settlement was connected with the bone and antler working industry.

In describing the different kinds of antler raw material resources it is worth pointing out that North Altai in antiquity was situated in the contact zone, where different animal species providing osseous raw material lived (e.g. roe deer, elk, red deer, Siberian ibex). Of the antler-bearing species roe deer constituted the largest group, while others (elk, red deer) are found occasionally.

The seasonal character of manufacture is visible not only in the osteological material from different sites (caves -A.P. Okladnivkov, Tytsyeken II, settlements -Maima 1, Maima 3, Chultukov Log-9, hill forts -Cheremshanka and Manzherok, kurgans groups -Cherny Anui-3, Manzherok-12), but also among items found on those sites. In the Early Iron Age during the Hunno-Sarmatian period many different items were made of bone - tools (for leather and wood processing), items of everyday use (e.g. hooks), some horse-riding equipment elements, and perhaps ritual items.

CONCLUSION

The visible domination of osteological raw material (roe deer antler especially) shows a significant similarity between the North Altai and the forest-steppe area of the southern part of western Siberia. In those territories, mass migrations of roe

Fig. 7.—Fragment of the roe deer skull (1), pieces of antler (2-5) from the settlement Chultukov Log-9 (early Iron Age, Hunno-Sarmatian period).

deer hampered the collection of superior quality raw material. Thus, antler material of better quality (red deer, elk) would be valued much more highly there. Perhaps that led to establishment of the local bone crafting centres in the territory of the Lower Katun River in the Early Iron Age (Бородовский, 2007:140-141). In the Hunno-Sarmatian period the situation changed somewhat. Due to many cultural changes (influx of new population, decrease in the population, disappearance of the "scytho-siberian" animal style tradition), items made from the large red deer antler were less common. In general, the bone and antler industry, representing the Maima tradition, constituted an integral part of the material culture of the Hunnic period in Central Asia at the turn of the millennia.

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BIBLIOGRAPHY

АЛЕХИН, Ю.П., ГАЛЬЧЕНКО, А.В. and ДЕМИН, И.А. (1997): "К вопросу о древнейшем скотоводстве Алтая (по материалам поселения Колыванское-1)", Известия лаборатории археологии 2, Горно-Алтайск, pp.138-142.

БОРОДОВСКИЙ, А.П. (1995): **"***Аварийные исследования могильника эпохи раннего железа в верховьях р. Ануй*", *Сохранение изучение культурного наследия Алтайского края: Материалы науч.-практ. конф* 5:1, *Барнаул,* pp. 118-121.

БОРОДОВСКИЙ, А.П. (1997): Древнее косторезное дело юга Западной Сибири. (вторая половина *II* тыс. до н.э.- первая половина *I* тыс. н.э.), Издательство ИАЭТ СО РАН, Новосибирск.

БОРОДОВСКИЙ, А.П. (2007): Древний резной рог Южной Сибири, Издательство ИАЭТ СО РАН, Новосибирск.

БОРОДОВСКИЙ, А.П. (2009): **"**Гравировки эпохи средневековья в Мыютинском петроглифическом комплексе", Проблемы археологии, этнографии, антропологии Сибири и сопредельных территорий, матлы Итоговой сессии ИАЭТ СО РАН (Т.15), Издательство ИАЭТ СО РАН, Новосибирск, pp. 224-230.

БОРОДОВСКИЙ, А.П. (2014): "Граница распространения центральноазиатской петроглифической традиции на Северном Алтае", Архаическое и традиционное искусство: проблемы научной и художественной интерпретации, Новосибирск, pp. 9-13.

ВАСИЛЬЕВ, С.К., БЕНЕКЕ, Н., ПАРЦИНГЕР, Г. and МОЛОДИН, В.И. (2000): "К реконструкции хозяйственной деятельности населения памятника Чича-1. Предварительные итоги изучения остеологического материала по результатам раскопок 2000 г.", Проблемы археологии, этнографии, антропологии Сибири и сопредельных территорий 6, Новосибирск, pp. 263-268.

ВАСИЛЬЕВ, С.К., МАРТЫНОВИЧ, Н.В. and ЧЕМЯКИНА, М.А. (1999): "Охота по данным остеологического анализа материалов памятника Омь-1", Проблемы археологии, этнографии, антропологии Сибири и сопредельных территорий 5, Новосибирск, pp. 322-327.

ГАЛЬЧЕНКО, А.В. (1994): "К вопросу о хозяйственной деятельности афанасьевских племен", Археологические и фольклорные источники по истории Горного Алтая, Горно-Алтайск, pp. 14-19.

ГРЯЗНОВ, М.П. (1979): **"**Таштыкская культура", Комплекс археологических памятников у горы Тепсей на Енисее, Новосибирск: Наука, pp. 89-145.

ДАРЖА, В. (2013): Традиционные мужские занятия тувинцев *Т.I:* Хозяйство, охота, рыбалка. Кызыл, ОАО ЫВАПОЛИГРАФ.

ДЕРЕВЯНКО, А.П. and МОЛОДИН, В.И. (1994): Денисова пещера, Новосибирск,

Европейская и сибирская косули (1992) (В.Е. СОКОЛОВ, ed.), Наука.

ЗАХ В.А. (2000): "Исследования городища Ласточкино Гнездо-1", Проблемы взаимодействия человека и природной среды, Тюмень, pp. 33-36.

КИРЕЕВ С.М. (1991): "Поселение Черемшанка", Охрана и исследование археологических памятников Алтая, Барнаул, БГПИ, pp. 84-89.

КИРЕЕВ С.М., КУДРЯВЦЕВ П.И. and ПОЛОСИНА Я.Ю. (1994): "К вопросу о хозяйстве населения предгорий северного Алтая в эпоху поздней бронзы и раннего железа (по материалам Майминского археологического комплекса)", Археология и этнография Сибири и Дальнего Востока, Барнаул, pp. 88-91.

КИРЮШИН, Ю.Ф., КИРЮШИН, К.Ю. and СЕМИБРАТОВ, В.П. (2005): "Исследования Тавдинского грота в 2005 г.", Проблемы археологии, этнографии, антропологии Сибири и сопредельных территорий 11:1, Новосибирск: Издательство ИАЭТ СО РАН, pp. 333-339.

КОСИНЦЕВ, П.А. (1981): "Косуля из археологических памятников Урала и Западной Сибири (эпоха бронзы-средневековья)", Териология на Урале, Свердловск, pp. 39-43.

КОСИНЦЕВ, П.А. (1988): "Голоценовые остатки крупных млекопитающих Западной Сибири", Современное состояние и история животного мира Западно-Сибирской низменности, Свердловск, pp. 32-51.

КУБАРЕВ, Г.В. (2014): "*Граффити местонахождения петроглифов Калбак-Таш* II", Проблемы археологии, этнографии, антропологии Сибири и сопредельных территорий 20, Новосибирск: Издательство ИАЭТ СО РАН, pp. 198-201.

КУБАРЕВ, В.Д. and МАТОЧКИН, Е.П. (1992): Петроглифы Алтая, Новосибирск.

КУБАРЕВ, В.Д. and ЦЭВЭЭНДОРЖ, Д. (1996): "Раннесредневековые граффити Монгольского Алтая", Новейшие археологические и этнографические открытия в Сибири, Новосибирск: Издательство ИАЭТ СО РАН, pp. 140-143.

КУНГУРОВА, Н.Ю. (1997): "Охота неолитических обитателей Катуни", Известия лаборатории археологии 2, Горно-Алтайск, pp. 3-8

ЛЕОНТЬЕВ, Н.В. and ПАНКОВА С.В. (2012): "Петроглифы горы Георгиевской (таштыкские резные рисунки)", Памятники наскального искусства Минусинской котловины 10, Кемерово: Кузбассвузиздат, pp. 5-27.

МАТВЕЕВ, А.В. (1993) Ирменская культура в лесостепном Приобье, Новосибирск.

МОЛОДИН, В.И. and СОБОЛЕВ, В.И. (1986): "Скотоводство населения Барабинской лесостепи в 14-16 вв. (по данным археологии)", Палеоэкономика Сибири, Новосибирск, pp.120-125.

ПОЛОСЬМАК, Н.В. and БОГДАНОВ, Е.С. (2015): Курганы Суцзуктэ (Ноин-Ула, Монголия) 1, Новосибирск «ИНФОЛИО».

САГАЛАЕВ, А.М. (2001): "К проблеме «Вещь» и «Миф» в культуре урало-алтайских народов (опыт прочтения символики посоха)", Пространство культуры в археолого-этнографическом измерении. Западная Сибирь и сопредельные территории, Томск, pp. 253-254.

СЕМЕНОВ, С.А. (1957): Первобытная техника *(опыт изучения древнейших орудий и изделий по следам работы)*, Издательство Академии Наук СССР, Москва-Ленинград.

СОБАНСКИЙ, Г.Г. (1992): Копытные Горного Алтая, Новосибирск, Наука

СОЁНОВ, В.И. (2003a): "Петроглифы Горного Алтая гунно-сарматского времени", Древности Алтая 10, *Горно-Алтайск, ГАГУ,* pp. 100-107.

СОЁНОВ, В.И. (2003b): Археологические памятники Горного Алтая гунно-сарматской эпохи (описание, систематика, анализ), *Горно-Алтайск, ГАГУ.*

СОЁНОВ, В.И. and КОНСТАНТИНОВ Н.А. (2014) Охотничья деятельность населения Алтая в *I* тыс. н.э., Горно-Алтайск.

ТКАЧЕВ, А.А. (2000): "Работы на могильнике Магометкуль", Проблемы взаимодействия человека и природной среды, Тюмень, pp. 25-27.

ТРОИЦКАЯ, Т.Н. and БОРОДОВСКИЙ, А.П. (1994): Большереченская культура лесостепного Приобья, Новосибирск, Наука.

BORODOVSKIY, A.P. and OLESZCZAK, Ł. (2012): "Intermountain valley of the lower Katun at the hunno-sarmation time", *Rechercher Archeologigues Nouvelle Serie* 4, Kraków, pp. 97-112.

OLESZCZAK, Ł., BORODOVSKIY, A.P., MICHALCZEWSKI, K. and POKUTTA, D.A. (2017): "Chultukov Log 9 -a settlement from the Xiongnu-Xianbei-Rouran period in the northern Altai", *Eurasian Prehistory* 14:1-2, pp. 153-178.