

*L. Demay, P. M. Vasylev, L. V. Koulakovska,  
D. V. Stupak, P. S. Shydlovskiy, V. I. Belyaeva*

## PALAEOLITHIC HUMAN SOCIETIES DURING THE UPPER PLENIGLACIAL PERIOD AND THEIR CONNECTIONS WITH THE ANIMAL WORLD ACCORDING THE EVIDENCE FROM ARCHAEOLOGICAL SITES OF UKRAINE

*We present here a synthesis about activities of Palaeolithic human populations from the North Ukraine during the first part of the Upper Pleniglacial (around 26000—20000 BP), particularly linked to mammals.*

**Keywords:** *Upper Palaeolithic; Zooarchaeology; Subsistence activities; Gravettian; Epigravettian*

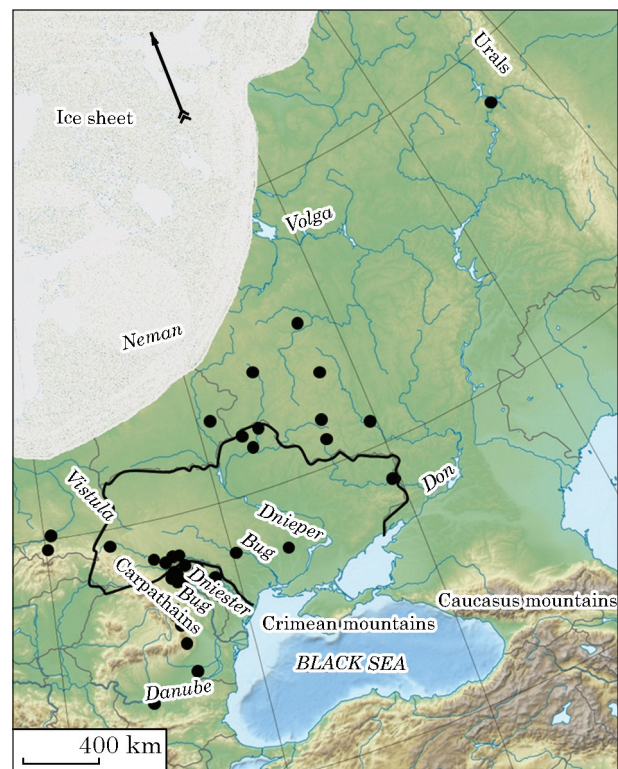
**Introduction.** At the end of the Upper Pleistocene, the climatic conditions were unstable, which leads to the modifications of the palaeoenvironmental and geographical conditions. The first part of Upper Pleniglacial (26—20000 BP) was characterized by the Last Glacial Maximum with the maximum extension of ice sheet and permafrost, a dry and cold climate in a tundra-steppe environment (Velichko, Zelikson 2005; Haesaerts et al. 2007; Clark et al. 2009). The different animal species had to adapt to these environments. It is also during this period that the transition between Gravettian and Epigravettian technocomplexes took place. The territory of Ukraine, area we are concentrating on, covered a large space, with different biotopes, which makes the link between the extracarpatic area and the plain (fig. 1).

We present here the situational analyses of recent archaeological works on open air sites in the North part of Ukraine (fig. 2).

Pushkari group was discovered in 1932 (Rudinski 1947). The sector I was excavated by M. J. Rudinskiy in 1932—1933, on 144 m<sup>2</sup>, the sector II by P. I. Boriskovskiy in 1937—1939, on 400 m<sup>2</sup>, the sector III 1937 by Boriskovskiy, the sector IV by Boriskovskiy in 1938—1939, on 20 m<sup>2</sup>, the sector V by V. I. Belyaeva between 1981 and 1996, the sector VI too, in 1997. The

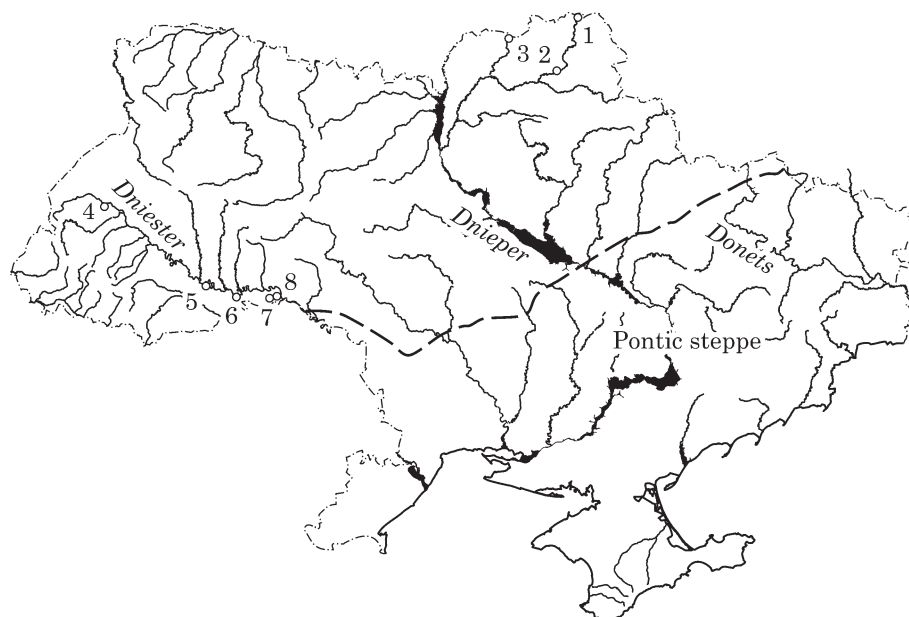
sector VII was highlighted by surveys carried out in 1996—1998 by Yu. N. Gribchenko and excavated by V. I. Belyaeva with P. M. Vasil'ev until 2018, on 98 m<sup>2</sup>.

Pogon (Pushkari 8) was discovered in 1940 by M. V. Voevodskiy who excavated it (Voevodskiy 1950). From 2011 to 2013, P. M. Vasyliiev excavated it in another sector, on 14 m<sup>2</sup> (Vasyliiev 2014).



**Fig. 1.** The main archaeological sites in the East European between 26—20000 BP with the extension of ice sheet and the delimitation of Ukraine

**Fig. 2.** Main archaeological sites of the first part of Upper Pleniglacial (26–20000 BP) from the North part of Ukraine: 1 — Pushkari 1 and 8 (Pogon); 2 — Obollonnya; 3 — Klussy; 4 — Galich 1; 5 — Dorochivtsy III; 6 — Oselivka 1; 7 — Molodova V; 8 — Korman IV



Obollonnya was discovered in 2010 during civil engineering. The excavations led by D. V. Stupak were made in 2011–2013, on 12 m<sup>2</sup> (Stupak et al. 2014).

Klussy, discovered in 1964, was excavated by I. G. Shovkopliash in 1965–66, on 1.300 m<sup>2</sup> (Shovkopliash 1967). D. V. Stupak made new test pits in 2002 on 14,9 m<sup>2</sup> and excavations in 2005 on 27 m<sup>2</sup> (Stupak 2008; Nuzhnyi 2009).

Galich 1 was discovered in 1988 and excavated in the 2000<sup>s</sup> by O. Sytnyk and K. Cyrek (Wojtal et al. 2001; Sytnyk et al. 2005).

Dorochivtsy III was discovered in 1968 by A. P. Chernysh (Chernysh 1985). The excavation have been led by L. V. Koulakovska in 2007–2010 (Kulakovska et al. 2012). New excavations are in process by L. V. Koulakovska and M. Poltowicz-Bobak.

Oselivka sites were discovered in the 1920<sup>s</sup>. The layer III of Oselivka 1 was excavated on 55 m<sup>2</sup> (Borziac et al. 2006; Chernysch 1973).

Molodova V was discovered in 1948 by A. P. Chernysh (Chernysh 1959). The layer 8 was excavated on 750 m<sup>2</sup> and the layer 7 on 860 m<sup>2</sup>.

Korman IV was discovered in 1930–31 by I. G. Botez (Chernysh 1977). The layer 7 was excavated on 118 m<sup>2</sup> and the layer 6 on 210 m<sup>2</sup>.

All these sites are related to the Gravettian. The Gravettian in Eastern Europe developed from 28000 to 20000 years BP (Chernysh 1959; Ivanova, Tzeitlin 1987; Otte 1982). Lithic technology is characterized by the use of uni- and bipolar cores to produce blades and bladelets by applying mostly soft hammer and using blades as the main blanks for the manufacture of different types of tools. Among the tools, the most revealing are elements of projectile weapons primarily such as Gravettes and micro-gravettes made by abrupt and semi-abrupt retouching, different variants of points on blades, shouldered points. The begin-

ning of the Upper Gravettian is contemporary with the deposit of the first loessic cover of the upper pleniglacial in a cold but still slightly humid environment, evidenced by the associated tundra gleys. It is characterized by the development of shouldered points. It is known in Molodova V/8–7, located in humic silts to a temperate episode (Tursac), dated between 25–23000 BP. The formal tools are made up of burins (dihedral, on truncation, on break), implements with abrupt retouch (gravettes, microgravettes), blades, truncated elements, endscrapers, shouldered points, retouched and pointed blades. In the Dnieper basin, Pushkari I, Pogon and Klussy represent a particular facies called Pushkarian (Belyaeva 2002). The lithic industries are characterized by points with a curved back and a different processed basal parts, massive rectangles and burins, mainly on blades. Some sites present small series of shouldered points and «Kostenki knives».

The Obollonnya industry is characterized by dominant unipolar, very used cores. From tool-complex the largest group are blades and bladelets with retouching of various types. Most part of burins was produced on blades or bladelets. Dominate burins on truncation and dihedral. Scrapers are typically made on flakes, scrapers with a nose totally dominate. Microliths are rare. The stone complex is complemented by two basal fragments of points of the Isturitz type, produced from a mammoth tusk. So this site is related to Epiaurignacian. Sites are generally characterized by limited development and none provided storage pits. Pushkari 1 and Molodova V yielded more structures. The lithic industries were made on local raw material (table 1; 2).

Our aim is to better understand the way of life of the nomadic hunters-gatherers, especially focusing on humans and other mammal relationships. For that we take in account zooarchaeo-

**Table 1.** Main archaeological sites and data in the North Ukraine between 26000 and 20000 BP

Sites	Altitude, m	Structures			Lithic remains			Type of site	
		Hearth (s)	Small pits	Dwelling structure	Number of		Dominant tools		Raw material local / exogenous
					re-mains	tools			
Dorochivtsy III/6	26	yes	no	no	23286	491	endscrapers, blades, bladelets	yes	temporary camp halt
Dorochivtsy III/5	26	no	no	no	19	7	burins	yes	
Dorochivtsy III/4	26	yes	no	no	604	27	endscrapers, blades, bladelets	yes	temporary camp
Dorochivtsy III/3	26	yes	no	no	3981	40	the same	yes	temporary camp
Galich 1	—	yes	no	no	105	12	endscrapers, burins	local	killing and butchering camp
Klussy, 1965—66	20—30	yes	no	no	10500	≈400	burins, points	local	temporary camp (s)
Klussy, 2002, 2005	20—30	yes	no	no	5997	261	burins, points, pièces esquillées	local	temporary camp
Korman IV/7	22—28	yes	no	no	146	29	endscrapers, burins	local	—
Korman IV/6	22—28	yes	no	no	625	55	endscrapers, burins, retouched blades	local	temporary camp
Molodova V/8	50	yes	no	no	1462	132	the same	yes, and Volhyn flint	temporary camps
Molodova V/7	50	yes	no	no	51032	2183	burins, endscrapers, retouched blades	yes	base camp
Obollonnya, 2010	6—10	no	no	no	16	2	burins	yes	temporary camp? killing and butchering site?
Obollonnya, 2011—13	6—10	no	yes	no	11553	250	scrapers, burins, retouched blades and bladelets, microliths	yes	temporary camp? killing and butchering site?
Oselivka 1	50—55	yes	no	no	—	—	points, burins, endscrapers	—	flint workshop
Pushkari 1, exc. I	35—40	yes	no	no	≈100000	—	backed point on blades and bladelets, rectangles, point on a blade, burins, scraper	yes	temporary camp (s)
Pushkari 1, exc. II	35—40	yes	no	yes	—	—	the same	yes	temporary camp (s)
Pushkari 1, exc. V	35—40	yes	no	yes	—	—	the same	yes	temporary camp (s)
Pushkari 1, exc. VII	35—40	yes	yes	yes?	36777	1489	the same	yes	slaughtering and butchering site
Pushkari 8, exc. I—VI	35—40	no	no	no	671	67	shouldered and backed points, rectangles, point on a blade, burins, scraper	yes	temporary camp (s)
Pushkari 8, exc. VII	35—40	yes	yes	no	3552	130	the same	yes	slaughtering and butchering site?

logical remains to highlight the modalities of use of mammal resource by humans, the modalities of settlement in the territories and a part of human strategies and ways of thinking.

**Material and methods.** We used precedent data obtained from the sites taken in account, to analyse them in their globality (table 3). We focus on faunal remains by the zooarchaeological approach. These data were obtained from paleontology, biology, quantification, mortality profiles of mammals, ethology, taphonomy and paleoethnography.

**Research Taphonomy.**In Dorochivtsy III, the layers 7, 2 and 1 were badly preserved, in leached soils. The layers 6—3 were more quickly buried, well protected, but with some soil movements in particular in layer 6. The index numbers of correlation linked to the skeletal preservation and bone density of these four layers do not show differential preservation due to naturel processes of dispersion neither due to predator (s) (Demay et al. 2015).

In Galich 1, mammoth bone surfaces show intensive root etching, making it impossible to



carry out detailed taphonomic study (Wojtal et al. 2001).

In Molodova V, the archaeological layers are well preserved, also as faunal remains (Chernysh 1987).

In Korman IV, the deposits are inclined towards the river, having caused zones of rupture in the stratigraphy, but are generally well preserved (Chernysh 1977).

In Obollonnya, bones show well preservation. We observed the same phenomena of alteration in both locci. Bone are affected by weathering and runoff water. Small bones and bones of small mammals were present. All the bones are damaged by oxidation phenomena due to water percolation and more than half of the bones are affected by plant root marks. Many bones are affected by alterations due to *charriage-a-sec*. There are few marks of carnivores or rodents. Bones were quickly buried in a wetland in the subsurface and subjected to some movement of sediments. During the warm season the melting ice probably caused flooding of an ancient channel of the Desna river which could affect this assemblage, but with a low flow of the water (Stupak et al. 2014; Demay et al. 2016a).

In Pushkari and Pogon, the taphonomic observations are similar. The surfaces of bones are altered by weathering and bones are pulverulent or concretioned. The bones were covered by loess sediments, whose acidity is probably the origin of the intense alteration of the bones. The oxide deposits (manganese and iron), due to water percolation are visible on many bones of large, medium and small mammals. There are few pits of dissolution due to runoff of water and acidic solutions generated by the installation of a vegetative cover later and upperoxidized sediments. Some bones are affected by traces of *charriage-a-sec*, reflecting some soil movements and of trampling, but not really intense. The types of fractures observed on the bones of large mammals and medium-sized mammals are longitudinal cracks, spiral and stepped breakages. It is due to freeze/thaw action. Root etching are concentrated in small parts of the bones of all species. It shows a relatively poor vegetation cover on the promontory (Demay et al. 2016b).

**Table 2.** Main archaeological sites and data in the North Ukraine between 26000 and 20000 BP

Site	Layer / sector	Dating	Reference	Material	
Dorochivtsy III	6	22300 ± 100	GrA-44217	Charcoal	
	4	20976 ± 76	COL 1114.1.1	»	
	3	20700 ± 90	GrA-44705	»	
		20504 ± 83	COL 1115.1.1	»	
Galich I	3	25100 ± 450	Ki-8928	»	
	3	24900 ± 450	Ki-8929	»	
	2	24600 ± 450	Ki-8930	»	
	2	24 200 ± 600	Ki-8931	Bone	
	1	23500 ± 600	Ki-8932	»	
Korman IV	7	24500 ± 500	GIN-1099	Charcoal	
	7	25140 ± 350	LU-586	»	
	5	18000 ± 400	GIN-719	»	
	5	18560 ± 2000	SOAN-145	»	
Molodova V	8	>24600	LU-14	»	
	7	23000 ± 170	GrA-9455	»	
		25170 ± 210	GrA-9457	»	
		23650 ± 140	GrA-22909	»	
		25130 ± 220	GrA-9564	»	
		21070 ± 150	GrA-9443	»	
		23120 ± 330	GrA-27614	»	
		23000 ± 800	MO 11	»	
		23700 ± 320	GIN 10	Humific soil	
Obollonnya	2010	15200 ± 200	SPb 442	Mammoth long bone	
	2011	20730 ± 120	Ox 28035	Mammoth bone	
Oselivka 1	—	22600 ± 300	GIN-4834	—	
Pushkari 1	Exc. II	16775 ± 605	QC899	Bone burned	
		19010 ± 220	AA1389	» »	
	Exc. V	20500 ± 500	GIN11311b	Bone	
		20900 ± 900	GIN11311a	»	
		20600 ± 1200	GIN8529	Mammoth bone	
		20700 ± 500	GIN8529a	» »	
		21100 ± 400	GIN3381	Bone burned	
		22350 ± 150	GIN11307	» »	
		Exc. VII	19500 ± 240	Ki11901	Bone of horse
			20160 ± 180	GIN11310	Bone burned
	20350 ± 180		GIN10195	» »	
	20840 ± 190		GIN11309	» »	
Pushkari 9, lower level, 5 m	—	18690 ± 770	LU361	Mammoth bone	
		22300 ± 500	GIN10193	Bone	
		22500 ± 450	GIN10194	»	
		23800 ± 700	GIN11315	»	
		24000 ± 1200	GIN11312	»	

**Table 3.** Main archaeological sites, data related to fauna and references in the North Ukraine between 26000 and 20000 BP

Sites	Faunal remains			Burned bones	Objects in hard matters of animal origin	Other use of bones	Art	References	
	NR	MNI	Presence						
Dorochivtsy III/6	1118	8	—	yes	yes	no	yes	Demay et al. 2015	
Dorochivtsy III/5	104	5	—	no	no	no	no		
Dorochivtsy III/4	1023	8	—	yes	no	no	no		
Dorochivtsy III/3	662	6	—	yes	yes	no	no		
Galitch 1	151	2	—	no	no	no	no		Wojtal et al. 2001
Klussy, 1965—66	—	—	yes	yes	no	no	no		
Klussy, 2002, 2005	—	—	yes	yes	no	no	no		Stupak 2008
Korman IV/7	—	—	yes	—	no	no	no		Tatarinov 1977
Korman IV/6	50	6	—	—	yes	no	no		
Molodova V/8	276	11	—	—	yes	no	yes		Alekseeva 1987
Molodova V/7	1493	43	—	yes	yes	no	yes		
Obollonnya, 2010	72	4	—	no	no	no	yes		Demay et al. 2016a
Obollonnya, 2011—13	787	5	—	yes	yes	no	no		
Oselivka 1	—	—	yes	yes	no	no	no	Chernysh 1975	
Pushkari 1, exc. I	—	3	—	—	no	no	no	Rudinski 1947	
Pushkari 1, exc. II	—	48	—	—	yes	yes	yes	Boriskovski 1953	
Pushkari 1, exc. V	—	79	—	—	yes	yes	no	Sablin 1997	
Pushkari 1, exc. VII	7564	22	—	yes	yes	yes	no	Demay et al. under press	
Pushkari, exc. I—VI	—	—	yes	—	no	no	no	Boriskovski 1953	
Pushkari 8, exc. VII	7344	8	—	yes	no	yes	no	Demay et al. under press	

All these sites present well preserved traces of human occupations.

**Faunal spectrum.** The main species (255 individuals) present in all archaeological sites are Mammoth (56.1%), Reindeer (12.9%), Horse (11.4%), Fox (9%) and Wolf (5.5%), followed by Red deer, Bison, Hare, Woolly Rhinoceros, Moose and Bear (all <2%).

The faunal spectrum in each site is few diversified. Molodova V present the most varied faunal spectrum. We often find the trio Mammoth-Reindeer-Horse. Galich 1, Pushkari 1 and Obollonnya seems to be oriented to monospecific exploitation, Mammoth (fig. 3).

Looking to the type of occupations the base camp shows quite equal representation of Horse, Reindeer and Mammoth. The hunting halt correspond to a more easy taxon acquisition, Reindeer. The killing and butchering sites show also some

more specialized acquisition of fox carcasses. Some temporary camps could correspond to specialized mammoth hunting sites (fig. 4).

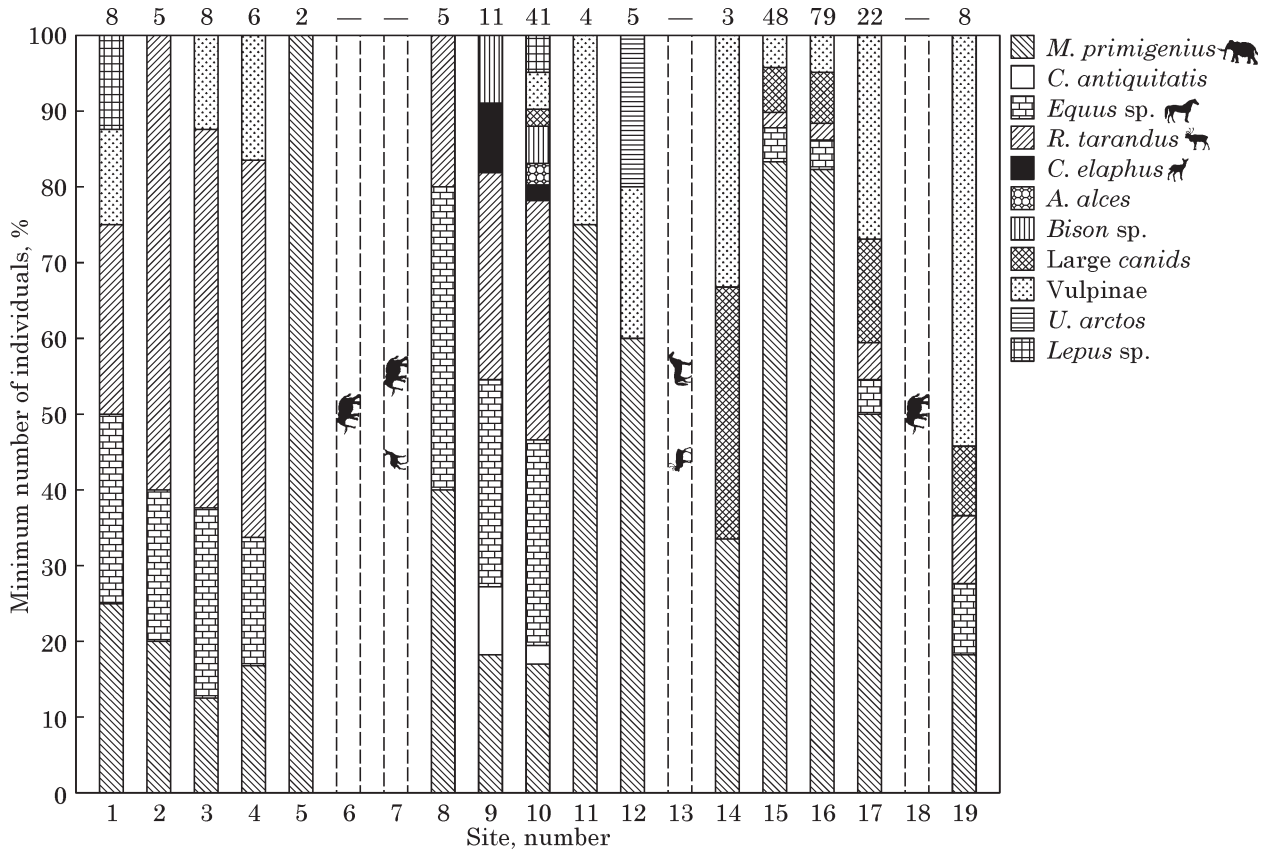
Mammoth is more dominant in the North and Reindeer and Horse in the Middle Dniester.

**Season of occupation.** Dorochivtsy III shows different seasons of occupations. For Pushkari 1, Pogon and Obollonnya season has been estimated about the possibility of calve births in spring-summer (table 4; Rountrey et al. 2012).

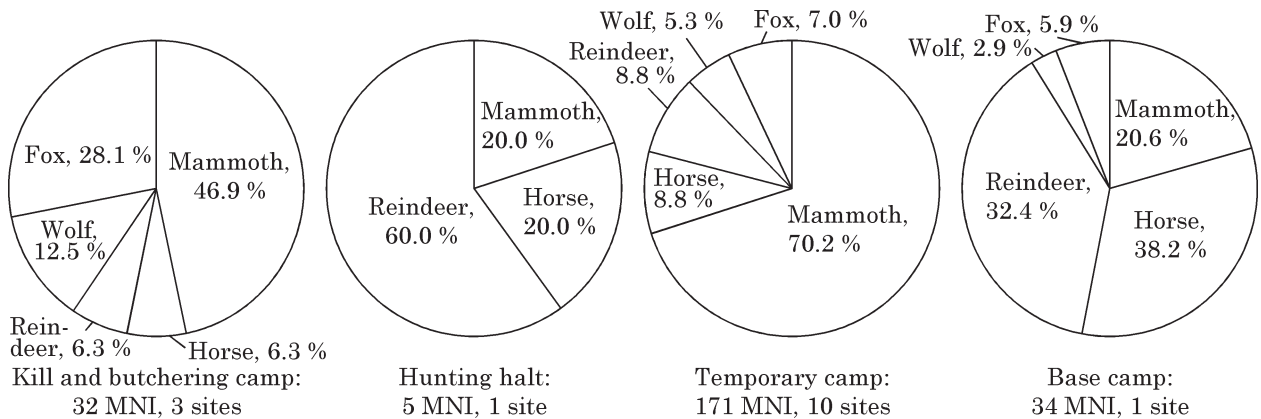
**Mortality profiles of mammals.** Reindeers are mainly young adults, with some adults, males and females, typical of anthropogenic selections. The fact that young, females and males are together could correspond to the times of herd grouping, in June—July or / and in October-November. We cannot obtain reliable data about the horse, but the presence of juveniles and adults suggests an acquisition within mare and foalherds. Re-

**Table 4.** Season of occupations of the main archaeological sites in the North Ukraine, between 26000 and 20000 BP

Site	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Dorochivtsy III/5						—	—	—	—	—		
Dorochivtsy III/4	—	—	—	—	—						—	—
Dorochivtsy III/3			—			—	—	—	—	—		
Obollonnya	—	—	—				—	—	—	—	—	—
Pushkari 1	—	—	—				—	—	—	—	—	—
Pogon	—	—	—				—	—	—	—	—	—



**Fig. 3.** Faunal composition in percentage of the minimum number of individuals and by occurrences of the main archaeological sites in the North Ukraine, between 26000 and 20000 BP: Dorochivtsy III: 1 — N 6; 2 — N 5; 3 — N 4; 4 — N 3; 5 — Galitch 1; 6 — Klussy; Korman IV: 7 — N 7; 8 — N 6; Molodova In: 9 — N 8; 10 — N 7; Obollonnya: 11 — boiling room; 12 — exsavation 2011—2013; 13 — Oselivka 1; Pushkari 1: 14 — exsavation I; 15 — exsavation II; 16 — exsavation V; 17 — exsavation VII; Pushkari 8 (Pogon): 18 — exsavation I—IV; 19 — exsavation VII

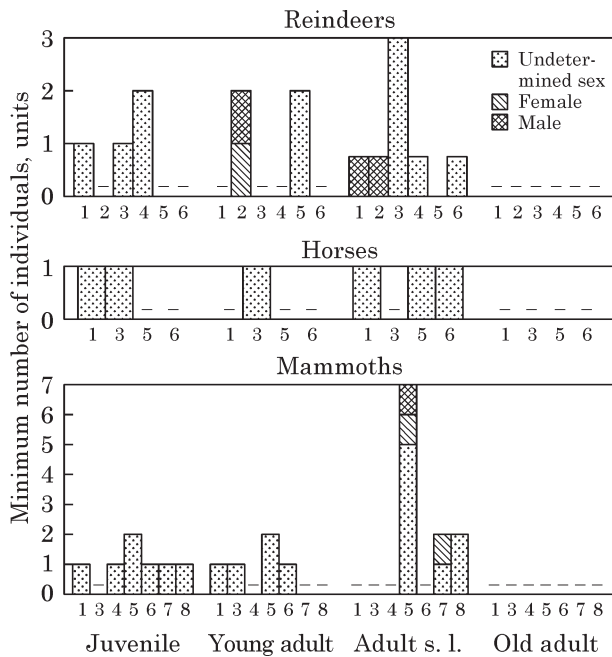


**Fig. 4.** Main species in percentage of the minimum number of individuals according to the type of occupations of the main archaeological sites in the North Ukraine, between 26000 and 20000 BP

garding mammoths, these are young individuals in all layers in Dorochivtsy III. It could be gathered bones or quarters of carcasses or a choice of killing the youngs. In Pushkari 1 / exc. VII mammoths are mainly adults and some juveniles. By comparing these data with the models of mortality profiles made on Elephantid populations (Haynes 1987), we see that this profile corresponds to human predation. Presence of juveniles and young adults, at least one female, allows us to identify

one or more «matriarchal» herds. The presence of at least one male also identifies male group (s) or a lonely male (fig. 5).

**Carcasses treatment.** According to these sites we can build strategies of carcass treatments by humans from the anatomical elements representation, the cutmarks and the impacts of breakage. In Dorochivtsy III layers, parts of carcasses, mainly limbs, were brought showing a first treatment on the hunting site, then a secondary



**Fig. 5.** Profiles of mortality of the main mammals in the main archaeological sites in the North Ukraine, between 26000 and 20000 BP: Dorochivtsy III: 1 — N 6; 2 — N 5; 3 — N 4; 4 — N 2; 5 — Pushkari 1; 6 — Pushkari 8 (Pogon); Obollonnya: 7 — boiling room; 8 — excavation 2011—2013

treatment in the camp with disarticulation of the limbs and marrow removal. For horses, marrow was removed. Butchering activities on elephantids are difficult to see, due to the mass of soft tissue (Crader 1983). Moreover, only meat may have been taken, due to heavy bones (Bocherens et al. 2005). In Pushkari 1, Pogon and Obollonnya, mammoth carcasses are quite complete, showing that humans stayed near the killing site.

#### Used of hard material of animal origin.

Some archaeological layers furnished bone pieces or / and other uses of bones. In Korman IV/6, a bone awl was found (Chernysh 1977). In Molodova V/8, a bone awl, an ivory pendants and perforated shells were found (Abramova 1995). In Molodova V/8, three bone awls, three *lissoirs*, six *betons percés* and four picks made on reindeer antler, two handles, three bone points, an ivory point, a perforated fox tooth, perforated shells and a perforated talus of red deer were found (Abramova 1995). In Dorochivtsy III/6 ivory points, bone awls and an engraved tusk were found. In Obollonnya, two ivory points and an engraved tusk were found. In Pogon mammoth bones were stored vertically in pits around a hearth, maybe as a wedging structure. In Pushkari 1 / exc. II, mammoth tusks were disposed around hearths, interpreted as remains of dwelling structures. In the exc. V, mammoth skulls were put around a hearth, also interpreted as a dwelling structure. In these sectors were also found a *lissoir* made on mammoth rib and two ivory pendants. In the sector VII mammoth tusks

were stored, canid bones were put in small pits and a femur of fox was sawn.

In all sites bones were used as fuel to nourish fire, notably mammoth ribs.

**Discussion. Human settlements and chronocultural comparisons.** The same sites were reoccupied, sometimes at different seasons, linked to local lithic resources. In the Dniester valley it corresponds to displacements of small human groups, excepting in Molodova V/7, which could be a base camp, or a mix of several layers. In Pushkari 1, it could correspond to more important human group or gathering of different groups. It shows the continuity of occupations of the territories until 20000 BP, with the persistence of important and organized activities, innovations and varied behaviors and the coexistence of cultures.

Other Ukrainian sites could be contemporaneous or dated to just after 20000 BP: Novgorod-Siverskyi, Kyrylivska, Radomysh'1 and Molodova V/6.

Novgorod-Siverskyi presents similar lithic features to the Pushkarian and could be contemporaneous. We would need to deepen our analyses of this site, still in process. It is characterized by a varied faunal spectrum with many reindeers, mammoths, canids and lagomorphs (Pidoplichko 1947).

Kyrylivska (Khvoika 1913), dated between 20—19000 BP, furnished a late Gravettian lithic industry (Shydlovskiy, Stupak 2015). It is the latest Gravettian sites in the Dnieper basin of the northern zone. Numerous faunal remains were found, mainly Mammoth (Pidoplichko 1969), whose an engraved tusk.

Radomysh'1 (Shovkopljas 1965), is dated to around 19000 BP but could be a little bit older. The Gravettian lithic industry does not have close analogues in the frames of Gravettian technocomplex (Kononenko 2018). The faunal spectrum is dominated by Mammoth (67 individuals; Kornietz 1962; Péan, Kononenko 2004).

Molodova V/6, dated to around 20000 BP, yielded the earliest Epigravettian features (Chernysh 1987). The fauna is dominated by Reindeer, then Horse and Mammoth. There many pieces made in bone, ivory and antler.

The layer 6 of Dorochivtsy III raises questions. Indeed, the shouldered points and the particular engraved tusk seems to be Epigravettian feature premises.

After the peak of LGM, it should be noted that, between 19—16000 BP, there are no Upper Palaeolithic sites in northern Ukraine, except for the Middle Dniester group. In the northern part of Ukraine, the spread of Epigravettian industries is associated with a much later time, from 15000 BP (Molodova V, Ovruch, Mizyn, Barmaky, Mezhyrich and Yudinovo groups).

**Palethnographic implications concerning the main species peculiarities.** The main spe-



cies present in archaeological sites — Mammoth, Reindeer, Horse, Fox and Wolf — imply particular interactions and resource gestion by humans who had to adapt to their biological cycles, physical capabilities, cognitive faculties and ethology.

Mammoths were probably a key species in human life. They were the largest terrestrial mammals with very particular physiology. They lived in united herds led by an elderly female. The rest of the group was made up mostly of female individuals, young individuals and occasionally old males. The other males lived in groups or alone. During the dry season groupings are frequent near water points and mineral salt points. They did seasonal migration (Hoppe 2004). They had a significant impact on their environment, in particular by shaping the landscape using the same paths, creating tracks (Haynes 2006). They also had the ability to remember large-scale space over long periods and the capacity to find sources of water and dig holes to reach it (Byrne et al. 2009). These facts could have been an opportunity for humans to facilitate their movement and access to water.

Moreover Elephantids pay high attention to their dead (Pfeffer 1989). So mammoths could have represented an important symbolic intermediate for human psychology and cultural codes, also as a major ally for their subsistence. They also could have been important soft and hard matters resources for humans: hairs, fat, meat, brain, viscera, ivory, bones, and marrow for food and for non-food activities. The different matters acquisition implies particular management and strategies because of the weight of such animal and the danger encountered. These resources can be accessed on dry carcasses by gathering and on fresh carcasses by scavenging. In terms of hunting, human groups have been confronted to an extremely strong and dangerous animal, necessitating adapted technics. Such quantity of meat requires a good management of cooking and preservation treatment. Eventually the management of ivory involves specific treatments.

Reindeers live in herds. During spring and summer, females lead small mixed groups or groups of females. Sometimes the males form separate groups. During the summer the small bands disperse. During the rut, in September-October, a male is placed at the head of a large herd of females, which will separate again in winter. There is a summer migration in May—June and a winter migration in September. The groups are led by sterile females, then the herd is divided up first with the females, then the young and finally, the males (Bouchud 1954). These herds can reach 300 km and consist of thousands of individuals. During the resting phases, the reindeer stay in open places. In case of danger, these animals flee and some of them remain prostrate. For hunters, it is in the fall that the animals have acquired maximum weight and fat reserves. In winter,

they scatter. Finally, the reindeer fur causes rapid decomposition of the carcasses, which means that the treatment must be carried out quickly.

Horses live in herds which move according to the availability of resources. These herds are composed exclusively of males or a stallion with 3—4 mares. A stallion and an old mare defend the group. These animals have strict habits, in the event of an abrupt change the reaction is instantaneous, the horse defends itself and flees (Beaver 2010). They have strong olfactory acuity and a highly developed visual memory, so easily identify predators. If human groups were able to hunt them, it was necessary to approach them without arousing attention.

Wolves live in pack with two alpha at the head. During the gestation of the female and the first weeks of education of the cubs, she lives in a den. They have an exceptional sense of smell and very developed hearing. They hunt in a very organized way. Humans could have taken parts of carcasses after wolves hunting. Foxes are more solitary or live in couple. Canids can be hunted using trapping techniques, such as snare, snare trigger, deadfall, snare trap, or hanged snare (Baker 1993). During the autumn they moult, and during the winter their fur has a large isothermal capacity, so it is the best season for human groups to exploit fur. It should be noted that care should be taken when handling wolf carcass and fur, due to tapeworm eggs in feces which are infectious. The meat can be a food resource. On the one hand, meat is vectors for parasites (tapeworm, trichinellosis; Kruuk 2002). On the other hand, the consumption of carnivores, especially of fox, is known in recent human populations (Tous-saint-Samat 1997). Bones and teeth can be used to make ornaments and tools.

In addition it is possible for humans to tame some species.

**Conclusions.** The archaeological sites from the North Ukraine of the first part of the Upper Pleniglacial (26—23000 BP) are very important to better understand the human occupations for all the East European Plain. They show the continuous occupation of the territories, in any seasons, with the persistence of organized activities, innovations and varied behaviors. The main species present in archaeological sites are Mammoth, Reindeer, Horse, Fox and Wolf. The eco-ethology involvement of these species in human ways of life, permits to highlight the potential human behaviors and strategies. Otherwise, there is a connection of the spread of major industries with climate events with the changes between the middle Gravettian and late Gravettian assemblages around the Last Glacial Maximum. This connection is more clearly traced in the northern zone of Ukraine. The late Gravettian industries continue to occupy the northern zone, a manifestation of which is the Pushkari group, Dorochivtsi III and Kyrlyivska, during the Last Glacial Maximum.



The end of the peak marks the disappearance of Late Gravettian and of human populations between 19—16000 BP. The gradual mitigation of the climatic situation marks the spread of Epigravettian sites from 16000 BP. However, it is impossible to explain all the processes within natural determinism. To better understand this transition in the socio-ecological systems of the nomadic populations we need to compare the systems of the Upper part of the Upper Pleniglacial with those of the second part.

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L. Demay, P. M. Vasyliiev,  
L. V. Koulakovska, D. V. Stupak,  
P. S. Shydlovskiy, V. I. Belyaeva

## PALAEOLITHIC HUMAN SOCIETIES DURING THE UPPER PLENIGLACIAL THROUGHOUT THEIR RELATIONS WITH OTHER ANIMALS IN UKRAINIAN ARCHAEOLOGICAL SITES

The first part of the Upper Pleniglacial (around 26000—20000 BP) is characterized by a deterioration in weather conditions, which reached its peak during the Last Glacial Maximum. In the East European Plain, most of its lands were dominated by a periglacial steppe-tundra with the maximum extension of ice sheet in the North and permafrost. The different animal species had to adapt to these environments, also as human groups. The recent works realized in Ukraine permit to better understand the lifestyles of the Palaeolithic human groups, particularly their subsistence activities, the modalities of settlements and the technological practices. We based our study on the main sites, Dorochivtsy III, Galich 1, Klussy, Korman, Molodova V, Obollonia, Oselivka, Pushkari 1 and Pogon (Pushkari 8). These sites are very important to better understand the human occupations for all the East European Plain. Here we particularly focus on the zooarchaeological remains, which permitted to better determine the taphonomic conditions, the human activities, the seasonality of occupations and the human and other animal relationships. The main species present in archaeological sites are Mammoth, Reindeer, Horse, Fox and Wolf, who have important implication on the territory modification and the food resource for humans. Moreover the animal eco-ethology involvement of their acquisition-exploitation by nomadic hunter-gatherers, permits to highlight the potential human behavioral strategies. They show the continuous occupation of the territories by humans, in any seasons, with the persistence of organized activities, innovations and var-

ied behaviors. This period corresponds to the changes between middle Gravettian and late Gravettian, then first Epigravettian features. The end of the Last Glacial Maximum peak marks the disappearance of Late Gravettian and of human populations between 19—16000 BP, followed by a hiatus until 16000 BP.

**Keywords:** Upper Palaeolithic, Zooarchaeology, Subsistence activities, Gravettian, Epigravettian.

*Л. Демей, П. М. Васильєв,  
Л. В. Кулаковська, Д. В. Ступак,  
П. С. Шидловський, В. І. Беляєва*

## ПАЛЕОЛІТИЧНІ СУСПІЛЬСТВА ДОБИ ВЕРХНЬОГО ПЛЕНІГЛЯЦІА- ЛУ ТА ЇХНІ ЗВ'ЯЗКИ З ТВАРИННИМ СВІТОМ ЗА ДАНИМИ АРХЕОЛОГІЧ- НИХ СТОЯНОК УКРАЇНИ

Перша частина верхнього пленігляціалу (близько 26000—20000 р. т.) Характеризується погіршенням погодних умов, яке досягло свого піку під час останнього льодовикового максимуму. На Східноєвропейській рівнині на більшості її територій переважала перігляціальна степова тундра з максимальним розширенням льодовикового покриву на півночі та вічною мерзлотою. Різні види тварин повинні були пристосуватися до цього середовища, також як людські групи. Недавні роботи, здійснені в Україні, дозволяють краще зрозуміти спосіб життя палеолітичних груп людей, особливо їх господарські моделі, поселенські стратегії та техніко-культурну специфіку. Ми базували своє дослідження на основних стоянках: Дорошівці III, Галич I, Кюлоси, Кормань, Молодова V, Оболоння, Оселівка, Пушкарі 1 та Погон (Пушкарі 8). Ці стоянки дуже важливі для кращого розуміння людського розповсюдження на всій Східноєвропейській рівнині. Тут ми особливо зосереджуємось на зооархеологічних залишках, які дозволили краще визначити тафономічні умови, діяльність людини, сезонність, а також стосунки між людьми та іншими тваринами. Основними видами тварин, які присутні на археологічних стоянках є мамонт, північний олень, кінь, лисиця та вовк, які мають важливе значення для засвоєння території людьми та продовольчих ресурсів. Більше того, особливості поведінки тварин для їх добування-експлуатації кочовими мисливцями-збирачами дозволяє висвітлити потенційні стратегії поведінки людини. Вони демонструють постійну окупацію територій людьми в будь-який сезон, з постійною організованою діяльністю, інноваціями та різноманітною поведінкою. Цей період відповідає змінам між середнім граветом та пізнім граветом, а потім початку епігравету. Кінець останнього льодовикового максимуму знаменує зникнення людських популяцій пізнього гравету між 19—16000 р. т. та хіатус до 16000 р. т.

**Ключові слова:** верхній палеоліт, зооархеологія, господарська стратегія, Граветт, Епіграветт.

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**БСЛЯЄВА Валентина Іванівна**, кандидат історичних наук, доцент, Санкт-Петербурзький державний університет, Університетська наб., 7/9, Санкт-Петербург, 199034, Росія.

**BELYAeva Valentina I.**, PhD, Associate Professor, Saint-Petersburg State University, University Embankment, 7/9, Saint-Petersburg, 199034, Russia. ORCID: 0000-0002-2395-5729, e-mail: vibel@list.ru.

**ВАСИЛЬЄВ Павло Михайлович**, кандидат історичних наук, молодший науковий співробітник, Інститут археології НАН України, вул. Богдана Хмельницького, 15, Київ, 01601, Україна.

**VASYLIEV Pavlo M.**, PhD, Research associate, the Institute of Archaeology, the National Academy of Sciences of Ukraine, Bohdana Khmelnytskoho str., 15, Kyiv, 01601, Ukraine.

ORCID: 0000-0002-9800-8152, e-mail: pavlikmoro-zovski@gmail.com.

**ДЕМЕЙ Лєтісія**, PhD, науковий співробітник, Національний природничий музей та університет Перпіньяна, вул. Рене Панхард, 1, Париж, 75013, Франція.

**DEMay Latitia**, PhD, Research Fellow, Muséum national d'Histoire naturelle, rue René Panhard, 1, Paris, 75013, France.

ORCID: 0000-0003-4930-7030, e-mail: laetitia.demay@mnhn.fr.

**КУЛАКОВСЬКА Лариса Віталіївна**, кандидат історичних наук, завідувача, Інститут археології НАН України, вул. Богдана Хмельницького, 15, Київ, 01601, Україна.

**KOUlAKOVSKA Larissa V.**, PhD, head of Department, the Institute of Archaeology, the National Academy of Sciences of Ukraine, Bohdana Khmelnytskoho str., 15, Kyiv, 01601, Ukraine.

ORCID: 0000-0002-8704-8642, e-mail: larissa.kulakovska@gmail.com.

**СТУПАК Дмитро Вікторович**, кандидат історичних наук, науковий співробітник, Інститут археології НАН України, пр-т Героїв Сталінграда, 12, Київ, 04210, Україна.

**STUPAK Dmytro V.**, PhD., Research Fellow, the Institute of Archaeology, the National Academy of Sciences of Ukraine, Heroiv Stalinhrada ave., 12, Kyiv, 04210, Ukraine.

ORCID: 0000-0002-0809-2179, e-mail: stupak17@ukr.net.

**ШИДЛОВСЬКИЙ Павло Сергійович**, кандидат історичних наук, доцент, Київський національний університет імені Тараса Шевченка, вул. Володимирська, 60, 01033 Київ, Україна.

**SHYDLOVSKYI Pavlo S.**, PhD, Associate Professor, Taras Shevchenko National University of Kyiv, Volodymyrska str., 60, Kyiv, 01033, Ukraine. ORCID: 0000-0001-6771-812X, e-mail: pav.shy@gmail.com.