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MASTER AND VISITORS OF THE CAVE OSTANTSEVAYA (SAKHALIN ISLAND, RUSSIAN FAR EAST)

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I. Kirillova – N. Zelenkov – A. Tesakov: Master and visitors of the cave Ostantsevaya (Sakhalin Island, Russian Far East)

Abstract: The Ostantsevaya Cave (Sakhalin Island, Russian Far East) yielded rich and diverse vertebrate fauna of Late Glacial through Holocene time. The bone assemblage is dominated by remains of brown bear and hare, reindeer and snow sheep. The fauna for the first time documented the presence on Sakhalin of several mammal forms including cave lion, steppe ferret, collared lemming, and ground squirrel. The origin of the bone accumulation in the site is mainly due to natural factors, such as predators and fluvial activity, but the Early Man was also undoubtedly involved in this process. Brown bear was the most important bone-accumulating agent throughout the investigated history of the cave.

Key words: Natural cave, mammals, taphonomy, Late Pleistocene, Holocene, Sakhalin, Russia

INTRODUCTION

Environmental changes during the Quaternary were marked by glacial and interglacial fluctuations. On Sakhalin Island, likewise in other parts of the Palaearctic, these climatic cycles caused periodical southward/northward range shifts of plant and animal associations. The Central Sakhalin located in between northern and southern parts of the island that dramatically differ in their environmental conditions. Of particular interest is the formation of the cave sediment record in a geologically short but palaeogeorgaphically very significant time interval from the Late Glacial time through the present time. These geographical and time factors defined the bone assemblage composition of the Ostantsevaya Cave.

Location and origin of the cave

The cave Ostantsevaya is located on the southwestern slope of the Vaida Mountain (049°51'N, 143°31'E), in the northern part of the Okada limestone massif. It represents an ancient Upper Jurassic reef assigned to the Ostrinskaya Formation. The 4.5 km long Okada Massif is located in the upper reaches of the Vitnitsa River. Its southeastern part forms the Vaida Mountain, which has two peaks (835 and 947 m).

The cave has a karst origin. Flatness of walls, arches, and ceiling, as well as the ongoing entering of water clearly indicate the current activity of these karst processes.

History of investigation

Dozens of karst caves have been found in the Okada Massif since 1948, including one of the deepest (875 m) Far Eastern cave, the Kaskadnaya one. Several archaeological sites containing mammal bones (Laz Muraveika, Ikonnikova, Medvezh'ih Tragedii, Lastochkina) as well as zoogenous bone assemblages of the Late Glacial and Holocene have been investigated in details (Alekseeva, 1990, 1995; Alekseeva et al., 2004; Burova, 1998; Panteleev, 2001; Kirillova, 2003). An expedition of the Pacific institute of geography of the FESC USSR AS led by Yu. I. Bersenev and expedition of Biology-Soil institute of the FESC USSR AS under the direction of M. P. Tiunov studied the karst massif of the Vaida mountain in details in 1981 – 1982.

The cave Ostantsevaya was discovered by Yu. I. Bersenev in 1970-s; excavations were led by S.V. Gorbunov (Tymov regional museum) in 1994 – 1997. The cave entrances is at the attitude of 380 m a.s.l. It is 70 m higher than the local base level of the Vitvitsa River. The cave has a length of 21 m, and the area of 24 m^2. The cave has two narrow entrances (up to 2 meters heigh) which in few meters merge into a gallery with a platform and an inclined well at its end (Fig. 1). The depth of this well is about 7 meters; its area ranges from 0.5 to 1.5 m^2.

Vertebrate bones were found near the cave entrance and also inside the well. Bones collected near the entrance (totally 199) were studied by E. I. Alekseeva. She has found the prevalence of the reindeer and snow sheep, the significant amount of bones of the Siberian musk deer, and a few remains of the Arctic fox, deer, hare, and horse (Alekseeva et al., 2004 and web-based report of the Poronaisk regional museum). This is the first evidence for the existence of horse on Sakhalin. Radiocarbon data showed the age of this find being older than 15 ka (Kuzmin et al., 2005). Two bones of the Gyrfalcon (*Falco rusticolus*) were also previously identified from the cave (Panteleev, 1997).

The aim of the present paper is to characterize and reveal the origin of the vertebrate assemblages from the well of the Ostantsevaya Cave.

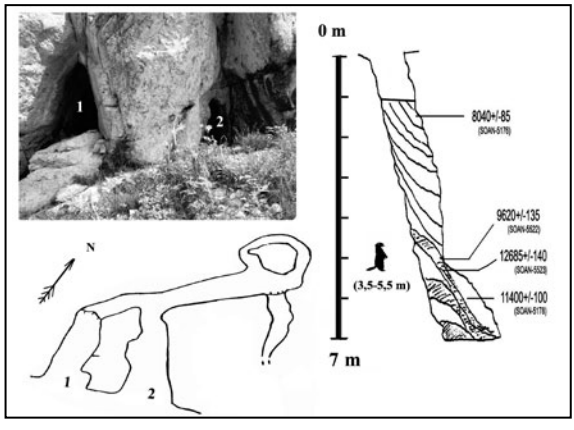

Fig. 1. Ostantsevaya Cave: entrance view (photo), plan and profile (field drawings of S. V. Gorbunov). ^{14}C dates after Kuzmin et al. 2005.

MATERIAL

Bones from the well have been assigned to 12 conventional horizontal layers, 0.5 m each. According to S. V. Gorbunov (pers. comm.), natural layers had inclined position, particularly significant near the bottom of the well. Thus each conventional layer may include bones from at least two natural layers. This fact does not allow for precise correlation of bone accumulation phases with the regional climatic changes, but it is still possible to reveal major factors that affected the accumulation of bones.

When excavations started, the well was filled with sediments up to the level of 1.1 m below the cave floor. Flowing water and burrowing animals could have caused some mixing of the materials between layers. For example, the brown bear often burrows upper ground layers as a preparation for wintering. Noteworthy, first explorers of the cave

noted scratches on the walls evidencing that the cave was used by wintering bears. Any of the factors mentioned above may be responsible for the inversion of the radiocarbon dates which is documented for the lower layers of the well; these data are (from the lower to upper parts of the well): 11,400; 12,700; 9,600 in the lower third, and 8,000 in the upper part.

Bones from the cave were studied by I. V. Kirillova (large mammals), A. S. Tesakov (small mammals), and N. V. Zelenkov (birds). The whole collection of animal remains from the Ostantsevaya cave contains approximately 9000 bones, 4200 of which were identified up to lower taxa, including about 200 bones of ruminants and 28 bird bones. The rest are large mammals of 25 taxa (Kirillova, 2006). The majority of the avian bones is undamaged and well identifiable.

All materials are catalogued by the Tymovskoe Museum of Regional Studies (TMRS).

Small mammals

This group of mammals is poorly represented in the collection due to the sampling methods aimed mostly at getting large size remains. Nevertheless, our material includes sporadic remains of Chiroptera indet., *Eptesicus nilssoni, Ochotona* cf. *hyperborea*, Sciuridae gen. indet., *Tamias sibiricus, Spermophilus undulatus, Discrostonyx* cf. *torquatus*, *Clethrionomys rufocanus, Clethrionomys rutilus, Microtus* sp. Collared lemming and long-tailed ground squirrel were found on Sakhalin for the first time (Kirillova and Tesakov, 2005, 2008).

Large mammals

Taxonomic list of large mammals is given in the Table 2. The bones are generally well-preserved, as typical for karst localities. Bones are white to dark brown, usually fragmented. Sings of digestion are visible on few first and second bear phalanges that indicates an action of a large predator. More than a half of bones have scratches attributable to large carnivoran teeth (Fig. 2).

Along with the animal bones, about 20 stone artifacts have been found in the cave; the cut-marks are well visible upon some large animal bones (see below).

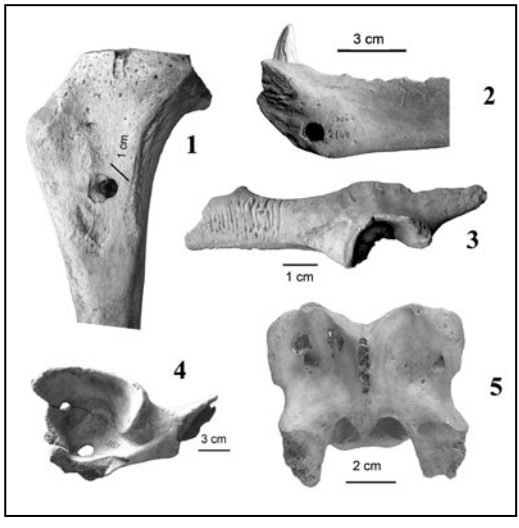

Fig. 2. Tooth marks on bones: 1 – tibia of bear (No. 279-4), 2 – mandible of young bear (No. 279-2144), 3 – pelves of musk deer (No. 279-986), 4 – pelves of bear (No. 279-2157), 5 – first cervical vertebra of bear (No. 279-5124).

RESULTS AND DISCUSSION

Tables 1, 2, and Fig. 3 show that the majority of remains belongs to the brown bear and hare. They are followed by middle-sized ungulates (reindeer, snow sheep), and the red fox, while the other animals constitute a small portion of the whole number of bones. The taxonomic list of large mammals from the cave differs from the extant faunal list of the island. Along with the species that inhabit the Sakhalin Island today (reindeer, brown bear, red fox, glutton, sable and others), the fauna includes species now missing on the Sakhalin (such as, Siberian musk deer, moose, snow sheep, Arctic fox, cave lion, ground squirrel, etc.). Some of them (cave lion, large bovids, steppe ferret, collared lemming, and long-tailed ground squirrel) are the first records on Sakhalin.

The animals from the cave can be assigned to the several ecological types: mountain (snow sheep, ground squirrel), open nival landscapes (reindeer, snowy owl, Gyrfalcon, willow grouse), boreal (lynx, sable, Siberian musk deer, spotted nutcracker, hazel grouse), forests (moose, roe, red-backed voles, chipmunk, grae-headed woodpecker), periglacial and steppe dwellers (Arctic fox, collared lemming, steppe ferret, black-tailed godwit), ecologically plastic animals (brown bear, wolf, red fox, wolverine, ermine).

Table 1. Mammal remains (except small size forms), numbers and %, from the well of the Ostantsevaya Cave.

Level	Determinable		Undeterminable		Total in levels, specimens
	Specimens	%	Specimens	%	
1	271	**59**	190	**41.0**	**461**
2	437	**62.3**	264	**37.7**	**701**
3	424	**57.1**	318	**42.9**	**742**
4	735	**50.3**	727	**49.7**	**1462**
5	198	**30.0**	462	**70.0**	**660**
6	122	**40.4**	180	**59.6**	**302**
7	149	**49.5**	152	**50.5**	**301**
8	237	**68.5**	109	**31.5**	**346**
9	250	**28.5**	628	**71.5**	**878**
10	350	**69,4**	154	**30.6**	**504**
11	573	**37,3**	963	**62.7**	**1536**
12	218	**44,3**	274	**55.7**	**492**
Total	**3964**	**–**	**4421**	**–**	**8385**

Table 2. Taxonomic composition of mammal remains (except small size forms), %, from the well of the Ostantsevaya Cave.

Animals	Levels											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Lepus timidus	17.3	18.5	19.1	13.9	15.7	41.8	26.8	13.9	22.0	29.7	35.61	33.4
Ursus arctos	55.8	76.6	67.9	67.2	21.7	42.7	39.6	48.5	38.4	53.4	30.02	40.7
Canis sp.	0.4	–	–	0.3	–	–	–	–	–	–	–	–
Canis lupus	–	–	–	–	0.5	–	–	–	–	–	–	–
Alopex lagopus	–	–	–	–	–	–	0.7	–	–	–	–	–
Vulpes/Alopex	–	0.7	0.7	0.1	–	1.6	–	–	0.4	0.3	–	–
Vulpes vulpes	1.1	–	–	0.8	5.0	–	–	2.1	3.2	0.6	1.92	2.8
Gulo gulo	–	–	–	–	–	–	0.7	0.8	0.4	0.3	0.17	0.5
Martes zibellina	0.7	–	0.5	1.0	1.0	–	–	1.7	2.0	–	0.35	–
Mustela erminea	–	0.2	–	–	–	–	–	–	–	–	–	–
Mustela eversmanni	–	–	–	–	–	–	–	–	–	0.3	–	–
Lutra lutra	–	–	–	–	–	0.8	–	–	–	–	0.17	–
Mustelidae	–	–	–	0.1	–	0.8	–	–	–	0.9	0.52	–
Panthera cf. spelaea	–	–	–	–	–	–	–	0.4	–	–	–	–
Felis lynx	–	–	–	–	0.5	–	–	–	–	–	0.17	–
Carnivora, L	–	–	–	–	–	2.5	–	–	–	–	1.57	2.8
Moschus moschiferus	–	2.3	0.5	0.4	–	–	–	–	–	0.3	–	–
Capreolus	–	–	–	–	–	–	–	–	–	–	0.35	0.5
Alces alces	–	–	0.2	–	–	–	–	–	–	–	–	–
Rangifer tarandus	5.9	0.5	3.1	3.5	16.2	7.4	9.4	10.1	9.2	3.4	8.73	6.9
Cervidae, L–M	–	–	–	0.5	–	–	–	–	–	0.3	–	–
Perissodactyla, S	–	–	–	–	1.5	–	–	–	–	–	–	0.5
Perissodactyla, M	9.6	0.5	4.5	5.0	22.2	1.6	15.4	11.8	16.0	7.1	11.35	6.9
Perissodactyla, L	0.4	0.2	–	–	0.5	–	–	–	0.4	–	–	–
Bovidae, L	–	–	–	0.5	0.5	–	–	–	–	0.3	0.17	–
Ovis nivicola	8.8	0.5	3.5	6.7	14.6	0.8	7.4	10.6	8.0	3.1	8.90	5.0

1) Bold face stands for species recorded on Sakhalin for the first time.
2) Capital letters stand for size classes in mammal groups: S – small, M – medium, L – large.

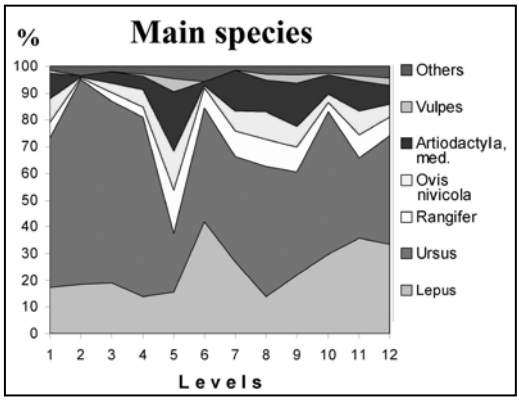

Fig. 3. Distribution of main species (more than 5 % of the assemblage) in levels of the Ostantsevaya Cave.

Birds. Avifauna from the well of the Ostantsevaya Cave comprises 7 species. The most numerous are remains of the grey-headed woodpecker (*Picus canus*) and the spotted nutcracker (*Nucifraga caryocatactes*); 8 bones of the former and 7 bones of the latter have been identified. The grey-headed woodpecker inhabits light deciduous forests, while the spotted nutcracker prefers coniferous forest with the Siberian pine which is the main food source of this species in the most of the Asian part of its range. The presence of these species throughout the depth of the well clearly indicates the presence of mixed forest landscapes during the whole period of accumulation. Other woodland species are the typical far eastern form, the white-throated needletail (*Hirundapus caudacutus*), and the hazel grouse (*Tetrastes bonasia*).

The black-tailed godwit (*Limosa limosa*) is an open-land dweller, but today it can be seen on the Island only during migrations (Nechaev, 1991). The snowy owl is a typical representative of the Pleistocene glacial steppe tundra and is very common in Pleistocene avifaunas (Ericson and Tyrberg, 2004). Two fragments of this species were found in the well. Nowadays the snowy owl is common on Sakhalin in winter (Nechaev, 1991), but the find of this species could also indicate the presence of the periglacial landscapes. Also a bone of the grouse (*Lagopus* sp.) was found in the well. This genus is also a typical representative of the Pleistocene faunas in Eurasia, but the grouses still occur on the Sakhalin today. One bone of a petrel (*Oceanodroma* sp.) from the first layer is rather strange find, since no other marine birds or mammals are represented in the cave deposits.

The predominance of the medium sized arboreal species in the collection of avian remains allows us to advocate the natural type of accumulation of bird bones. It seems to be unassociated with human activity, and could be caused by predators hunting or by occasional accumulation.

MOST COMMON REPRESENTATIVES OF THE CAVE TAPHOCENOSIS

Brown bear

At present, the Sakhalin Island is inhabited by a comparatively large form of brown bear, though the overall size and skull morphology of this species vary in different parts of the island (Yudin, 1993). Four well preserved skulls (2 males, 2, females) have been found in the upper layers of the well; they all belonged to individuals that were smaller than the modern Far Eastern bears (Fig. 4). Bones of larger individuals were found, however, among the bear remains from the lower part of the well.

Dental material from the well includes deciduous fangs of bear (totally 69). Modern bears on the Sakhalin island lose their deciduous fangs by the 14 months of life (Voronov, 1972), or during the first wintering at the age of about one year (Yudin, *pers. comm.*).

A find of a cranial fragment with erupting deciduous teeth and embryonic ulna in the layer 3 clearly indicates that animals died here in late autumn or in winter. In addition, growth marks on the outer surface of the tooth roots show that death occurred during

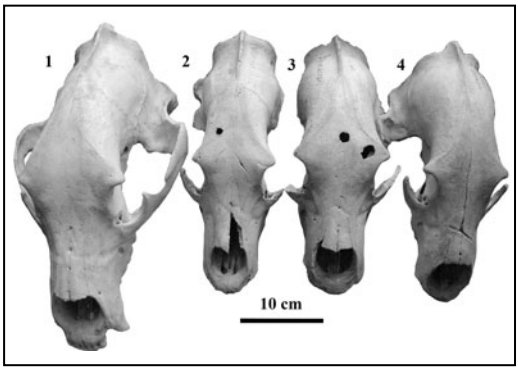

Fig. 4. Bear sculls: 1 – Modern male from the upper reaches of Bikin River (Primorie Territory), 2 – (No. 279-378), 3 – (No. 279-977) and 4 – (No. 279-3390) correspondingly from lavels 1, 2, and 4 from the well of the Ostantsevaya Cave. Marks on the scull 2 can me of the artificial origin. Orifice on frontale of the scull 3 are human made: a stone tool have been found inside the scull. The scull No. 4 bears a treck from a strong impact of a heave object on nosale (shock zone).

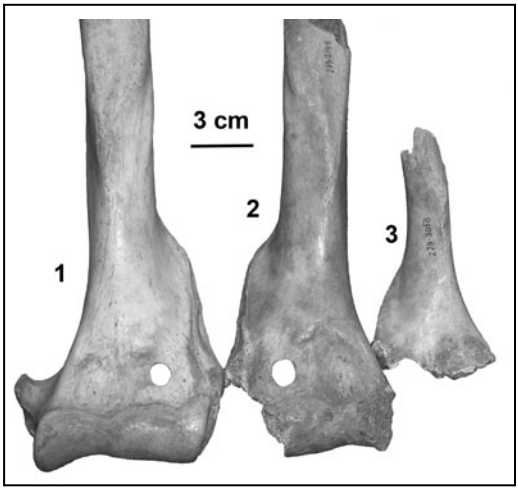

Fig. 5. Natural reach-through hole in ulnar facet of bear humeri from lavel 4: 1 – 2, one adult animal; 3 – juvenile animal.

non-growing period, specifically a cold season in specimen no. 279-1554, or at the very end of a cold season in no. 279-1551.

The fact that bears died in the cave during cold seasons together with the find of numerous deciduous teeth throughout the whole sequence of the well indicate that the Ostantsevaya Cave was used as a den for thousands of years.

Interestingly, remains of a few inspected adult individuals, according to the method of Klevezal (1996), died in warm season. Normally bears spend warm seasons outside their winter dens. This may indicate that not only natural type of accumulation played a role in the forming of the cave taphocenosis. However, we should keep it in mind that old and sick animals often stay in a shelter till they die, and the cave is such a suitable shelter.

Many humeral bones of the brown bear show foramen located proximally. Totally 5 fragments out of 8 distal humeral bones found in the layers 3, 4, and 8 have this feature (Fig. 5). This feature is not mentioned as common in other bear localities. In humans it is a discrete and heritable character (Drobyshevsky, 2006). Since the general morphology of the human and bear humerus is similar, this character may be also inheritable in bears. In this case, this trait may be common for the local population of bears. According to Yudin (*pers. comm.*), bears from the different parts of Sakhalin vary in skull morphology and size. It is possible that these humeri with foramen originate from females since they possess more gracile skeleton. The prevalence of females in the cave taphocenosis would not be surprising when taking into account their denning behavior.

In the Russian Far East, female brown bears usually winter in dens or other shelters due to reproduction reasons. On the contrary, male brown bears often winter in shallow rock shelters or even under rocks or trees. Moreover, females with cubs or younger males are relatively easy prey for a larger bear or other predator (cave lion, human). Cannibalism is common in mainland populations of bears where it often reflects limited resources. But it is not typical for recent island populations and, in particular, for bears of Sakhalin, because of perfect feeding conditions, including fish in spawning streams (Yudin, 1993). At

the same time animals that died during winter still can be utilized by carnivorous animals later, for example, early in the spring. This can explain abundant tooth marks on bear bones from the well.

Tooth marks on the second cervical vertebra from the layer 10 deserve a special note (Fig. 2.5). This can be an evidence of killing rather than just a consuming. Bear attacks large prey by breaking its backbone with the paw strike. When bears eat cervical parts of their prey they leave gnaw marks on pointed parts of vertebrae (or utilize them entirely). Therefore, this mark can be alternatively attributable to a large pantherine cat. These animals hunt on bears and the manner in which they kill bears was described in the literature: "Especially large tigers... successively hunt bears of the nearly equal weight... Tiger jumps on a bear from above, holds its chin by one front paw, and its neck by another paw, simultaneously biting through its cervical vertebrates... (Baikov, cited after: Ognev, 1935). Yudin (*pers. comm.*) also confirm the fact that tiger kill prey by cutting its neck. It will be correct to extrapolate this hunting behavior to the cave lion, represented in the well material by a deciduous tooth (Kirillova and Tesakov, 2008).

Hares

Hare remains are second most abundant element of the assemblage after the brown bear. The hare is a preferred prey for a number of predators. Adults and juveniles are nearly equally represented in the lower part of the well, but this ratio shifts toward the prevalence of juveniles in the upper layers. We propose the following explanation for that: when the well was empty, both juveniles and adults would die when occasionally trapped inside, but after the well filled with sediments, only juveniles could not escape this natural trap.

Remains of hare are often numerous in cultural layers of the late Paleolithic; they are abundant in zoogenous bone assemblages, especially those connected with the eagle-owl activity. In our case, however, no signs of partition or special patterns of fragmentation are evidenced. Most probably their accumulation was caused by an activity of birds of prey. Taphonomically similar condition is described in details for another site of the Vaida Mountain, the Lastochkina Cave (Burova, 1998).

Middle size ungulates

The reindeer and snow sheep fall in this category. Their remains constitute a significant part of the total number of bones (see above). Bones of these animals often bear teeth marks, they are often rolled (presumably due to the water flow in the well) and fragmented. Some of them bear cut marks. Adult remains prevail. The accumulation of ungulate bones is most likely connected with predators' activity.

Human artifacts in the Ostantsevaya Cave

Three of four almost complete brown bear skulls from the well show obvious marks of human impacts. Thus, the left half of the os frontale of an older male skull (specimen no. 279-977; Layer 2) has two rounded openings (Fig. 4.3) measuring 18 by 13.8 and 11.2 by 10.8 mm. The right squamosum of this specimen is also punched out. These openings are rimmed by cracks running from them. Detailed study of these skulls shows that these openings had been made when the skull was yet fresh. Lower jaws of this skull lack articulate processes, and the coronal processes are also missing or strongly damaged. Another example is a skull of mature female (specimen no. 279-3390; Layer 4). The base of nasal bones has an obvious linear mark indicative of a strong straight punch which was made by a huge object (Fig. 4.4). This trace is 37 mm long, 3 – 3.5 mm wide, and 1mm deep. This stroke apparently was fatal, and produced a large crack, passing through the sagittal crest. Finally, an opening 9 × 8 mm and a 40 mm long trace in the skull no. 279-378 (Layer 1) are also most probably produced by humans.

Some of the lower jaws from the Layer 10 have similar injuries of the ascending process (Fig. 6), which is the evidence of human activity. Most likely, they were made during the

splitting the lower jaws from the skulls.

Marks on a fibula of the brown bear (Fig. 7) indicate a stroke, and of no doubt artificial. One femur of the brown bear show cut-marks made during the removing of the flesh from the bone; traces on a pelvic bone (Fig. 7) obviously have similar origin.

Further worth to be mentioned are similar holes on four astragals of the middle sized ungulates from the layers 4 and 11. Similar holes likewise common in sites of ancient hunters of Mesolithic and Neolithic, and are sometimes referred as to a signs of marrowbone extraction. But this bone is too thick and the quantity of the marrowbone is too small. Most probably these bones served as parts of composite tools.

The overall small quantity of artifacts and burned bones, together with rare signs of human impacts on animal bones indicate the irregular occurrence of humans in the cave. E. Alekseeva (*pers. comm.*) speculated on a ritual use of the cave.

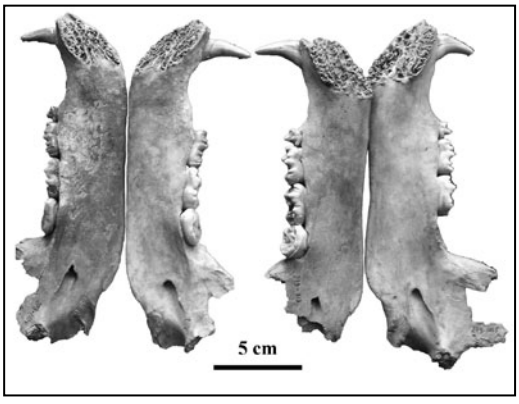

Fig. 6. Homogeneous artificial damages of bear mandibles (possible cutting of ascending parts of lower jaws during their divison from sculls). No. 279-1105, 279-713, 279-1104, 279-1106.

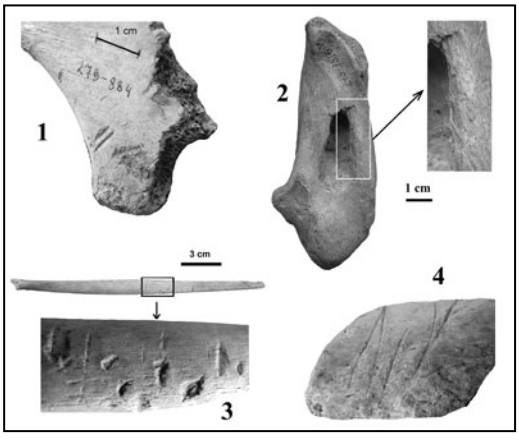

Fig. 7. Human produced marks of bones. 1 – cutting of bear pelves (No. 279-884), 2 – artificial hole on calcaneal of a medium size ungulate (No. 279-1516), 3 – impact of pointed object on fubula of bear (No. 279-888), 4 – signs of narrow blade on proximal part of bear tibia (No. 279-694) (fragment), possibly originated during butchering.

CONCLUSIONS

The process of vertebrate remains accumulation in the Ostantsevaya Cave took a long time from the latest glacial to the second half of the Holocene. Radiocarbon data from the bones range from 16 to 8 ka. During all or at least part of this time interval, environmental conditions were different from those found on the island nowadays, that is evident from the remains of horse, large bovids, suslik, steppe ferret, and cave lion – because all of them are absent on the Sakhalin at present.

Heterogeneous taxonomic list of animals from the cave documents changes in environmental conditions. Various animals represent different environments: horse, large ungulates, hor, ground squirrel, and collared lemmings indicate the presence of open habitats that nearly entirelly missing on the Sakhalin today, whereas reindeer and lynx, sable, musk deer, moose, and roe indicate the presence of semi-open forests. The cave was also inhabited by early humans, but signs of their presence are rare.

Osteological materials from the cave contain information on events that occurred in the cave and in its neighborhood throughout the thousands of years. The cave was a natural trap for some animals, bones of consumed animals accumulated here as well,

and the brown bears, the main visitor of the site, accidentally died here during winter seasons. These are obviously the main factors that influenced the accumulation of vertebrate remains.

Most likely, the cave was an efficient trap for smaller animals, like hares and foxes, while brown bears could die here during the period of the intensive snow melting, or hard rains. Since the cave was a good wintering place for bears, cases of cannibalism and intraspecific hunting (as well as that by humans) were common here. Most probably, both humans and other predators (brown bear, fox, panthera, and wolf) consumed their prey here. The Ostantsevaya Cave is the first documented evidence of the interaction between the brown bear and *Panthera*, which is evident from the find of a vertebra of bear with the teeth marks attributable to a pantherine cat.

Although the assemblage of bones from the cave is polygenous, the key figure and the main participant of this historical scenario was the brown bear.

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ХОЗЯИН И ПОСЕТИТЕЛИ ПЕЩЕРЫ ОСТАНЦЕВАЯ (ОСТРОВ САХАЛИН)

Резюме

Описана фауна позвоночных позднего ледниковья и голоцена из пещеры Останцевая (остров Сахалин, Дальний Восток России). Среди костей доминируют остатки бурого медведя и зайца; заметна доля северного оленя и снежного барана. Некоторые виды млекопитающих, включая пещерного льва, степного хоря, копытного лемминга и суслика, впервые найдены на Сахалине. Накопление костных остатков в пещере связано в основном с естественными процессами (деятельностью хищников и водных потоков); несомненно также участие древнего человека. Активность бурого медведя была основным фактором, обусловившим накопление костей в течение всего времени формирования ориктоценоза.

VLÁDCA A NÁVŠTEVNÍCI JASKYNE OSTANCEVAJA (SACHALIN, RUSKÝ ĎALEKÝ VÝCHOD)

Zhrnutie

Jaskyňa Ostancevaja na ostrove Sachalin (ruský Ďaleký východ) predstavuje bohaté nálezisko rôznorodej fauny stavovcov z obdobia neskorého glaciálu až holocénu. V akumulácii kosťových pozostatkov dominuje medveď hnedý, zajac, sob a horská ovca. Nájdená fauna prvýkrát dokumentuje prítomnosť viacerých cicavcov na ostrove Sachalin, a to vrátane veľkých cicavcov, ako jaskynný lev, stepná fretka, golierikatý lumík a dlhochvostá zemná veverica. Vznik akumulácie kostí v jaskyni odzrkadľuje prirodzené procesy, mnohé nájdené znaky svedčia o aktivite predátorov a fluviálnom transporte. Podľa nálezov možno usudzovať, že najvýraznejším faktorom ovplyvňujúcim akumuláciu kostí počas depozície skúmaného sedimentárneho záznamu bol pobyt a aktivita medveďa hnedého v jaskyni Ostancevaja.