

Palaeoenvironmental analysis of the Upper Palaeolithic site of Buzhanka 2, based on the 2025 investigations

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abstract

This paper presents the results of the faunal analysis of the Upper Palaeolithic site of Buzhanka 2 obtained during the 2025 field season. The Buzhanka 2 archaeological site is located in the village of Buzhanka, Korop Amalgamated Territorial Community, Novhorod-Siverskyi District, Chernihiv Region. The site dates to the period following the Last Glacial Maximum. Its technological complex corresponds to the Mezhyrich type of the Epigravettian industry. In 2025, excavations were carried out in two squares of the site, revealing traces of a fireplace within their boundaries. The faunal collection obtained in 2025 consists mainly of burnt bone that served as the primary fuel for the fireplace, as well as a small number of intact remains of mammoth fauna. Standard archaeozoological methods were applied to study the collection, including taxonomic assignment, assessment of the minimum number of individuals, and age groups of mammals. The species composition of the 2025 collection generally corresponds to the results obtained in previous years. The dominant species at the site is the woolly mammoth *Mammuthus primigenius* (Blumenbach, 1799). Among the mammoth remains from all stratigraphic horizons, infant and juvenile individuals predominate. Mammoth bones constitute the bulk of the fuel remains within the fireplace. These remains are supplemented by finds of predators, including the brown bear, wolf, and arctic fox. The wet-sieving from the site's cultural layers revealed the remains of rodents, including the narrow-headed vole, steppe lemming, and water vole. These rodents were not hunted by humans but formed part of the natural environment surrounding the inhabitants of the Buzhanka 2 site. The interpretative section focuses on the role of animal resources in the subsistence strategies of the site's inhabitants, the season of site occupation, and the reconstruction of the natural environment. The recovery of the remains of a newborn mammoth calf indicates the beginning of the growing season, whereas the remains of a 4–5-month-old bear cub suggest death in May or June. The dimensions of the mammoth calves' ribs suggest that they belonged to individuals approximately 6–9 months old, corresponding to an autumnal period of human presence at the site. The discovery of bear remains corroborates the results of pollen analysis, which indicate the presence of shrub and tree communities in the area. These findings highlight the potential for further field research at the Buzhanka 2 site.

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Палеоекологічний аналіз верхньопалеолітичної стоянки Бужанка 2 (за результатами досліджень 2025 року)

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Резюме. Ця стаття присвячена результатам визначення фауністичної колекції верхньопалеолітичної стоянки Бужанка 2, яка була відібрана в ході польових досліджень 2025 року. Стоянка Бужанка 2 розташована в с. Бужанка, Коропська ОТГ, Чернігівська область і датується часом після максимуму останнього зледеніння. Технокомплекс стоянки є подібним до Межиріцького типу епігравецької індустрії. У 2025 році були проведені польові дослідження на двох квадратах стоянки, які вказали на сліди давнього вогнища в їхніх межах. Фауністична колекція, зібрана у 2025 році, являє собою здебільшого горілу кістку, яка слугувала основним горючим матеріалом, а також окремі цілісні рештки представників мамутової фауни. Для вивчення колекції були застосовані стандартні методи археозоологічних досліджень — визначення видового складу зібраної колекції, мінімальної кількості особин кожного виду, а також індивідуального віку тварин. Видовий склад колекції, зібраної у 2025 році, в цілому повторює результати, отримані до попередніх років. Домінуючим видом на стоянці є мамут *Mammuthus primigenius* (Blumenbach, 1799). Серед решток цього виду в усіх стратиграфічних горизонтах переважають особини дитячого та молодого віку. Кістки мамутів складають основну масу кісткового вугілля у межах вогнища. Його рештки доповнюють знахідки хижаків — бурого ведмеда, вовка та песця. Промивка ґрунту культурних шарів стоянки дозволила виявити рештки гризунів — полівки вузькочерепної, лемінга та стокатки. Гризуни не були об'єктом полювання первісної людини, а становили собою частину природного оточення мешканців пам'ятки Бужанка 2. Інтерпретаційна частина пов'язана із деталізацією ролі тваринної продукції у життєзабезпеченні мешканців стоянки, сезонності перебування первісної людини на стоянці, а також реконструкцією природного оточення. Знахідки уламків несформованої пластини зуба утробного мамутеняти вказують на зимовий час перебування первісної людини на стоянці, епіфіз плечової кістки новонародженого мамутеняти вказує на час початку вегетаційного сезону; знахідки решток ведмеда 4–5-місячного віку вказують на орієнтовний час його смерті у травні або червні. Розміри ребер мамутенят вказують на їх приналежність особинам віком 6–9 місяців, що відповідає осіннім місяцям перебування первісної людини на стоянці. Знахідки решток ведмеда підкреслили результати спорово-пилкового аналізу, які вказали на наявність у місцевості чагарникових та дерев'яних рослинних угруповань. Отримані результати підкреслили перспективність проведення на стоянці Бужанка 2 подальших польових досліджень.

Ключові слова: Україна, верхній палеоліт, епігравець, археозоологія, мікротеріологія, палінологія.

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Introduction

During the Late Pleistocene, the Middle Desna Basin was one of the regions of Eastern Europe that had been well settled by humans. The availability of animals that served as game animals was one of the most important factors influencing the choice of site locations. Evidence of this is provided by the size of the faunal collections and their species diversity at Upper Palaeolithic sites in the region, such as the Mizyn, the Pushkari complex of Upper Palaeolithic archaeological sites, Chulativ I and II, and others. The region's loess deposits contributed significantly to the good preservation of faunal remains at many sites of the Middle Desna Basin. This created favourable conditions for reconstructing the overall picture of biodiversity in the Middle Dnieper region during the Late Pleistocene (Korniets, 1962; Rekovets, 1985; Pean, et al. 2010). The Buzhanka 2 archaeological site is located in the centre of the village of Buzhanka, Novhorod-Siverskyi district, Chernihiv Oblast. Topographically, the cultural layers of the site occupy a low-lying section of a promontory at the head of a ravine that cuts through the right bank of the Desna River. Located slightly more than one kilometer from Buzhanka 2 there is another Upper Palaeolithic site — Buzhanka 1 (Fig. 1).

Excavations at Buzhanka 2 were carried out by its discoverer, Dmytro Stupak, between 2003 and 2008, as well as in 2013 and 2025. During this time, using test pits and boreholes, the depths of the

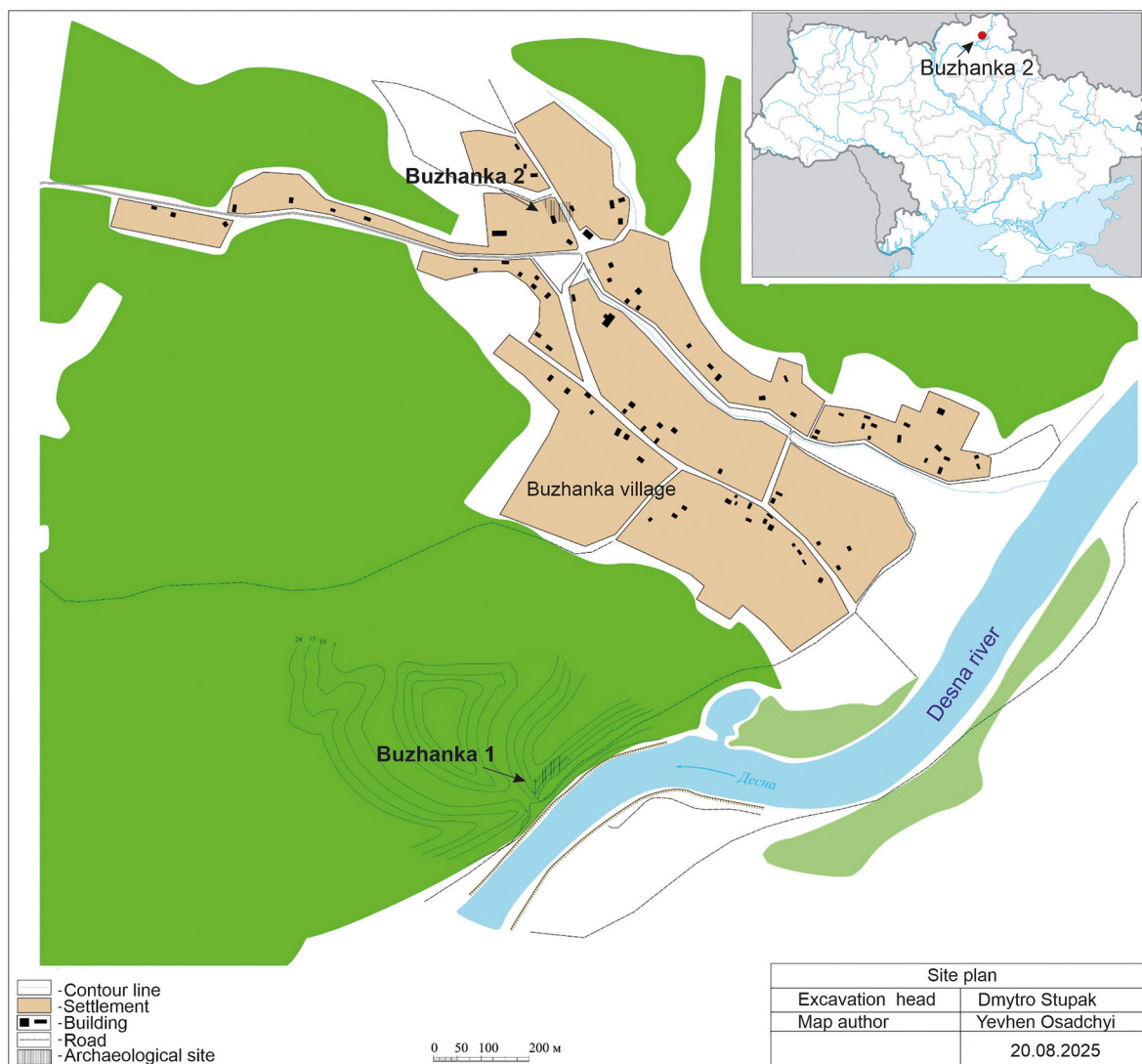


Fig. 1. Location of the archaeological site Buzhanka 2.

Рис. 1. Місце розташування стоянки Бужанка 2.

cultural layers and the extent of Palaeolithic materials were established over an area of approximately 180×100 m. Three excavation areas were established at the site. Upper Palaeolithic materials originate from Excavations No. 1 and No. 3. At Excavation No. 1, covering an area of 20 m², three cultural layers have been identified: 1a, 1 and 2. Cultural Layer 1 is the richest in material and the most informative. Based on the characteristics of its lithic industry, it is closer to Mezhyrich-type sites (Stupak, 2008, 2011). It is precisely the Mezhyrich-type sites that include the world-famous sites of Mezhyrich, Dobranichivka and Hintsy, featuring dwellings made of mammoth bones and structures such as pits and fireplaces (Nuzhnyi, 2015).

Cultural Layer 1 at the Buzhanka 2 site also contains objects — Pit 1 and a fireplace. Radiocarbon dates obtained for this layer are the following: 13,500 ± 80 BP (GifA-80178/SacA-12043) for the left humerus of a wolf, and 14,350 ± 60 BP (GrA-38555) for the long bone of a juvenile mammoth (Stupak, 2011, 2014). Within Excavation No. 3, a cluster of mammoth bones was discovered that potentially represents elements of a dwelling structure (Stupak, 2021).

At the current stage of research on the Buzhanka 2 site, Dmytro Stupak has analysed the lithic artifact collections, Maryna Komar has conducted pollen analysis, and the initial identification of the theriofauna was carried out by Stephane Pean (Komar & Stupak, 2011). The results of the analysis of the faunal collection from the Buzhanka 2 site, including the 2025 materials, have been submitted for publication in the form of abstracts for the UISPP-2026 Congress. The results of the analysis of the 2025 faunal collection have been submitted for publication in the form of an abstract for the conference “Conservation of Biological and Landscape Diversity and Historical and Cultural Heritage in the Context of Sustainable Development”, organised by the Mizyn National Nature Park. The present article is devoted to a thorough analysis of the Buzhanka 2 assemblage collected in 2025.

Materials and methods

During the exploratory archaeological work carried out in 2025, one of the key objectives was to assess the current condition of the Buzhanka 2 and Buzhanka 1 sites following the deoccupation of the Chernihiv Oblast from the Russian Federation’s armed forces. It was found that at Buzhanka 2, part of the high roadside embankment, containing the cultural layer, had been destroyed as a result of natural erosion processes. This poses a threat to the preservation of cultural layers. In July–August 2025, rescue excavations were carried out at the site of the road embankment’s erosion, within two 1×1-metre squares. Upon completion of the fieldwork, the road embankment was stabilised and reinforced. The work was carried out in squares L101 and L102 of Excavation No. 1. Within these squares, Cultural Layer 1a was poorly represented; Cultural Layer 1 proved to be rich in informative material; Cultural Layer 2 is represented by a small number of bones and lithic artifacts (Fig. 2).

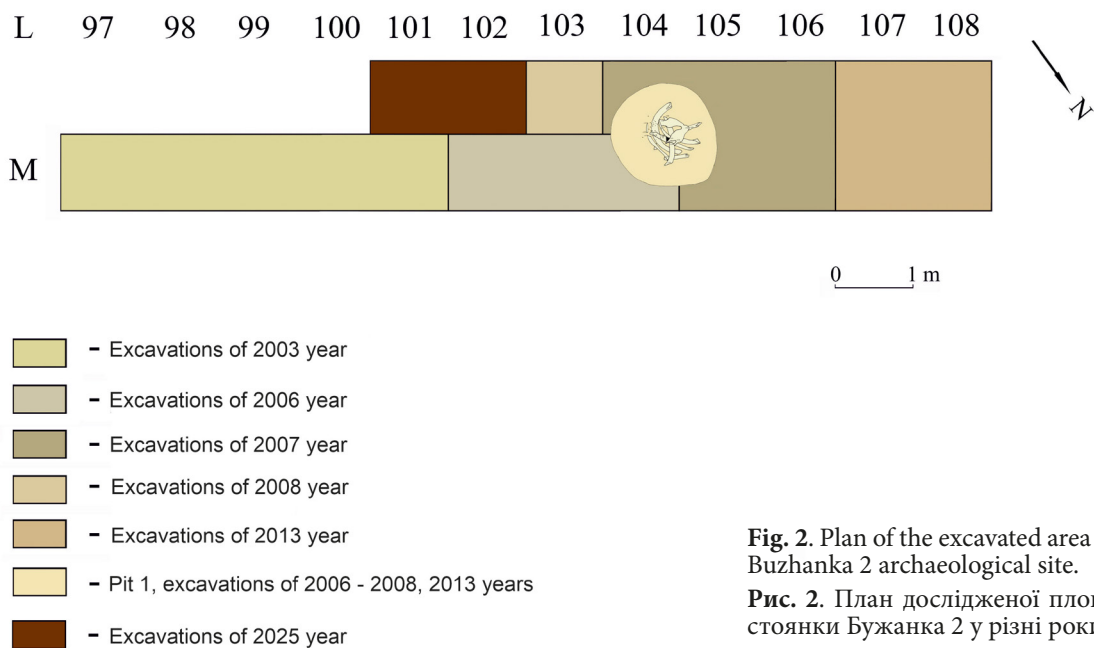


Fig. 2. Plan of the excavated area of Buzhanka 2 archaeological site.

Рис. 2. План дослідженої площі стоянки Бужанка 2 у різні роки.

The main finds in Cultural Layer 1 consisted primarily of burnt bone fragments. Across most of the area of square L102, they formed a continuous debris layer, within and beneath which fragments and small patches of burnt soil were identified (Fig. 3a). These features made it clear that we had investigated part of the fireplace. During excavation, it was noted that uncharred or partially charred bones were generally located in the upper part of the bone debris (Fig. 3b). These bones were likely intended for later use as fuel for the hearth at a later stage. In square L101, the main faunal material came from discrete piles consisting of fragments of predominantly burnt bones that lay tightly packed together. In our interpretation, these accumulations resulted from the discarding bone fragment

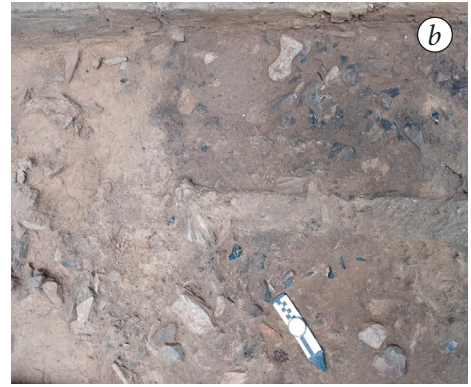


Fig. 3. Cultural layer 1 of the Buzhanka 2 archaeological site with the fireplace, according to the 2025 field investigations: a — squares L101 and L102 of Excavation No. 1; b — the fireplace in square L102; c — accumulations of burned bone fragments, which were thrown out of the hearth in square L101.

Рис. 3. Культурний шар 1 стоянки Бужанка 2 зі слідами вогнища досліджений у 2025 році: а — квадрати L 101 та L 102 Розкопу 1; б — вогнище в квадраті L102; с — скупчення горілих кісток, які становили собою викид з вогнища в квадраті L101.



Fig. 4. Cultural layer 1 of the Buzhanka 2 archaeological site.

Рис. 4. Культурний шар 1 стоянки Бужанка 2.

groups from the fireplace (Fig. 3c). Such ejections likely occurred either to extinguish the fireplace or whilst clearing the fireplace area in preparation for its next ignition. As in collections from previous years, the materials from Cultural Layer 2 consist of relatively large bone fragments that show no signs of fire damage. They are in poorer condition than the faunal remains from Cultural Layer 1, due to soil erosion, which has affected the condition of the bones (Fig. 4).

The cultural layers were excavated primarily using wooden tools, including knives and toothpicks to avoid damaging the faunal remains. The excavated soil from the squares was wet sieved through a 1×1 mm mesh, which allowed the finest artifacts and bones to be recovered.

Methods of studying faunal remains

The bone identification was carried out using comparative mammalian collections housed in the Department of Palaeontology of the National Museum of Natural History, National Academy of Sciences of Ukraine. The individual age of woolly mammoths, *Mammuthus primigenius* (Blumenbach, 1799), was determined according to methodologies based on studies of the growth and replacement of mammoth and African elephant teeth, as well as the development of the mammoth postcranial skeleton (Laws, 1966; Roth, 1984; Haynes, 2017; Maschenko, 2002). The process of tooth replacement in mammoth ontogeny was described by Garutt & Foronova (1976). The individual age of the brown bear, *Ursus arctos* Linnaeus, 1758, cub was determined using a method involving comparison of the measurements of the cub's foot bones with those of an adult individual (Halfpenny, 1986; Pazhetnov, 1990; Pazhetnov *et al.*, 1999). For this purpose, foot skeletal remains from the same individual, discovered in previous excavation seasons, were used. Bone measurements were taken according to the methodology of von den Driesch (1976).

The statistical analysis included the total number of identified specimens (NISP) and the minimum number of individuals (MNI). In determining the minimum number of individuals, age and the frequency of diagnostic anatomical elements were considered (Lee Lyman, 2008).

Results

Faunal composition of Layer 1

Almost all animal remains identified during the 2025 season belong to mammals (Table 1). Only one fragment of a long bone belongs to an indeterminate bird (Fig. 5). The investigated section of Cultural Layer 1 is heavily saturated with fragments of burnt bones, which were used by the site's inhabitants as fuel. The most numerous remains within Cultural Layer 1 are those of the woolly mammoth (NISP=144, MNI=3). Mammoth remains are represented by different age groups. The youngest age category of mammoth calves is represented by two finds (NISP=2, MNI=1) of an unformed plate of dentes praemolares decidui (dp3) tooth. These finds consist of elongated enamel columns forming part of an undeveloped mammoth tooth plate (Fig. 6b). At the time of the animal's death, these plates were still located within the alveolus. Similar specimens have been described by Maschenko (2002) for the skeleton of a prenatal mammoth calf. The proximal epiphysis of the mammoth calf's humerus belongs to newborn mammoth calves, according to data from Maschenko (2002) (Table 5, Fig. 6c).

Table 1. Mammal species composition of the Buzhanka 2 archaeological site (2025 field investigations).

Таблиця 1. Видовий склад ссавців стоянки Бужанка 2 за матеріалами польових досліджень 2025 року.

Taxon	Cultural layer 1			Cultural layer 2		
	NISP	MNI	%	NISP	MNI	%
<i>Mammuthus primigenius</i>	144	3	65.5	7	1	100.0
<i>Ursus arctos</i>	1	2	0.5	–	–	–
<i>Canis lupus</i>	2	1	0.9	–	–	–
<i>Vulpes lagopus</i>	1	1	0.5	–	–	–
<i>Lasiopodomys gregalis</i>	1	1	0.5	–	–	–
<i>Lagurus lagurus</i>	1	1	0.5	–	–	–
<i>Dicrostonyx</i> sp.	3	1	1.4	–	–	–
<i>Ochotona</i> sp.	1	1	0.5	–	–	–
<i>Microtus</i> sp.	1	1	0.5	–	–	–
Mammalia indet.	64	1	29.1	–	–	–
Aves indet.	1	1	0.5	–	–	–
TOTAL	220	14	100.0	7	1	100.0

The rib remains of a mammoth calf (NISP=2, MNI=1) were assigned to an individual estimated to be less than 6–9 months old. The rib widths of 2.4 cm and 1.9 cm do not differ significantly from those of the rib widths of the 7-month-old Kyrgyzlyakh mammoth calf Dima, which, according to X-ray data, measured 1.5–2.5 cm (Shylo *et al.*, 1983). Nevertheless, rib width is not a reliable age indicator and may vary depending on the individual developmental characteristics of the animal (Table 3).

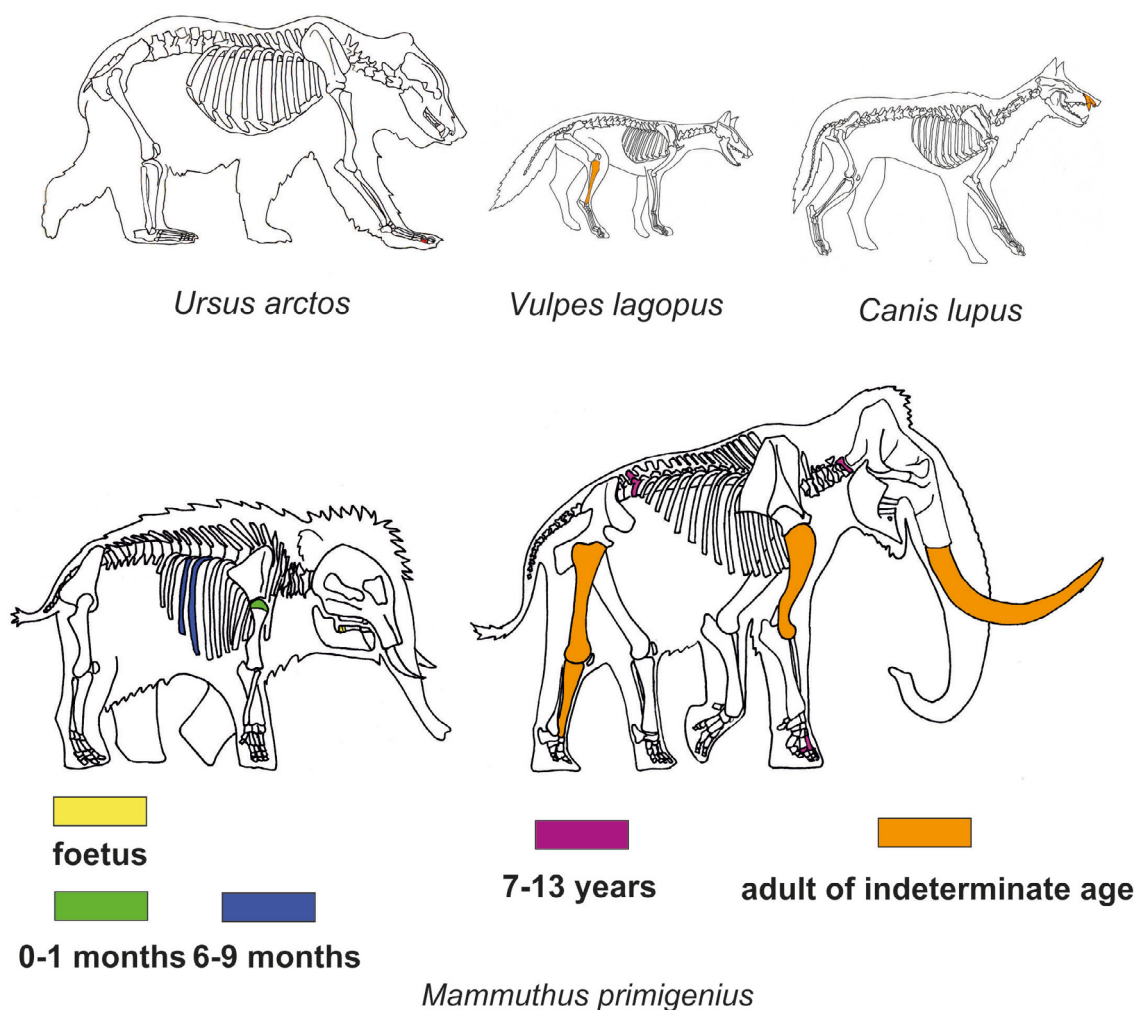


Fig. 5. Anatomical elements representation of mammals of the Buzhanka 2 archaeological site.

Рис. 5. Репрезентація анатомічних елементів ссавців стоянки Бужанка 2 за матеріалами досліджень 2025 року.

Table 2. Mammoth age groups at the Buzhanka 2 archaeological site (2025 field investigations).

Таблиця 2. Вікові групи мамутів стоянки Бужанка 2 за матеріалами польових досліджень 2025 року.

Age groups	Cultural layer 1		Cultural layer 2	
	NISP	MNI	NISP	MNI
0–1 month	3	1	–	–
Less than 1 year	2	1	3	1
7–13 years	4	1	–	–
Adults of undetermined age	142	1	4	1

Table 3. Measurements of the mammoth's ribs from the Buzhanka 2 archaeological site (2025 field investigations).

Таблиця 3. Проміри ширини ребер мамутенят стоянки Бужанка 2 за матеріалами досліджень 2025 року.

Age	Specimen	Costae width (cm)
≤1 year	Bzh-2-25, Layer 1, L 102, –107, No. 128	2.4
≤1 year	Bzh-2-25, Layer 1, L 102, –110, No. 12	1.9
≤1 year	Bzh-2-25, Layer 2, L 101, No. 3	2.4
≤1 year	Bzh-2-25, Layer 2, L 102, No. 3	3.3
≤1 year	Bzh-2-25, Layer 2, L 102, –135, No. 1	3.2

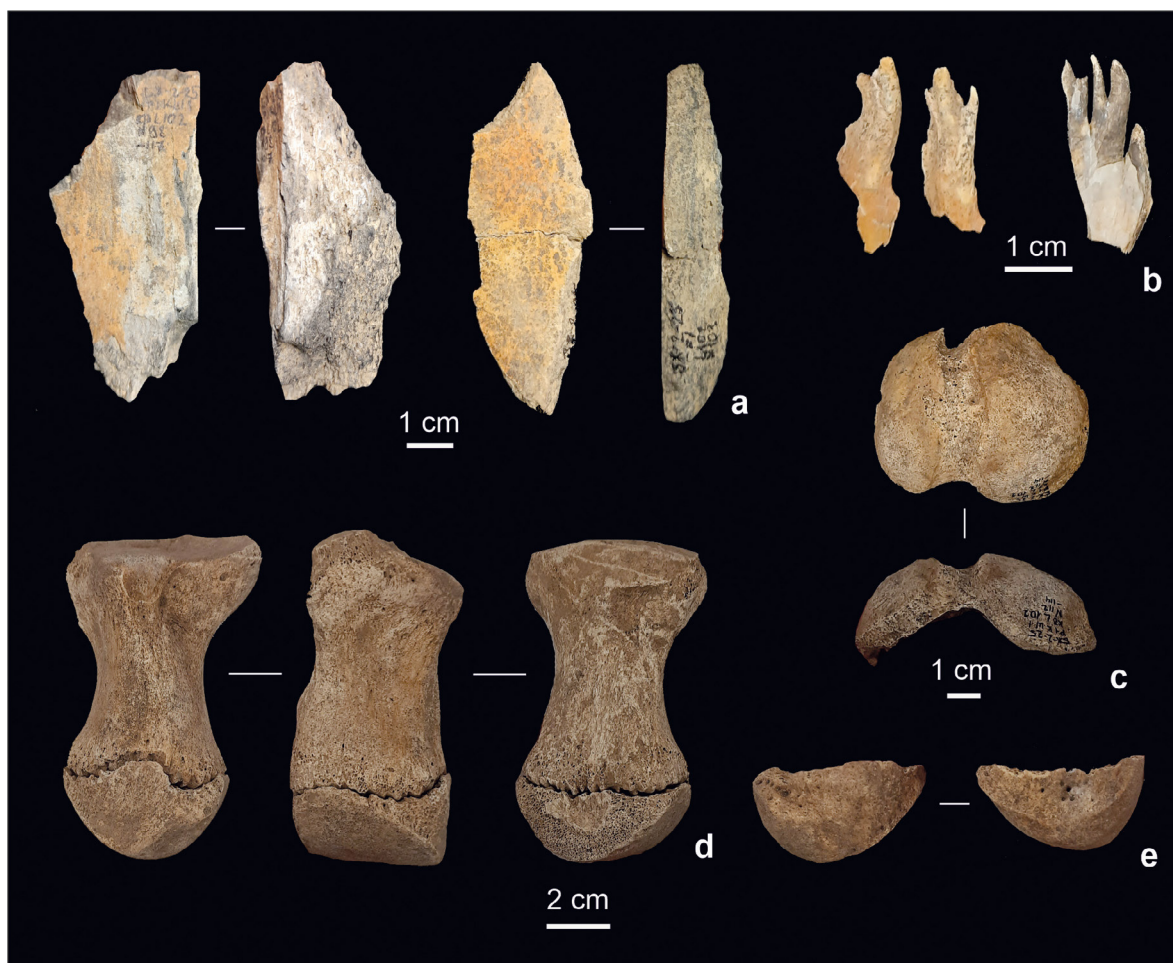


Fig. 6. Mammoth remains from the Buzhanka 2 archaeological site, according to the 2025 field investigations: a — bones with the red ochre colouration; b — mineralised enamel columns dp3 teeth of a newborn mammoth; d — metacarpal; e — metacarpal epiphysis (same individual).

Рис. 6. Рештки мамутів стоянки Бужанка 2 за матеріалами досліджень 2025 року: а — зразки кісток зі слідами фарбування вохрою; б — пластини зуба dp3 мамутеняти на стадії формування; с — верхній епіфіз плечової кістки мамутеняти; д — п'ясткова кістка; е — відпалий епіфіз п'ясткової кістки.

A subadult individual aged approximately 7 to 13 years is represented by finds of a metacarpal in the growth stage with an unfused epiphysis, and a separate epiphysis of a metacarpal bone, which we can attribute to a single mammoth individual (Fig. 6d, e). A fragment of the epiphysis of a thoracic vertebra and a cervical vertebra likely also belongs to this age group. All other mammoth remains are highly fragmented due to exposure to fire. This has made their morphological and age identification considerably more difficult. These remains constitute the bulk of the osteological material from the excavated squares. Among these samples, small fragments of the humerus, femur, and tibia can be identified. As these remains cannot be measured, it is difficult to determine with certainty the individual age of the animals to which they belonged. A cortical bone thickness of more than 1.5–2 cm indicates that these remains belonged to individuals approximately 10 years of age or older; therefore, we have classified these remains into a separate age group — “adults of indeterminate age”. At this stage, mammoths reach sexual maturity and attain body sizes similar to those of fully grown individuals, although complete ossification has not yet occurred (Table 2).

The remains of a wolf, *Canis lupus* Linnaeus, 1758, consist of the anterior portion of the maxilla. The left maxilla is partially preserved. The dentition preserved in the maxilla includes incisors (I¹–I³)

and a canine. The maxilla is broken into two parts at the level of the premaxilla (intermaxillary bone). The bone of the maxilla is fractured. The specimen shows damage to the enamel of the anterior surfaces of the incisors. The enamel is damaged from the point where the teeth emerge from the alveoli along their entire length to the apices. A chipped fragment of incisor I³ was found within one of the studied squares (L102), indicating that the tooth was damaged near the site of the specimen's burial. The canine shows minor damage to the lower portion of the crown and slight elongated linear damage along its entire length. The P² shows minor enamel damage, and the P³ is chipped at the point where it emerges from the alveolus. These are permanent wolf teeth that had reached their maximum size; therefore, the specimen can be attributed to an adult individual (Table 5; Fig. 7d).

The second phalanx of the foot of a brown bear, was recovered from square L102. The bone is undamaged, although the epiphysis is detached (Fig. 7a). This find forms part of the foot remains of the bear cub including the first phalanx and a metatarsal bone, previously recovered during earlier research at the Buzhanka 2 site. To estimate the age, osteological measurements were compared with published data on soft tissue development. The width of the palmar callosity is a stable indicator that correlates directly with metapodial growth. In cubs aged 4–5 months, this parameter typically ranges from 65–75 mm (Pazhetnov, 1990; Pazhetnov *et al.*, 1999; Spassov *et al.*, 2016; Halfpenny, 1986). Since the length of the metapodial bone from the same individual (61 mm) is below the lower limit of this range, it can be assumed that the individual was no older than 4–5 months (Table 4). This age profile corresponds to the period when cubs leave the den and begin active locomotion. It is also a stage during which inexperienced individuals are particularly vulnerable to predation or human hunting.

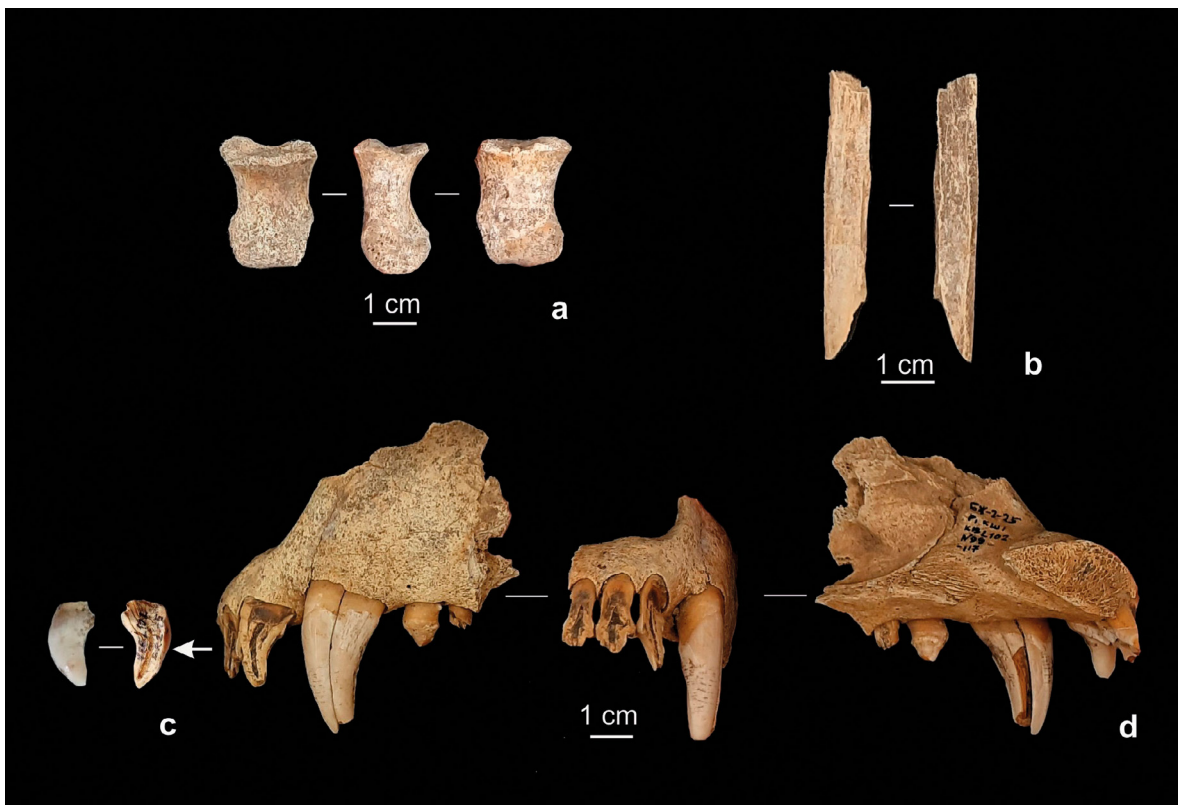


Fig. 7. Carnivore remains of the Buzhanka 2 archaeological site, according to the 2025 field investigations: a — brown bear palanx 2 of age 4–5 months; b — fragment of the polar fox tibia; d — part of the wolf maxilla.

Рис. 7. Рештки хижаків стоянки Бужанка 2 за матеріалами досліджень 2025 року: а — фаланга ведмедя; б — уламок великої гомілкової кістки песця; с — уламок різця вовка; d — частина верхньої щелепи вовка.

Table 4. Measurements of the mammoth and brown bear bones from the Buzhanka 2 archaeological site (2025 field investigations).

Таблиця 4. Проміри кісток мамутів і ведмедя зі стоянки Бужанка 2 за матеріалами 2025 року.

Species	Specimen	Bone	Bd (cm)	SD (cm)	BP (antero-posterior), cm	BP (medio-lateral), cm	GL (cm)
Mammoth	Layer1, L 102, –108, No. 48	mtc IV	5.4	4.3	7.0	5.6	11.7
Mammoth	Layer1, L 102, –114, No. 50	mtc III	5.5	–	–	–	–
Mammoth	Layer1, L 102, –114, No. 112	humerus	–	–	5.4	6.4	–
Brown bear	Layer1, L 102, –97, No. 2	ph2	1.0	0.8	–	1.2	1.5

The remains of the fox consist of a fragment of the tibia bone. The specimen represents the posterior part of the medial surface of the bone (Fig.7b). Although the fox bone fragment found is too fragmentary for precise taxonomic identification, it most likely belongs to an Arctic fox *Vulpes lagopus* (Linnaeus, 1758). The remains of the Arctic fox were the only fox species represented in the assemblage from previous years of research at the Buzhanka 2 site.

Table 5. Measurements of the mammoth and wolf teeth from the Buzhanka 2 archaeological site (2025).

Таблиця 5. Проміри зубів мамута і вовка зі стоянки Бужанка 2 за матеріалами 2025 року.

Species	Specimen	Plate height, cm
<i>Mammuthus primigenius</i>	Bzh-2-25, Layer 1, L102, –118, No. 85	2.6
	Bzh-2-25, Layer 1, L 102	2.7
		Maximum canine length / antero-posterior width, cm
<i>Canis lupus</i>	Bzh-2-25, Layer1, L 102, –117, No. 99	3.1 / 1.5

Using the wet-sieving method in Layer 1, rodent remains were recovered in the form of isolated teeth and postcranial skeletal elements. Rodents constitute a component of the local natural environment. They are represented by species such as the narrow-headed vole, *Lasiopodomys gregalis* (Pallas, 1779), (NISP = 1; MNI = 1) and the steppe lemming, *Lagurus lagurus* (Pallas, 1773), (NISP = 1; MNI = 1). Taxa identified to genus level include the pika *Ochotona* sp. (NISP = 1; MNI = 1), the lemming *Dicrostonyx* sp. (NISP = 3; MNI = 1), and the vole *Microtus* sp. (NISP = 1; MNI = 1).

Faunal composition of Layer 2

As in previous years' investigations, Cultural Layer 2 at the Buzhanka 2 site is represented by a significantly smaller assemblage in the 2025 survey. The seven recovered bones all belong to a single species, the woolly mammoth. Among them are three rib fragments assigned to juvenile mammoths, with widths of 3.3 cm, 3.2 cm, and 2.4 cm. The remaining finds consist of fragments of flat bones of the same species (Table 3).

Ecological implications

Pleistocene faunal and floral communities form mixed assemblages, combining elements of open habitats and woodland environments. This pattern is also evident in the materials from the Buzhanka 2 site. A significant proportion of the pollen spectrum consists of arboreal and shrub taxa. It is likely that during sediment accumulation, the landscape included green moss pine forests on moderately moist soils of upper slope positions, fern-dominated forests on more humid and nutrient-rich soils of flat areas and lower slope zones, and sphagnum pine communities in the wettest habitats. Shrub and meadow vegetation occupied low-lying relief elements. Areas with disturbed or poorly developed soil and vegetation cover were also present, as well as wetland (boggy) environments. The floristic assemblage also included tree and shrub forms of birch, which may have formed part of forest communities or occurred as separate stands on watersheds and along river valleys. A small admixture of thermophilous broad-leaved species complemented the composition of the forests of that period (Komar & Stupak, 2011).

The faunal data do not contradict the results of the pollen analysis. The presence of forest and scrub habitats is indicated by the occurrence of at least three brown bears at the site. Proximity to a moist, wooded environment likely facilitated the establishment of dens in this locality and provided a significant proportion of the plant component of the bears' diet. The faunal assemblage from the Buzhanka 2 site is also rich in wolf remains (NISP = 18; MNI = 4). In collections from previous years at the same site, a small number of remains of reindeer, *Rangifer tarandus* (Linnaeus, 1758), (NISP = 6; MNI = 2) and wild horse, *Equus ferus caballus* Boddaert, 1785, (NISP = 4; MNI = 2) were identified. These findings indicate the presence of a trophic base for both bears and wolves. During the Upper Palaeolithic, the high proportion of ungulates—particularly reindeer—at sites in Chernihiv Polissia led Bibikova & Bilan (1973) to define a “*Rangifer* faunal group” for this region.

A single mandible of the European polecat, *Mustela putorius* Linnaeus, 1758, a rare taxon in the Pleistocene fauna of Eurasia, was recovered from earlier field seasons at the Buzhanka 2 site. This species prefers mosaic landscapes combining shrub vegetation with open habitats. The faunal assemblage also includes remains of its possible prey (rodents). The occurrence of the narrow-headed vole and lemming indicates cool climatic conditions.

Results of the faunal analysis of the 2025 field season from the Buzhanka 2 site

Overall, the species and age composition of the 2025 faunal assemblage generally corresponds to the data obtained in previous years of research at the Buzhanka 2 site. However, the 2025 assemblage is less diverse: mammal taxa such as reindeer, horse, and European polecat are absent, and no remains of the pike, *Esox lucius* Linnaeus, 1758, were recovered. This may be explained by the limited area investigated during the 2025 field season.

The age structure of mammoths at the site is consistent with data from previous years. Based on the minimum number of individuals, infant and subadult mammoths are the most numerous age groups. The hunting strategy of the inhabitants of the Buzhanka 2 site suggests that herds of female mammoths with calves were targeted. These data may indicate either selective hunting of young mammoths for specific purposes or differential spatial distribution of bone remains within the site. It is also possible that hunting encompassed all available age classes of mammoths, while the cultural layer associated with everyday activities primarily accumulated remains of low economic value, such as calves.

The remains of adult mammoths may have been used for the construction of structures or stored in a separate area. For example, three adult mammoth mandibles, as well as adult mammoth tusks, were recovered from the bottom of Pit 1 (Stupak, 2014) (Fig. 8).



Fig. 8. Pit 1 of the the Buzhanka 2 archaeological site. Mammoth mandibles and tusks on the bottom of Pit 1.

Рис. 8. Яма 1 стоянки Бужанка 2. Щелепи та бивні мамутів на дні ями.

From the perspective of seasonality assessment, the finds of prenatal mammoth dp3 teeth, either still in the alveoli or at an early stage of eruption at the time of the animal's death, are of particular interest. The discovery of specimens of undeveloped dental plates of mammoth foetus suggests a possible winter occupation of the site by prehistoric humans. The humeral epiphysis most likely belonged to a neonatal mammoth (Maschenko, 2002). Based on the timing of mammoth calving, which most likely occurred at the beginning of the growing season (April–May), these finds suggest that the animal died in spring (Kosintsev *et al.*, 2012).

Remains of a brown bear aged 4–5 months were also recovered from collections obtained during previous years of research of Layer 1 at the Buzhanka 2 site. These include a metatarsal bone, the two specimens of the first phalanx, and the second phalanx. It cannot be excluded that these elements belong to a single individual. Phalanges are most commonly left as residual elements following skinning and butchering processes. The presence of brown bear phalanges aged 4–5 months may indicate late spring to early summer occupation, as bear cubs are born during the winter months (January–February) (Dykyy & Shkvyria, 2015). In Cultural Layers 1 and 2, ribs of mammoth calves were also recovered, with widths comparable to those of a Kyrgylyakh mammoth calf (Dima) (Shylo *et al.*, 1983). Their age was estimated at 6–9 months, which may correspond to autumnal human occupation of the site. However, rib width is not a reliable age indicator and may vary depending on individual developmental variation.

Artifacts made of organic materials

Animals were used not only as a source of food by the inhabitants of the Buzhanka 2 site. In 2025, finds were recovered that demonstrate the manufacture of mammoth tusk and deer antler. From square L102, from the fireplace area, a medial fragment of projectile weapon equipment was recovered. It was reconstructed from eight small, heavily burnt fragments collected during wet sieving. The artifact was probably made of deer or *Rangifer* antler. The length of the reconstructed portion is 50.14 mm. It has a partially rounded and partially flattened cross-section. One part of the fragment, 21.81 mm in length, has a circular cross-section with a maximum diameter of 6.30 mm near the distal end of the fragment (Fig. 9).

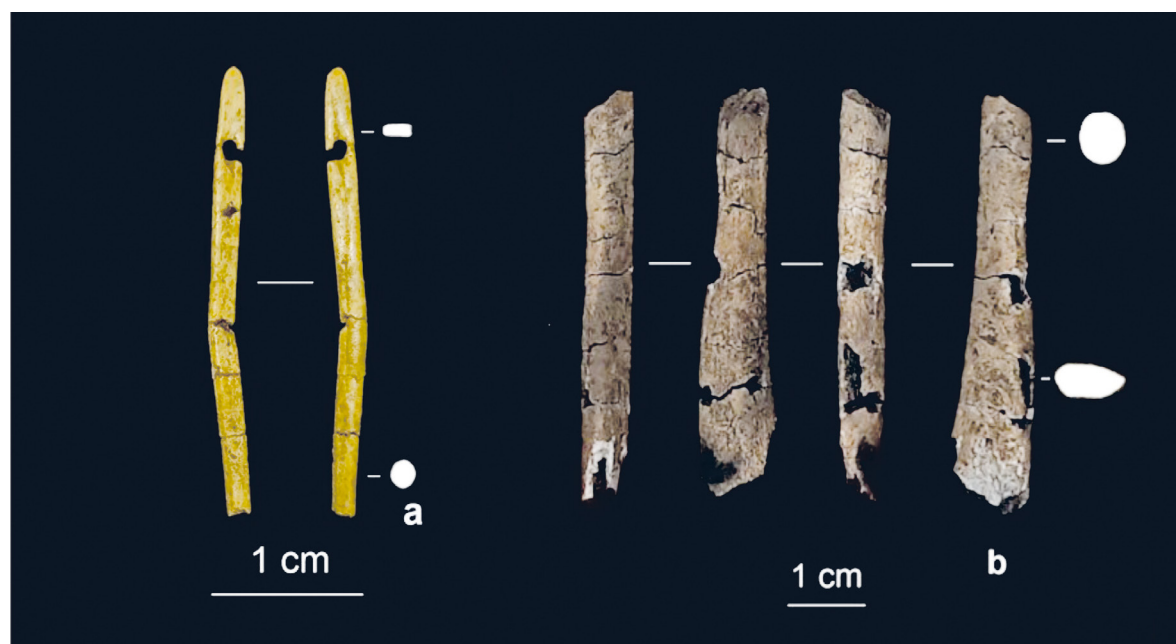


Fig. 9. Вироби з органічних матеріалів: а — голка, б — медіальна частина метальної зброї.

Рис. 9. Artifacts made of organic materials: a — a needle, b — medial fragment of a projectile weapon.

The other part, 28.33 mm in length, has a flattened, sub-oval cross-section with maximum dimensions of 9.90×5.26 mm. A needle comes from square L101. It was reconstructed from five fragments recovered during wet sieving. The needle shows no traces of exposure to fire. It was made of mammoth ivory. The distal end of the artifact is missing, but the needle eye is preserved; traces of the cutting technique used to perforate the hole are visible near it on the surface of the object. The length of the reconstructed portion is 30.37 mm. Towards the distal end, the cross-section is rounded, becoming flattened on both sides towards the eye. Its diameter near the distal end is 1.63 mm. Near the eye, its dimensions are 2.12×1.12 mm. The maximum dimensions of the eye are 2.16×0.86 mm. The size of the perforated hole is 1.60×0.80 mm.

During the 2025 excavations, in Cultural Layer 1, samples of burnt mammoth long bones bearing traces of ochre pigment on their surfaces were recovered. Most of these finds originate from the area surrounding the fireplace in square L102. A total of 920 such specimens were identified, of which 318 are larger than 1 cm. The two largest measure slightly over 5 cm, while a further 602 specimens are smaller than 1 cm. The bone surfaces display reddish to red colouration (Fig. 6a). Ochre traces occur only on the external bone surfaces, suggesting that they were deliberately applied by humans before the bones were subsequently damaged by burning. Finds of ochre in various shades of red and reddish tones are common in this cultural layer, and a small number of additional specimens were also recovered in 2025.

These data suggest that the practice of applying ochre to mammoth bones or other objects was present at the settlement. Ochre is one of the most widely used mineral pigments in the Stone Age record. Similar practices of applying ochre to animal bones are widely documented at Palaeolithic sites across Eurasia, including Ukraine. At sites such as Mezyn, mammoth bones decorated with ochre in the form of geometric ornamentation, the so-called “Mezyn-type meander”, have been recovered. Bibikov (1981) interpreted these finds as components of a musical ensemble of percussion instruments. At the Mezhyrich site, a mammoth skull painted with ochre was also discovered. According to Pidoplichko (1976), the prehistoric artist may have intended to depict fire.

Conclusions

Only two excavation squares were investigated at the Buzhanka 2 site in 2025. Nevertheless, the recovered material was relatively abundant due to the richness of Cultural Layer 1, particularly the faunal remains. Most of these consist of fragments of burnt mammoth bones, which were likely used as fuel for the fireplace. Overall, the results of taxonomic identification are consistent with those obtained during previous years of research at the site. The faunal assemblage includes a smaller number of species; however, this is attributable to the limited extent of the excavated area. The mammoth age structure also corresponds to that documented in earlier materials. These results support evidence for seasonal human occupation of the site, likely during winter, spring and possibly autumn. The 2025 analysis of the faunal assemblage from Buzhanka 2 underscores the importance of continued investigations at the site.

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