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Vengerovo-2—a Krotovo Culture Site in the Baraba Forest-Steppe: An Archaeozoological Study

This study addresses faunal remains from Vengerovo-2 in the Baraba forest-steppe—a Bronze Age site associated with the Krotovo culture. We describe the origin of the sample, the distribution of bones in the living space, the species and skeletal parts represented, and the age of the animals. The sample consists of small fragments, which are likely butchering and kitchen waste, as well as the leftovers of production and rituals. Bones of domesticated animals are more frequent (62 %) than those of wild ones. Skeletal parts from utility pits (pelvic bones, ribs, and appendicular bones) differ from those found in production areas—mandibles, crania, and entire skeletons. Presumably, pits contained food, and production areas were places where work was accompanied by rituals. The reconstructed animal breeding system indicates its domestic nature, centered on sheep and goats, with a small number of horses and cattle. Hunting large prey (elk and roe deer) was important, and the same is true about fur animals (fox and marten) and waterfowl. The procurement of peltry, hides, and leather were principal occupations. Bone tools were made mostly from elk bones. Results of correlation analysis suggest that in terms of composition, the faunal sample was largely similar to those from contemporaneous Krotovo and Yelunino sites.

Keywords: *Baraba forest-steppe, Bronze Age, Krotovo culture, archaeozoological studies, faunal sample composition, pastoralism.*

Introduction

V.I. Molodin identified the Krotovo culture of the Middle Bronze Age in 1975. During more than 40 years of large-scale study of the Krotovo culture in the Irtysh basin and Baraba forest-steppe, the following settlements were discovered and researched: Preobrazhenka-3 (Molodin, 1977), Cherno-Ozerye IV (Gening, Stefanova, 1982), Cherno-Ozerye VI (Stefanova, 1988: 55), Inberen X (Stefanova, 1985; Stefanov, Stefanova, 2001), Saranin II (Glushkov, 1984), etc. One of the largest settlements of this culture studied to date is Vengerovo-2. This settlement is located on the edge of the second floodplain terrace on the left bank of the Tartas River, on the territory of the Vengerovsky District of the Novosibirsk Region (Fig. 1). Today, the site is located 0.8 km of the shoreline, but during the period of its use (the Bronze Age), the settlement was located immediately near the river. In

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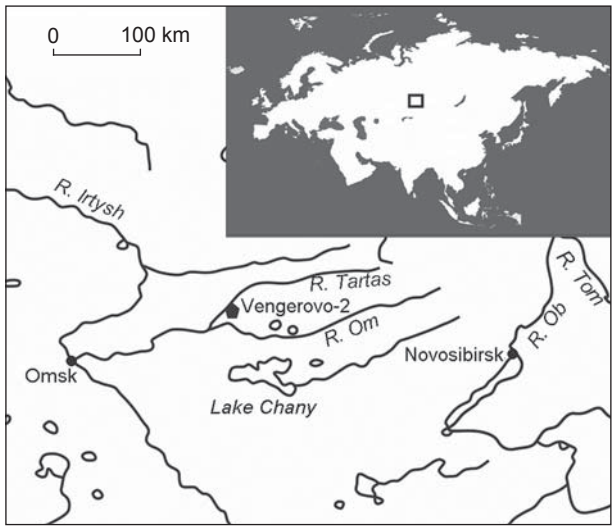

Fig. 1. Location of the Vengerovo-2 site.

the stratigraphic sequence, the surf zone, and traces of destruction of some pits as a result of flooding, are clearly recorded.

The settlement of Vengerovo-2 was discovered in 1966 by T.N. Troitskaya (Troitskaya, Molodin, Sobolev, 1980). In 1973 and 1975, it was investigated under the supervision of Molodin: two dwellings were excavated (No. 1 and 2), on the basis of which the Krotovo culture was distinguished and characterized (Molodin, 1977; 1985; Molodin, Polosmak, 1978). In 2011–2017, eight more residential structures (No. 3–10), as well as several facilities of various purposes, have been researched at the site. Thus, deposits on an area of 2064 m^2 were uncovered here, ten structures and a significant part of the space between the dwellings were studied (Molodin et al., 2016).

Based on coal samples from burnt structures and hearths, as well as bones from utility pits, a large series of radiocarbon dates was obtained, according to which the settlement functioned in the interval of approximately 1950–1700 /600 cal years BC (Molodin et al., 2013: 280).

Paleofaunal materials traditionally serve as the basis for re-creating the structure of carnivorous consumption, as well as for studying the dynamics of the faunal environment and the importance of hunting, and for assessing the composition of the herd and the role of cattle breeding in the economy of the ancient population (Antipina, 2016: 99; Kosintsev, 2004; Kosintsev, Varov, 1996; Kosintsev, Gasilin, 2006; Roslyakova, Kosintsev, 2013; and others). The results of this analysis can be discussed both in a local context (for example, in comparison with those of the nearby Krotovo sites and other cultural formations of the Early, Middle, and Late Bronze Age in Western Siberia), and in a broader context when analyzing stable isotopes to reconstruct the diets of various populations of this time (Marchenko et al., 2015, 2017). Data on the composition of animal bones from Vengerovo-2 are important for consideration of the general trends in the distribution of domesticated animals from the territory of Central Asia in Siberia (Kosintsev, 2004; Benecke, 2017; Kiryushin, Gaiduchenko, Makarevich, 2020).

The purpose of this study is to reconstruct, on the basis of the results of paleozoological analysis, the elements of the subsistence system of the population of Vengerovo-2.

Materials and methods

The research methodology of the site called for the horizontal opening of the excavation areas with the adjacent space between the dwellings, and the obligatory fixation of all finds (including osteological remains) in a three-dimensional coordinate system, using a tacheometer. As a result, significant paleofaunal material of more than 2.5 thousand fragments of bones was obtained. However, only a part of the faunal remains (1029 spec., as established in the course of planigraphic and stratigraphic analysis) belonged to the layer of the Krotovo culture. This is due to the fact that the upper horizons of the site were disturbed both by the exploitation of the terrace by the population of the Early Iron Age, the Middle Ages, and the Modern Age, and by modern anthropogenic activity. The inclusion of materials from these horizons could significantly distort the results of the frequency statistical analysis. The species of the bones were determined, including those presented in the form of calcined fragments from the fillings of hearth facilities, and also the ones that served as the basis for a few bone tools. Results of the study of the osteological collection from the excavations of 1973–1975 (dwellings No. 1, 2) were published earlier (Molodin, 1985: Tab. 3) and were not included in the sample for this study.

The collection is dominated by the bones that were the waste of carcass processing, cooking, and making tools. These are characterized by a high degree of fragmentation; only a few whole bones are found. Therefore, the species identification was made only for a part of the collection (445 spec., 43.2 %). As noted above, finely fragmented calcined bones (8332 spec.) from the filling of smelting furnaces were analyzed separately. Species identification was carried out for 451 specimens (5.8 %).

Thus, the total sample of bone fragments from Vengerovo-2, identifiable to the species level, was 896 specimens. Statistically, such a sample is considered sufficient to establish the species composition of the animals most significant in the economy of a particular settlement, as well as to determine the real ratio of their bones in kitchen remains (Antipina, 1997; Cemych, Antipina, Lebedeva, 1998). Statistical counts were mainly

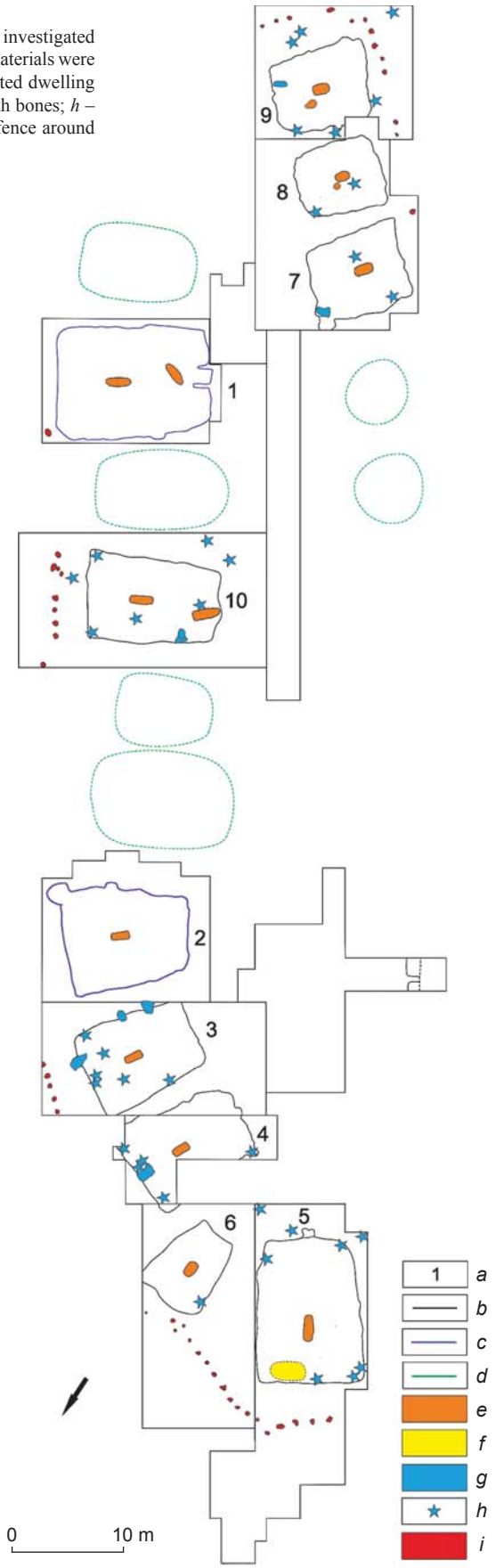

Fig. 2. Plan-scheme of the Vengerovo-2 settlement.
a – serial number of the dwelling; *b* – boundary of excavations and dwelling pits investigated in 2004–2017; *c* – boundary of dwelling pits investigated in 1973–1975, which materials were not included in the paleofaunal sample; *d* – conditional boundary of unexcavated dwelling pits; *e* – smelting furnace; *f* – facility No. 2; *g* – utility and production pits with bones; *h* – location of identifiable animal bones; *i* – pole pit marking the location of the fence around the settlement.

based on the number of identifiable bones (NISP). This was due to their prevalence throughout the site, high fragmentation, and low preservation, which made the reliable calculation of the minimum number of individuals (MNI) difficult.

Bones were found, as a rule, on the floor of dwellings, in pole or utility pits, hearths, filling of production facilities and clusters (Fig. 2). Most of the identifiable bones, 358 specimens, or 80 % (of which most (314 spec.), were studied as part of production facility No. 2 of dwelling No. 5), were found during the exploration of production areas. In the space between the dwellings, 26 identifiable bones were found; on the floor of the dwellings, there were 22; in the filling of the pole pits, there were 20; and in the filling of the utility pits, there were 14 specimens (Molodin et al., 2013, 2014).

Production areas were located in the northwestern part of each dwelling. They yielded accumulations of household and technical ceramics (crucibles, ladles, fragments of casting molds), bones, stone and bone tools, and pits with bones. Spatial analysis of finds in the structure of the dwelling made it possible to identify these zones as areas for storing bronze casting and other implements, and to reveal their connection with the hearth zone (Molodin et al., 2012, 2013, 2014).

Among the studied complexes, production facility No. 2 in dwelling No. 5 stands out (Fig. 3, *1*): at the northwestern wall of the excavation, at the floor level, an accumulation of bone fragments was found, 428 spec.; among them, 314 spec. were identified as species: pine marten *Martes martes* – 261/6*, sable *Martes zibellina* – 2/1, roe deer *Capreolus pygargus* – 6/2, elk *Alces alces* – 9/1, horse *Equus caballus* – 11/2, sheep/goat *Ovis capra* – 20/2, cow *Bos taurus* – 2/1. Fox *Vulpes Vulpes*, dog *Canis familiaris*, and saiga *Saiga tatarica* were isolated finds. Thus, in this cluster, 88.3 % of the identifiable bones belong to fur animals. Since the bones of the pine marten belong mainly to nearly intact skeletons of six individuals, these were not taken into account when calculating the proportion of different species in the osteological spectrum, because these would distort the results of the frequency distribution (see *Table*). On the territory of production facility No. 19, in dwelling No. 7, 22 fox bones were found in a pit (a whole humerus, fragments of the ulna, tibia, calcaneus, lumbar and cervical vertebrae,

*Number of bones/minimum number of individuals.

Fig. 3. Production facilities of the Vengerovo-2 settlement. *1* – No. 2 (dwelling No. 5); *2* – No. 19 (dwelling No.7): *a* – fragments of skulls, *b* – jaws of foxes in the filling of the facility.

at least two skulls, and two mandibles (Fig. 3, *2*)) and a horse splint bone. In dwellings No. 3, 4, 6, 9, at production areas, in pits, fragments of the mandibles of a sheep/goat and a fox were recorded.

The number of bone tools in the settlement is small: only nine specimens. The handle from dwelling No. 5 was made from the diaphysis of the long bone of a large mammal (Fig. 4, *1*). The raw material for the chisel tool and the cylindrical handle from dwelling No. 3 was the antler of an elk (Fig. 4, *2*, *3*), and for the tool of the blunt knife type, the pelvic bone of an elk was used. Another elk antler tool was found in dwelling No. 10 (Fig. 4, *5*). Deep cuts were recorded on the bone of a bear, and drilling marks on one of the sheep/goat's talus bones (Fig. 4, *4*).

The bones of domestic animals in the osteological collection of the Vengerovo-2 settlement make up 62 % of the identified remains. This suggests that cattle breeding was the basis of the economy of the inhabitants of the settlement at the time of its functioning; in addition, meat was an important component of the diet of the Krotovo people. Four types of domestic animals have been identified: sheep/goat*, cattle, horse, and dog (see *Table*).

The most abundant bones are from small ruminants; their share is 88.6 % of the remains of domestic species and 55 % of the total amount of the osteological collection. Notably, more than 80 % of small ruminant bones were found in the hearths in a calcined state. This can be explained by the fact that in small bones of a sheep/goat, with strong fragmentation as a result of exploitation, during burning, morphological signs for diagnosis are better preserved than in large bones of large mammals. Morphological differentiation of sheep and goats was possible only in five cases (four bones belonged to individuals of *Ovis aries* and one to *Capra hircus*). Analysis of the remains by skeletal elements for these species showed that the bones of all sections were present. Owing to the small size of the fragments, it is difficult to determine the age of the animals. It was found that six bones belonged to immature or young individuals under two years old, and eight bones belonged to adult animals.

The horse is represented by 38 bones and it is the second most numerous animal in the collection, after the small ruminants. However, the question of whether all the horse bones belong to domestic animals, and not to wild individuals, remains open. The morphological features of all the bones of the skeleton of wild and native domestic horses are extremely similar (Antipina, 2016: 101). Analysis of the distribution of skeletal elements revealed the predominance of limb bones. Vertebrae, ribs, and jaw fragments come in fewer numbers. Epiphyseal fusion indicates that most of the horses were adults at the time of slaughter. The jaw of the horse from the filling of facility No. 2 of dwelling No. 5 belonged to a young individual, which makes it possible to classify it as a domestic species, since, as some researchers believe, hunters of wild horses did not kill young individuals (Amalrik, Mongayt, 1966; Bökönyi, 1991), although this situation requires further research (Nurushev, 2018). Perhaps, the inhabitants of Vengerovo-2 were finding the bones of wild horses. This assumption is based on the results of radiocarbon dating of the horse bone from the household pit of dwelling No. 10; its calibrated age corresponds to the 6th millennium BC. It should be added that the presence of domesticated horses among the members of the Krotovo culture is clearly evidenced by the image of a skier driving a bridled horse on the top of a single-edged dagger from the Rostovka burial ground (Irtysh region of the Om) (Matyushchenko, 1970). The authors are aware that the problem of horse domestication remains relevant for the West Siberian

*The bones of a sheep and a goat are very similar morphologically. In cases where they lack diagnostic signs or are highly fragmented, such bones are referred to the same category as small ruminants (see, e.g., (Yanish, 2018: 107)).

region; its solution requires numerous analyses of bone material, including paleogenetic.

Cattle is represented by only three bones, which are associated with different parts of the skeleton. One of the bones, a lower end of the large left metacarpal (78 mm wide), was originally attributed to a cow, but eventually diagnosed as the bone of an auroch *Bos primigenius*; it possibly belongs to the paleofauna.

Domestic dog is represented by four bones: the vertebra of an adult, fragments of the humerus and heel bones.

Wild mammals and *birds* are associated with 38 % of the identifiable bones in the osteological collection of Vengerovo-2 (see *Table*). This indicates that the meat of this group of animals and birds was included in the diet of the inhabitants of the settlement, and the bones served as raw materials for the manufacture of tools and fuel. Since a significant part of the remains of large mammals is highly fragmented and cannot be identified, it can be assumed that the role of meat of such animals as elk or roe deer in the diet of the Vengerovo-2 population was higher than the bones identified to the species level suggest.

Nine species of wild mammals have been identified: elk *Alces alces*, roe deer *Capreolus pygargus*, brown bear *Ursus arctos,* saiga *Saiga tatarica*, fox *Vulpes vulpes*, hare *Lepus timidus*, marten *Martes martes*, sable *Martes zibellina*, and beaver *Castor fiber*. Most of the wild animals are fur-bearing species (80 %), which indicates the hunting specialization of the inhabitants of the settlement. The proportion of fox bones is high (75 %); these were most often found in the filling of the hearths. Analysis of the distribution of skeletal elements revealed the predominance of limb bones. Recall that in the filling of facility No. 2 of dwelling No. 5, bones of at least six practically complete skeletons of the pine marten *Martes martes*

Species composition of the bones from the Middle Bronze Age settlements of the forest-steppe zone of Western Siberia, spec.

Site	Small ruminants	Horse	Cattle	Dog	Elk	Roe deer	Bear	Wolf	Boar	Fox	Marten	Hare	Sable	Beaver	Aurochs	Bird	Area, m^2	Source
Vengerovo-2*: 2011–2017	56	37	2	3	23	7	1	–	–	29	3**	5	3	1	1	13	2064	This article
from hearths	294	1	1	1	–	–	–	–	–	152	1	–	–	–	–	1	–	Ditto
Inberen X	35	84	64	2	96	2	–	–	–	–	–	–	–	–	–	–	405	Stefanova, 1988
Saranin II	35	84	36	–	26	–	13	–	–	1	–	–	–	–	–	–	< 800	Ditto
Cherno-Ozerye IV	356	82	25	–	8	–	2	–	–	1	–	2	–	–	–	–	< 300	Smirnov, 1975
Cherno-Ozerye VI	4415	1189	504	–	45	6	64	6	5	35	1	6	–	–	–	8	2255	Ditto
Preobrazhenka-3, Abramovo-10A, Vengerovo-2 (1973–1975)	130	319	122	3	126	56	34	19	2	19	–	74	15	4	–	58	–	Molodin, 1985
Berezovaya Luka	17,941	7719	5139	219	51	5	–	39	3	36	7	127	–	94	–	96	< 2000	Grushin, 2012; Kosintsev et al., 2005; Kosintsev, Yavsheva, Devyashin, 2011
Kolyvanskoye I	159	278	436	8	4	–	10	–	1	1	–	4	–	5	–	18	2500	Grushin, 2012, 2015
Kostenkova Izbushka	62	251	114	135	748	33	99	–	9	19	–	13	–	128	–	–	1414	Grushin, 2012

*Identifications by N. Benecke and S.K. Vasiliev.
**The bones from facility No. 2, dwelling No. 5, are not taken into account, because these belong to six almost intact skeletons of marten.

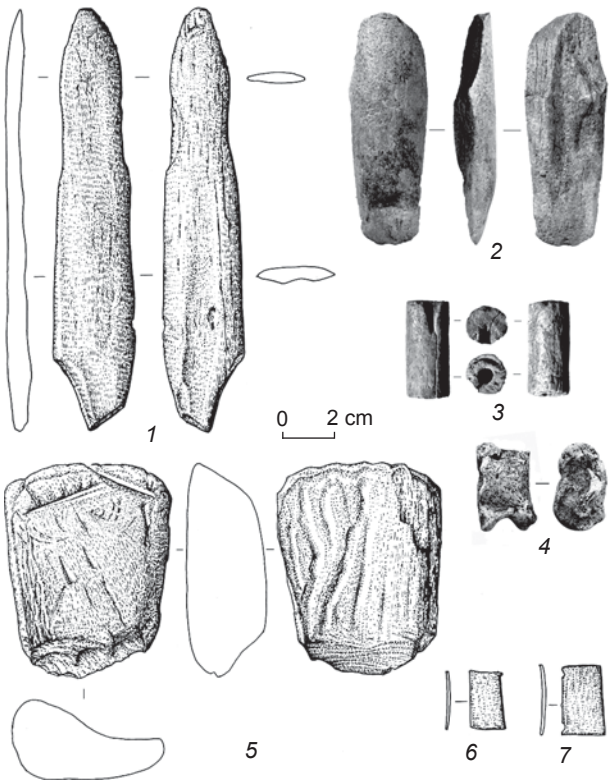

Fig. 4. Antler and bone tools from the Vengerovo-2 settlement.
1 – handle with bronze oxides (dwelling No. 5, facility No. 2); *2* – adze (dwelling No. 3); *3* – cylindrical handle with a rounded groove (dwelling No. 3); *4* – talus with traces of drilling (dwelling No. 5); *5* – a tool of the hoe type (dwelling No. 10); *6*, *7* – plates (dwelling No. 5, facility No. 2).

were found, deliberately not taken into account when calculating the proportion of different species in the osteological spectrum.

Avian bones belong to various types of ducks. The collection contains mostly long tubular bones with diagonal cleavages, which appear when a whole bird carcass is cut into pieces (Antipina, 2016: 108).

The fillings of the hearths show extensive evidence of fish consumption by the inhabitants of the settlement, which will be addressed in a special work.

Discussion of the results

The collection under study is relatively scarce, taking into consideration the excavated space. The entire sample of finds from the eight investigated dwellings (No. 3–10) (excluding the calcined bones found in the filling, which are usually not subjected to archaeozoological analysis) totals 1000 specimens, although the excavated area is over 2000 m^2 (0.5 spec. per 1 m^2 of area). The bones from dwellings No. 1 and 2 were not included in this calculation. Collections of animal bones from other settlements of Western Siberia of this time are much larger (see *Table*). For example, the osteological collections of the settlements of the Krotovo culture, Cherno-Ozerye IV and VI, located on the Irtysh River, include 476 and 6284 specimens, with excavation areas of <300 and 2200 m^2, respectively (Gening, Stefanova, 1982; Stefanova, 1988: Tab. 1, 9) (1.6 and 2.8 spec./m^2, respectively). During the excavation of the settlement of the Yelunino culture Berezovaya Luka in the Kulunda forest-steppe, on an area of about 2000 m^2, more than 30,000 bones were recorded (Kosintsev, Yavsheva, Devyashin, 2011: 140) (15 spec./m^2). The relatively small size of the collection of bones from Vengerovo-2 can be explained by the special method of waste disposal (these were used as fuel or buried outside the settlement) or the short life of the settlement. The latter, taking into account the concentration of arckostenkhaeological finds, thickness of the cultural layer, traces of restructuring, and obtained radiocarbon dates, is unlikely. The tradition of a complete utilization of bones was recorded among carriers of the Kulai culture at the Krokhalevka-7A settlement of the Early Iron Age (Sumin et al., 2013: 211). The use of bones as a fuel by the inhabitants of Vengerovo-2 is evidenced by the results of the analysis of the hearths' filling (Nesterova, 2019: 129–131).

The analysis showed that in the settlement herd, the small ruminants outnumbered horses and cattle. Animal husbandry, apparently, had the domestic characteristic in which animal shelters were part of each household structure. Earlier, it was suggested that the fence located 3–5 m of the rear walls of the dwellings may have served as a support for the shed under which the animals were kept in winter (Molodin et al., 2016). The total area of the settlement to be reconstructed is at least 3770 m^2, the area between the fence and the dwellings is nearly 500 m^2. During a selective study of the latter, a large amount of humic organic matter was recorded in the layer, which indirectly confirms the proposed assumption. If we proceed from modern sanitary requirements (1.5–3.0 m^2 per sheep (Metodicheskiye rekomenatsii…, 2012: Tab. 10)), the village could contain 200–300 heads of cattle. The flooded meadows located in the immediate vicinity of the settlement (the Tai locality) with abundant herbage constantly provided the sheep with food, and made it possible to harvest it for the winter under any weather conditions (drought, watering) (Molodin, 2016).

Hunting activity was focused on the fur trade, as evidenced by the predominance of wild species among the osteological remains: foxes and martens. The authors have noted the role of leather production in the structure of the economy of the Krotovo population (Molodin et al., 2020; Nesterova, 2019: 112). Noteworthy is the peculiarity of the distribution of bones according to the functional purpose of facilities: the pelvic bones, ribs,

and the bones of the legs of animals were found mainly in household pits; jaws, skulls, and whole skeletons* were at production areas. The former can be interpreted as the remains of carcasses intended for cooking. The latter, perhaps, should be considered as traces of some ritual actions that could accompany production or hunting operations. The basis for this assumption is the presence of identical species (fur-bearing animals) and skeletal composition, as well as the localization of such finds in the northwestern part of the dwelling, behind the hearth. Noteworthy is the specific composition of osteological finds in smelting furnaces: these are mainly the bones of sheep/goats and foxes. Interpretation of such a sample is still questionable.

Evidence that the industrial (in particular the bronze casting) activities were accompanied by cult/ritual practices (including the use of animal bones) can be found in the research works on the Bronze Age and the Early Iron Age settlement complexes (see, e.g., (Chernykh, 2007; Efremova et al., 2020; Troitskaya, Borodovsky, 1994: 8; Troitskaya, 1979: 59)). The use of the bones of wild animals in hunting rituals was recorded among the natives of Siberia (Kulemzin, 1984; Basilov, Sokolova, 1999; Ivasko, Lobanova, 2003). For example, the Khanty, in order to ensure good luck in the hunt, kept certain parts of the carcasses and limbs of animals. As a rule, various bones of an otter, fox, sable, bear were kept, and "only two hind legs are kept from a hare" (Kulemzin, 1984: 83). For the same purpose, the Lower Ob Ostyaks kept the skulls of hares and partridges (Ivasko, Lobanova, 2003: 70). The Kets believed that the revival of an animal could occur only if its skull and some parts of its skeleton were preserved (Alekseenko, 1967: 175). Notably, the materials from the Vengerovo-2 settlement contain a significant number of fox limb bones. N.V. Lukina noted that among the Khanty, the skins from fox's paws, which were distinguished by their great strength, were considered especially valuable. According to the Khanty, the legs of fur-bearing animals contributed to a successful hunt (Lukina, 1985: 150).

For the manufacture of tools, the Vengerovo-2 people most often used the long bones and the antlers of large mammals, mainly elk. This conclusion can be drawn from the materials of all Krotovo culture settlements (Molodin, 1985: 73; Stefanova, 1988: 65).

Wild species represented in the analyzed osteological spectrum usually belong to forest fauna. This is consistent with the complex reconstruction of the climate of the Baraba forest-steppe, carried out on the basis of the analysis of lacustrine sediments: at the turn of the 3rd–2nd millennia BC, there was a humidification and cooling, as well as an expansion of the taiga vegetation zone (Zhilich et al., 2017; Molodin, Zakh, 1979).

In the burial grounds of the Odino and Krotovo cultures Sopka-2A, -2/4B, C in the Baraba forest-steppe, which are contemporaneous to the Vengerovo-2 settlement, the bulk of the bone artifacts were also made from the bones of elk and other large mammals (Molodin, 2012; Molodin, Grishin, 2016). Among these finds, there are jewelry items made from the bones of hare, beaver, teeth of bear, sable, fox, and wolf. In the burials, the talus bones of small ruminants are present in various quantities (up to 15 units); in rare cases, of cattle and horses.

Correlation analysis demonstrated that the osteological collections of the Vengerovo-2 settlement in terms of species composition are generally identical to the collections of the Krotovo settlements Preobrazhenka-3 and Abramovo-10A (Baraba forest-steppe), Cherno-Ozerye VI (Irtysh basin) (Molodin, 1985: 73, tab. 3) (Fig. 5). On the basis of osteological finds, Molodin defined the economy of the people of the Krotovo culture as diversified, with a productive livestock-raising basis and a significant role of hunting. Cattle (bulls and cows) and horses dominated the herd; a smaller proportion were sheep (Ibid.). The paleofaunal materials of the Inberen X settlement also confirm that the basis of the herd were cattle and horses; the share of small ruminants was also significant (Stefanova, 1988). In the Yelunino settlement Kolyvanskoye I (northeastern foothills of Altai), herd was also dominated by cattle; according to the head of the excavations, this was due to the mining and metallurgical specialization of the village: bulls were used as a draft force (Grushin, 2012: 174). The osteological collection of Vengerovo-2 is distinguished from the collections of other Krotovo sites by a small proportion of horse and cattle bones. This may indicate both specialized livestock breeding, focused on sheep and goat breeding, and the specific composition of the meat diet (with a greater proportion of meat from small ruminants). A similar situation was recorded while studying the settlements of Cherno-Ozerye IV and VI: the basis of the livestock, according to V.F. Gening and N.K. Stefanova, consisted of small ruminants (up to 85 %), cattle and horses were represented in equal amounts (1982: 62). At the Yelunino settlement Berezovaya Luka (left bank of the upper Ob River), among the identifiable bones, the remains of small ruminants are 17,941 spec., or 58.3 %, horses – 7719 spec., or 25.1 %, cattle – 5139 spec., or 16.6 % (Grushin, 2012: 172).

In the osteological spectrum of the Krotovo settlements, the proportion of wild animals reaches approximately 40 %. This testifies to the significant role of hunting in the economic system of the population. On this basis, only the collections of the Cherno-Ozerye IV and VI settlements are distinguished (Gening, Stefanova, 1982: 62), in which single bones of wild animals were found. According to

*Unsatisfactory macroscopic preservation of bones does not allow us to reliably determine the features of their "exhibition" in the form of whole carcasses or in skeletonized form.

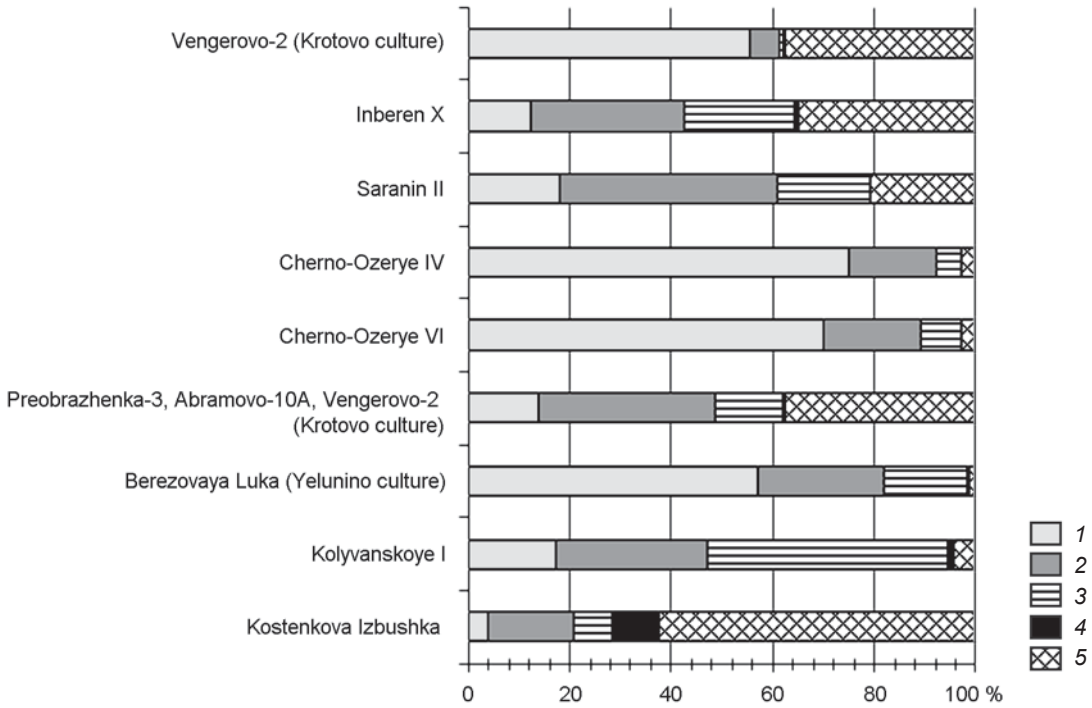

Fig. 5. The ratio of the bones of wild and domesticated species of animals from the Middle Bronze Age settlements in the forest-steppe zone of Western Siberia, %.
1 – small ruminants; *2* – horse; *3* – cattle; *4* – dog; *5* – wild species.

the results of the osteological analysis of materials from the Yelunino settlement Kostenkova Izbushka (right bank of the upper Ob River, the shore of Lake Itkul), the main occupations of its inhabitants were fishing and hunting; bones of wild animals make up more than 60 % of the osteological collection (Grushin, 2012: 176).

Thus, the results of archaeozoological analysis indicate the economic variability of the settlement population of the Western Siberia forest-steppe zone. This was due to the natural landscape conditions, economic characteristics, and elements of material culture (Levin, Cheboksarov, 1955; Andrianov, 1968; Arutyunov, Khazanov, 1979; and others). Among the settlements of the Yelunino culture located in the Altai forest-steppe, S.P. Grushin distinguished three economic and cultural types: forest, hunting, fishing, and cattle breeding, diversified, with a predominance of hunting and fishing (the 1st type); forest-steppe, cattle breeding, with an insignificant role of hunting and fishing (the 2nd type); foothill, metallurgical, with a leading role of cattle breeding and with an insignificant role of hunting and fishing (the 3rd type) (2012: 175–176). The materials presented in the article make it possible to classify the Vengerovo-2 settlement as a variant between 1st and 2nd type, in which the significant role of hunting remains, but the basis of the economy is the local breeding of small ruminants livestock.

The distribution of domesticated animal species in Western Siberia has been recorded at least from the middle of the 3rd millennium BC. It probably originated from the centers of domestication of sheep, goats, and cattle that had been functioning in the western regions of Central Asia since the 6th–5th millennia BC (Benecke, 2017). The oldest remains of domesticated bovids in Siberia were found in the Altai; they belonged to the Afanasyevo period (late 4th millennium BC). The appearance of Western Asian domesticated animals and pastoralism with nomadic herds in the steppe and forest-steppe zones of Western Siberia dates back to the early 3rd millennium BC. In the Baraba forest-steppe, this is associated with the carriers of the Odino culture. Domesticated small ruminants came to them from the western regions of Central Asia as a result of migration processes, such as *Contacts* (contacts within the interregional trade relations) (Molodin, 2019). This is evidenced not only by the sheep bones found at the Odino sites (see, e.g., (Molodin, 2012; Marchenko et al., 2016)), but also by the appearance of imported items of southern origin (jewelry). Cattle phalanges with the signs of deformation recently discovered at the Novoilyinka VI site (Kulunda forest-steppe) indicate that the populations that lived at a distance of about 450 km southwest of Baraba, apparently by the end of the 4th millennium BC, switched to a nomadic lifestyle,

with seasonal movement (Kiryushin, Gaiduchenko, Makarevich, 2020). To determine how far north this trend has spread is a challenge for future research. The materials of such settlements as Vengerovo-2 give grounds to draw a conclusion about the stationary way of life of their inhabitants, who were engaged in local household animal husbandry, with a predominance of small ruminants in the herd.

Conclusion

The study of archaeozoological collections of the Vengerovo-2 settlement showed that animal resources were the most important element of the population subsistence system. Household animal husbandry was focused on breeding mainly small ruminants, with a small proportion of horses and cows. Hunting for large mammals, such as elk and roe deer, as well as fur-bearing animals, played a significant role. Elk bones served as the main raw material for making tools. The procurement of furs, hides, and skins was probably one of the main economic activities of the population, along with bronze casting, pottery making, and other household crafts. The presence of whole skeletons, as well as the skulls of fur-bearing animals, at production areas is possibly associated with ritual activities.

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