



Human Palaeontology and Prehistory (Prehistoric Archaeology)

A Levalloisian jasper cache from the Arts Bogdyn Nuruu massif in the Gobi Altai Mountains, southern Mongolia



Une cache de jaspes Levallois du massif Bogdyn Nuruu dans les montagnes du Gobi Altaï, Mongolie méridionale

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ABSTRACT

A Pleistocene deposit of jasper cores was discovered in the Gobi Altai Mountains, within the Arts Bogdyn Nuruu massif in southern Mongolia. It was situated on a mountain ridge above the Khutul Usny valley at a height of ca. 1500 m a.s.l., away from human settlement (N44°16'09.3", E102°53'41.5"). Examination of traces of the artefacts' use proved that at least some of them display evidence of working. Technological analysis of the artefacts revealed that the find should be related to the Levallois–Mousterian population of the central Asian Middle Palaeolithic. The cache from Arts Bogdyn Nuruu is the first discovery of this type recorded within the Gobi Desert. It is a potential source of information contributing to the discussion of the specific nature of raw material exploitation, the dynamics of settlement and hunting strategies in the Altai region.

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R É S U M É

Un dépôt pléistocène de noyaux de jaspe a été découvert dans le massif Arts Bogdyn Nuruu des montagnes du Gobi Altaï, en Mongolie méridionale. Le dépôt est situé dans une chaîne de montagnes surplombant la vallée de Khutul Usny, loin des occupations humaines. L'étude des traces d'usage sur les artefacts révèle que certaines pièces ont été travaillées. L'analyse technologique indique que le site est à mettre en relation avec la population Levallois–Moustérien du Paléolithique moyen de l'Asie centrale. Cette cache d'Arts Bogdyn Nuruu est la première découverte de ce type dans le désert de Gobi. Il s'agit d'une source

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potentielle d'informations pour la discussion sur la nature spécifique de l'exploitation des ressources naturelles, de la dynamique des occupations et des stratégies de chasse dans la région de l'Altai.

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1. Introduction

Archaeological evidence indicates that the original settlement of the Altai occurred by 0.8 Ma. The subsequent spread of the late Acheulean or Acheulean–Mousterian industries to northern Asia, with the help of Levallois technology and bifacial tools, is referred to as MIS12–MIS10 and has been confirmed in the Altai area, the Denisova cave or in the Tsagaan Agui cave, as well as in Flint Valley. Thus, almost the oldest occupation in that part of Asia was witnessed in the *Arts Bogdyn Nuruu* massif area, especially Flint Valley. The Middle Palaeolithic in northern Asia is known primarily from the Altai and adjacent regions.

In Mongolia, the Middle Palaeolithic sites are concentrated in the Mongolian Altai and the Gobi Altai as well as in the Lakes Valley area; however, with the exception of Tsagaan Agui cave in Gobi Altai, the only known stratified and dated Middle Palaeolithic sites are concentrated in North-Central Mongolia in the Selenga river basin. The initial formation of this stage based on the materials from the Denisova cave refers to the interval 282–133 ka and the latest complexes refer to 33 ka BP (upper layer of the Okladnikova cave). Already within MIS 3 (50–30 ka), the Upper Palaeolithic forms and develops independently in the Altai and the surrounding areas (Buzhilova et al., 2017; Derevianko, 2005; Derevianko et al., 2014; Gunchinsuren, 2017).

This contribution presents a newly discovered Middle Palaeolithic cache from the *Arts Bogdyn Nuruu* massif in the Gobi Desert in Mongolia. To date only a single such find is known from Mongolia—a cache of several dozen flakes from Tolbor, an area where numerous stratified Pleistocene sites have been identified (Derevianko et al., 2004, 2005). It is considered to be a potentially symbolic Pleistocene deposit (Tabarev et al., 2013). This article discusses another deposit, discovered during the implementation of a Mongolian–Polish research project dedicated to the Stone Age in the Gobi Desert (Masojć et al., 2017). The project focuses on the area neighbouring the Flint Valley—a vast area of raw material resources for Palaeolithic societies. It is situated between the southern end of the Gobi Altai, formed by the *Arts Bogdyn Nuruu* massif, and the Altai's southern piedmont, called *Barrun Saikhany Nuruu* (Fig. 1). The work involved reconnoitring the space around four paleolakes situated in the central part of the research area and the area of the *Arts Bogdyn Nuruu* massif of the Gobi Altai (Fig. 2). The main goal of the research was to reconnoitre the prehistoric settlement around Flint Valley in contrast to the valley itself, where the excavations proved the presence of humans practically throughout the whole Pleistocene. A distribution of sites using the Flint Valley resources was established to investigate the settlement

preferences in different phases of the Pleistocene and early Holocene (Masojć et al., 2017). The jasper cache was part of this Palaeolithic settlement net surrounding the Flint Valley.

Caches, or dense deposits of artefacts without any vestiges of production or preparation at the site of discovery, usually deposited intentionally, are exceptional and rare prehistoric finds. Palaeolithic stone deposits are occasional finds, considerably diversified in their nature. They usually consist of a specific set of products, e.g., selected points, concentrations of blanks, blocks of raw material, or cores. They tend to be situated within settlement structures, as is the case of Natufian hut structures from Kharaneh in Jordan dated to 20 ka, which provided caches of objects like shell, red ochre, and burnt horn cores (Maher et al., 2012). They constitute an element of raw material provisioning, as is also the case for the late Pleistocene deposits of the eastern Italian Alps, where a deposit of several dozen ready to be used raw material blocks was discovered (Peresani, 2006). Another case, at Mount Pua in Israel, provided caches found within the specific context of flint extraction and reduction, containing Levallois and Acheulean products (Barkai and Gopher, 2010). Finally, the Clovis caching phenomenon from the New World has received a great deal of attention from archaeologists attempting to understand Clovis adaptations; they have suggested that Clovis caches were an adaptation for the initial colonisation of North America (Huckell and Kilby, 2014; Kilby, 2008). Caches are often spectacular, but their unambiguous interpretation is usually fraught with difficulties, especially when attempting to determine their character, i.e. whether they are a manifestation of utilitarian or ritual human activity. This problem is common to prehistoric deposits from both the Old (Hamon and Quilliec, 2008; Levy, 1982) and the New World (Buchanan et al., 2012; Huckell and Kilby, 2014). Adopting a number of criteria in their analysis—their content, arrangement, location, context or presence of evidence of use displayed by the deposited objects—facilitates the categorisation of the deposits as ritual or purely utilitarian, unrelated to religious activities. The archaeological and anthropological literature proposes two approaches to the interpretation of the function and significance of caches. The first views their content as a result of their implementation in practice and the other focuses on the ritual or symbolic reasons for their deposition (Bradley, 1990; Fontijn, 2002; Levy, 1982). According to the first approach, raw materials or tools were collected for future use (which never happened). Storing raw material for subsequent use is attributed even to early hominins (Potts, 1984; Shipton et al., 2009) and this interpretation is universally accepted for subsequent periods until the Metal Ages (Bertola et al., 1997; Chabai, 2008; Hurst, 2007; Peresani,

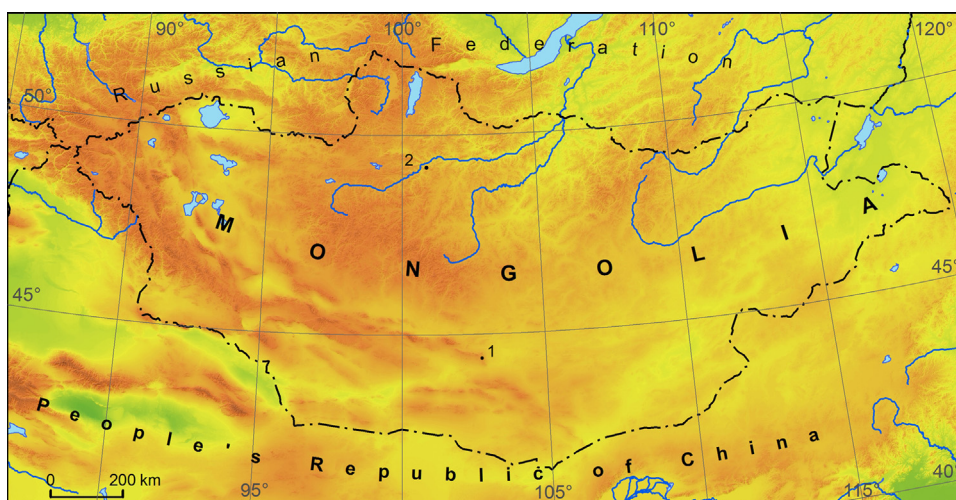


Fig. 1. Map of Mongolia. 1. Location of the Arts Bogdyn Nuruu massif, where the cache of jasper cores was discovered.. 2. Location of the area with numerous stratified Pleistocene sites and the deposit of Palaeolithic fakes in Tolbor area (drawing: Małgorzata Wieczorek).

Fig. 1. Carte de Mongolie. 1. Localisation du massif d'Arts Bogdyn Nuruu, où la cache de noyaux de jaspe a été découverte. 2. Localisation de la zone à nombreux sites stratifiés pléistocènes et du dépôt de faux objets paléolithiques dans la région de Tolbor (dessin : Małgorzata Wieczorek).

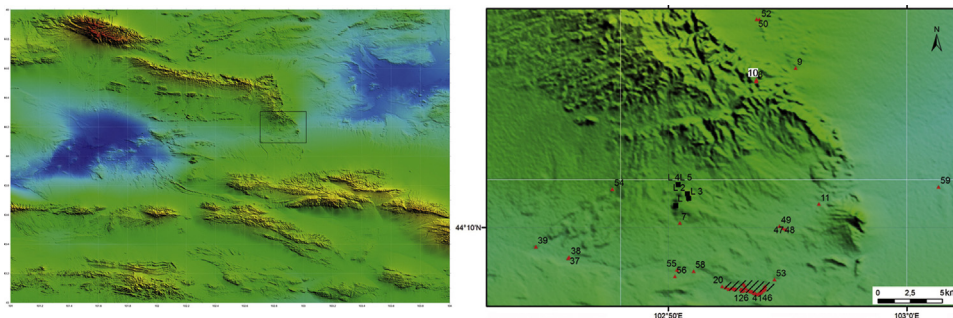


Fig. 2. The Arts Bogdyn Nuruu massif. Left: the area investigated in 2016 in the massif's southeastern region. Right: archaeological sites discovered within the massif and its foot. The jasper deposit is marked with the number 10. Flint Valley sites are numbered L1–L5 from Derevianko's team research (Derevianko et al., 2002). The remaining sites were discovered in 2016 (Masojć et al., 2017), except for site 59, which is known from Okladnikov's research (Okladnikov and Larichev, 1963) (drawing: Marcin Szmit).

Fig. 2. Le massif d'Arts Bogdyn Nuruu. À gauche : la zone étudiée en 2016 dans la partie sud-orientale du massif. À droite : les sites archéologiques découverts au cœur du massif et à son pied. Le dépôt de jaspe est marqué par le numéro 10. Les sites de la Flint Valley sont numérotés de L1 à L5 selon les travaux de l'équipe de Derevianko (Derevianko et al., 2002). Les sites restants ont été découverts en 2016 (Masojć et al., 2017), excepté le site 59, qui est connu d'après les travaux d'Okladnikov (Okladnikov et Larichev, 1963) (dessin : Marcin Szmit).

2006). The deposits interpreted as symbolic may have been connected with various rituals and magic, e.g., ensuring successful hunting, 'game charming' (Keyser and Whitley, 2000), or a supply of plentiful rock material (Barkai and Gopher, 2010; Khalaily et al., 2013).

In her work on the deposits from the Bronze Age in Scandinavia, Levy (1982, pp. 17–24) proposed different criteria for defining the specific nature of caches, such as their arrangement, context and content, amongst others. According to Levy, the deposits placed in distinctive surroundings and location, in an exceptional arrangement and consisting of specific/rare objects or raw material, should be recognised as symbolic. According to this concept, in the specific world of the Late Bronze Age in Scandinavia a deposit of flint artefacts buried shallowly or hidden behind a stone and consisting of banal objects from common raw material should be recognised as connected with non-ritual

human activity. Its exact opposite, recognised as ritual in its character, is the complete sickle from Stenild that was deposited in a bog in northern Jutland (Juel Jensen, 1990; Masojć, 2016).

It seems that an exceptional exposition of cache in the surrounding landscape might be recognised as a criterion for its symbolic nature; this was one of the premises suggesting the ritual nature of the Pleistocene deposit from Tolbor in the *Ikh Tulberiin Gol* River valley in northern Mongolia mentioned above (Tabarev et al., 2013). In North America, Paleo-Indian deposits with Clovis points were placed in the landscape's strategic areas and although researchers generally argue for functional uses of Clovis caches (Huckell and Kilby, 2014), they are at times interpreted as ritual (Gillespie, 2007).

The basic assumption for distinguishing between ritual and utilitarian deposits should be the thesis that a ritual is

devoid of any economic premises. This dichotomy is supported by Levy who argues that once an object is deposited, it loses all its utilitarian features (1982, 23). Especially in the case of Stone Age deposits, this contradicts the traces of use found on objects from deposits. Additionally, our knowledge of communities from tens of thousands of years ago is far too insufficient to enable the unambiguous division of human activity into ritual and utilitarian spheres. To use the most obvious example, hunting must have involved both spheres, in many instances at the same time (Whitley, 2014).

2. Flint Valley

The *Arts Bogdyn Nuruu* massif and its piedmonts, and especially the so-called Flint Valley located there, have been explored since the 1960s (Derevianko et al., 1997, 2001, 2002; Okladnikov and Larichev, 1963). Research in the Flint Valley took place on one of the mesa-like erosional remnants rising abruptly from the surrounding desert terrain. Stone pavements and flint debris cover the entire mesa's surface. According to the investigators, the formation of such pavements was greatly influenced by anthropogenic factors—ca. 60% of the material is the product of quarrying and the reduction of stone for flint artefacts. Several dozen square kilometres are covered by dense concentrations of stones, most of which are flint by-products. In the course of archaeological investigations in the Flint Valley, a total of more than 30,000 implements were collected. The analysed assemblages were ascribed to three chronological horizons: Early, Middle and Late Palaeolithic (Derevianko et al., 2002). In 2016, numerous new sites, including the jasper cache, were recorded. Most were Middle Palaeolithic remains of encampments situated on the shores of the paleolakes or workshops situated on the outcrops of rock raw material (Masojć et al., 2017). On the supraregional scale, the *Arts Bogdyn Nuruu* massif, like all of Mongolia, is crossed by routes connecting Siberia with China (both the WN-ES route along the Altai mountains and the N-S corridor from Lake Baikal to Inner Mongolia). According to A.P. Okladnikov (1981), the location of Mongolia, including the Flint Valley, could have had a significant influence on the cultural phenomena that developed during the Pleistocene in central Asia (Rybin et al., 2016).

3. Cache

Research on the *Arts Bogdyn Nuruu* massif involved reconnoitering the deep valley of *Khutul Usny* and its mouth opening toward the steppe plain. The slopes of the 5-km-long valley are considerably eroded. The appearance of the valley's bottom and the presence of pebbles on its surface prove that water flowed periodically there. Three relatively small caves were recorded on the valley's left slope. The jasper deposit (Fig. 3) was discovered almost directly above them, ca. 200 m to the north, at a height of 1581 m a.s.l. (N 44° 16' 09.3" E 102° 53 41.5"). The place offers a panoramic view of the eastern section of the *Khutul Usny* valley with its mouth opening towards the steppe, situated ca. 2 km from the find, and the end sections of two smaller valleys meeting the *Khutul Usny* valley.



Fig. 3. Location of the cache of jasper blocks in the valley of *Khutul Usny*. View from the east (photo: Józef Szykalski).

Fig. 3. Localisation de la cache de blocs de jaspé dans la vallée de *Khutul Usny*. Vue de l'est (photo : Józef Szykalski).



Fig. 4. Cache from *Arts Bogdyn Nuruu*. The deposit of jasper blocks during exploration with the view of the *Khutul Usny* valley (photo: Mirosław Masojć).

Fig. 4. Cache d'*Arts Bogdyn Nuruu*. Le dépôt de blocs de jaspé pendant l'exploration avec la vue sur la vallée de *Khutul Usny* (photo : Mirosław Masojć).

The deposit was situated ca. 30 m above the valley's bottom (Fig. 4). Six artefacts were observed on the surface, three of which were still partially buried in the ground, which is composed of a mixture of weathered rock, fine sand and gravel (Fig. 5). Five other artefacts of the same material were recorded during the excavation. The artefacts were buried at a depth of 15 cm, directly above the considerably eroded bedrock. The artefacts were intentionally deposited in a small hollow, possibly a pit or a niche left after a rock block was removed. It is quite possible that the cores were deposited in an organic container. The outlines of the pit where the deposit was placed were not recorded. The roof of the deposit was destroyed. The evidence of weathering and denudation (due to which some of the material appeared on the surface) observed may indicate that in its upper part, the deposit may have included more specimens.

The artefacts were made from jasper blocks and flakes of similar characteristics (morphology and colour), which



Fig. 5. Cache from Arts Bogdyn Nuruu. The deposit during excavation after clearing and removing of loose blocks (photo: Miroslaw Masojć).

Fig. 5. Cache d'Arts Bogdyn Nuruu. Le dépôt pendant le creusement après déblaiement des blocs meubles (photo : Miroslaw Masojć).

were all probably sourced from one outcrop. Reconnoitering of the area failed to confirm the occurrence of this kind of raw material in the vicinity of the deposit. In addition, the entire researched area failed to yield this raw material despite the fact that products made from it were ubiquitously present at most sites discovered around the Flint Valley (located a distance of ca. 10 km from the cache) on the southern slopes of *Arts Bogdyn Nuruu*. Levallois jasper products are also common at sites on the eastern slopes of the massif. Therefore, it is quite possible that outcrops of this raw material are present not far away from the deposit's location (Derevianko et al., 1996, 1997, 2001, 2002).

4. Methods

All necessary permits were obtained for the described study, which complied with all relevant regulations. Permission was issued by the Ministry of Education, Culture, and Science of Mongolia—permission number A/148. The research was carried out by the Institute of Archaeology, University of Wrocław, Poland, together with the Institute of History and Archaeology of the Mongolian Academy of Sciences, and the Mongolian State University of Education in Ulaanbaatar. The studied artefacts are stored in the collections of the Institute of History and Archaeology of the Mongolian Academy of Sciences in Ulaanbaatar.

The predominance of arid climactic conditions in vast areas of Mongolia during most of the Quaternary considerably hindered sedimentation processes, which are responsible for the fact that Pleistocene sites are commonly deposited on the surface. As in Flint Valley, they are frequently situated in the vicinity of raw stone deposits, while their mass occurrence as stone-working workshops forms specific chronological-settlement palimpsests. Such assemblages are systematised on the basis of analyses of their technological categories, aided by the assessment of the degree of preservation of product surfaces from individual assemblages. Research carried out by Anatoly Derevianko's team proves that, allowing for the

subjectivity of the method, it is possible to synchronise the degree of abrasion of the surfaces of artefacts with the periods when they were especially exposed to it, which is possible on the basis of a geomorphological analysis of the site, the contribution of individual raw materials in stone assemblages and the degree of their preservation (Derevianko et al., 2002). Periods of climactic conditions convenient for settlement in southern Mongolia coincided with periods of considerable cooling and increased humidity. On the basis of these premises, three chronological horizons have been identified in Flint Valley and in the area around Arts Bogdyn Nuruu: Early, Middle and Late Palaeolithic. These collections have been subdivided into four mutually exclusive categories based on relative degrees of surface weathering and abrasion: heavily (Early Palaeolithic), moderately (Mousterian period), and lightly abraded (Levallois-Mousterian and Upper Palaeolithic combination) and unabraded (late Upper Palaeolithic) artefacts (Derevianko et al., 2001, 2002).

For the analysis of the deposits from Arts Bogdyn Nuruu, the method proposed by Derevianko's team indicates a potential chronological range of the deposit's emergence. Tight technological links are seen between the jasper deposit and the assemblages from the series of moderately and lightly abraded artefacts. The assemblages feature Levallois materials and analogous Levallois pre-cores, the latter constituting the most important element of the deposit. Over a wide chronological spectrum, they are connected with the Middle Palaeolithic. The specific nature of core preparation from the deposit was the inspiration for performing a functional analysis of selected artefacts. The implemented method comprises observation of all traces of use on the edges and surfaces of the products made from stone, organic matter and, recently, from metal and their subsequent identification. In effect, on the basis of experiments and ethnographic data an interpretation is made allowing for formulation of hypotheses of how and for what a given tool was used. The method was proposed in the 1960s and 1970s (Keeley and Newcomer, 1977; Semenov, 1964; Tringham et al., 1974), improved and developed in the subsequent years (Anderson-Gerfaud, 1981; d'Errico and Giacobino, 1985; Fullagar, 1988; Keeley, 1980; Moss, 1983; Plisson, 1985; Van Gijn, 1990). With the contribution of the studies of the surviving remains (Hardy and Garufi, 1998; Haslam, 2006; Langejans, 2010) it has become an essential factor in interpreting artefacts, aiming at understanding their functions, performed individually, within the assemblage of the analysed artefacts, and the site itself. It is also a point of departure for a multi-faceted analysis, which should take into consideration an analysis of a concrete artefact in the site's wider spatial, technological, chronological and cultural contexts. This, in effect, offers an opportunity to understand and examine the activities performed by prehistoric communities.

The examination mentioned above was carried out with the use of two microscopes of the Olympus type:

- a stereoscopic one offering magnification of several dozen times;

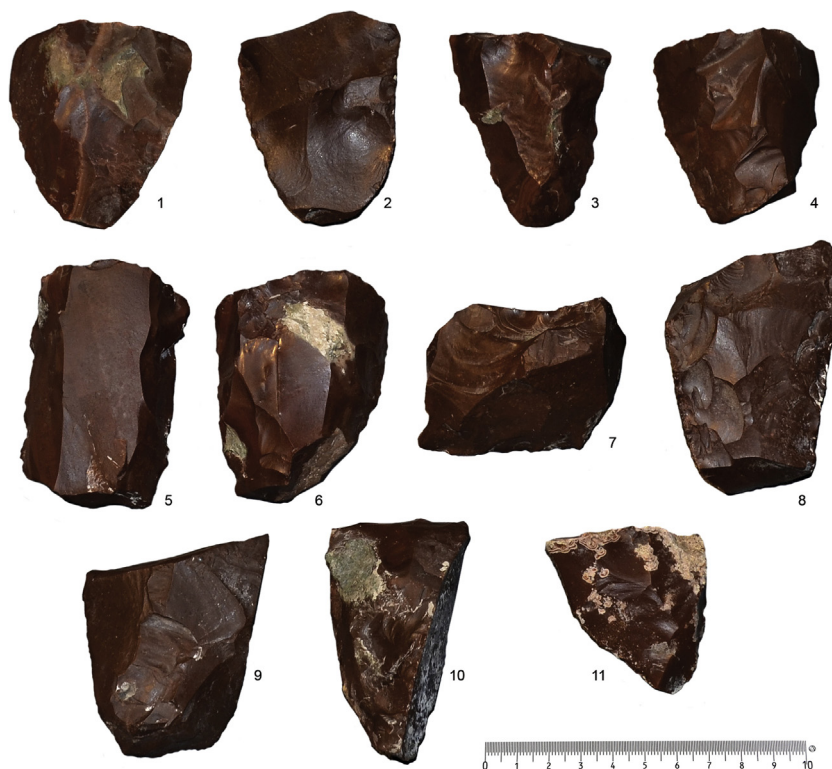


Fig. 6. Jasper cores from the deposit in the Arts Bogdyn Nuruu massif (photo: Marci Szmít).

Fig. 6. Blocs de jaspe du dépôt du massif d'Arts Bogdyn Nuruu (photo : Marcin Szmít).

- a metallographic one offering the magnification of 100, 200, 500 times.

Microscopic examination enabled documentation of microtraces visible on the artefacts, e.g., fractures, roundings or damage of flint edges, and microtraces in the form of burnishing. Recording of these alterations and their interpretation, utilising the knowledge acquired during the experiments recreating old tools and activities constituted the basis for the reconstruction of the function performed by a given tool in the past. The analysis employed a stereoscopic microscope with magnification of ca. 10× and a metallographic microscope with a magnification of 100×, 200×, and 500×.

5. Results

5.1. The deposit's technological characteristics

The cache consists of 11 blocks of red-brownish jasper (Figs. 6 and 7). The artefacts are very well preserved. They bear no evidence of abrasion that is so characteristic of some of the products from the Flint Valley and the sites around *Arts Bogdyn Nuruu*. This abrasion is a result of the raw material being exposed on the surface for a long time, which proves that the cache was deposited relatively quickly. The lack of abrasion also suggests that the partial uncovering of the deposit took place only relatively recently.

Most of the artefacts belong to the category of initial cores prepared with the use of Levallois technology. The Levallois concept is a predetermined technique of core preparation and reduction aimed at production of characteristic end-products. Levallois technology was originally defined on the basis of what were presumed to be distinctive end-products: i.e. large, flat sharp-edged flakes, blades and points with intensive platform faceting. There is generally one Levallois reduction strategy using a single invariable concept throughout the Palaeolithic Old World, albeit with multiple local variants. However, in the last few decades, this notion has been modified. In short, the end-products of the technique drew attention to the way they are produced and to the by-products of its consecutive stages (Boëda, 1995; Bordes, 1961; Chazan, 1997; Van Peer, 1992).

As many as 7 out of the 11 artefacts from the cache may be classified as Levallois forms (63%), mainly sub-triangular but also sub-quadrangular (Fig. 7:1). All were prepared in a similar way (Fig. 7:1–7). Striking platforms, flaking surfaces and the remaining surfaces were prepared in advance. They were centripetally knapped forming a convex, usually sub-triangular flaking surface (Figs. 6:1–4, 6, 8). The back of the cores were flattened with transverse knapping of preparing flakes (Fig. 7:3, 7:5, 7). The striking platform was prepared on the side of the flaking platform. Pre-cores display no evidence of reduction; only in two cases are isolated exploitation negatives visible on the flaking platforms (Fig. 7:5, 7). The character of the preparation of some edges

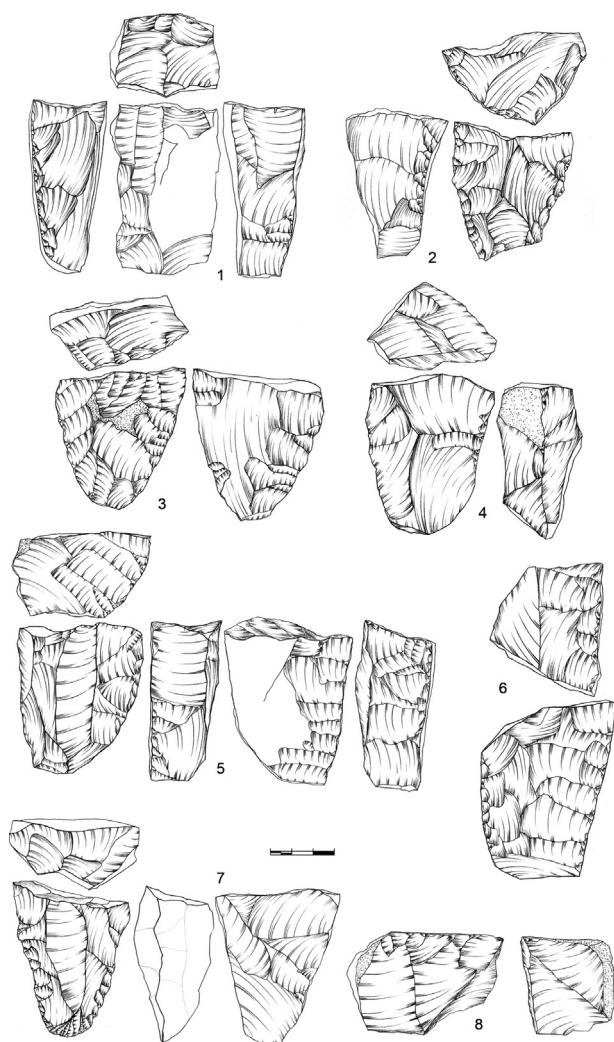


Fig. 7. Jasper cores from the deposit in the Arts Bogdyn Nuruu massif (drawing: Mirosław Masojć).

Fig. 7. Blocs de jaspe du dépôt du massif d'Arts Bogdyn Nuruu (dessin : Mirosław Masojć).

of the cores, with a series of transverse flakes—especially at the back of the cores, looks like a retouched working edge (Figs. 6:9; 7:1; 7:6) and may suggest their use as tools. This conclusion is corroborated by the functional analysis of some of the products. A simplified outline of the preparation of Levallois cores from the cache is illustrated in Fig. 9.

The preparation of the remaining cores from the deposit is not advanced enough to justify more detailed characteristics (Fig. 6:9–11). They are initial core preforms, where preparation is usually only visible on one edge. In the case of at least one of them, the preparation looks like retouch, which together with the presence of microtraces of working, testifies to its use as a tool (Fig. 6:9). The final product is a flake core with a changing orientation (Fig. 6:7). The characteristics of the individual products are presented in Table 1.

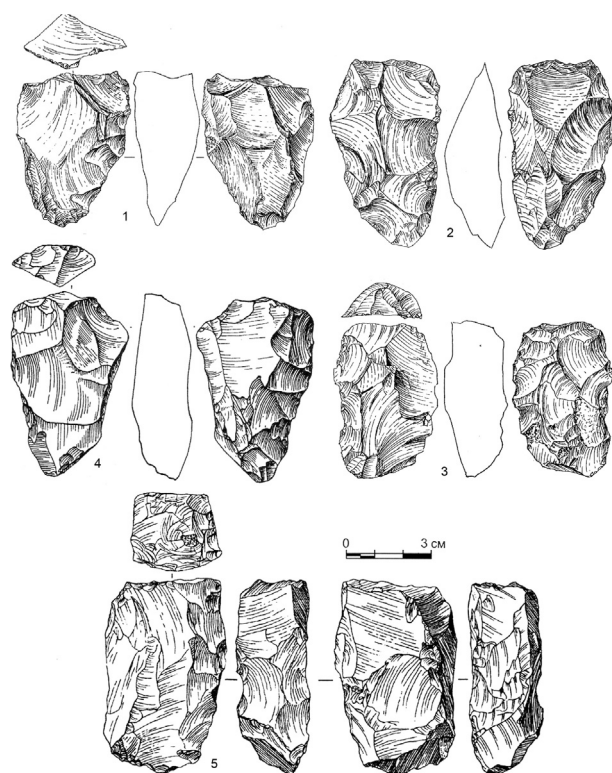


Fig. 8. Analogies. Levallois pre-cores from the sites in the Arts Bogdyn Nuruu zone connected with the series of lightly abraded artefacts (1–3) and moderately abraded artefacts (4, 5). 1. Flint Valley, locus 1 (Derevianko et al., 2002, p. 264, 95:1). 2. Flint Valley, locus 3 (Derevianko et al., 2002, 230, fig. 59:7). 3. Flint Valley, area adjacent to locus 3 (Derevianko et al., 2002, 278, fig. 111:1). 4. Mukhtar-Bulag 1 (Derevianko et al., 2001, 91, fig. 3:4). 5. Ikh-Bulag 16 (Derevianko et al., 2001, 127, fig. 75:3).

Fig. 8. Analogies. Pré-blocs Levallois des sites de la zone d'Arts Bogdyn Nuruu connectés avec les séries d'artefacts légèrement abrasés (1–3) et modérément abrasés (4, 5). 1. Flint Valley, locus 1 (Derevianko et al., 2002, p. 264, fig. 95:1). 2. Flint Valley, locus 3 (Derevianko et al., 2002, 230, fig. 59:7). 3. Flint Valley, zone adjacente du locus 3 (Derevianko et al., 2002, 278, fig. 111:1). 4. Mukhtar-Bulag1 (Derevianko et al., 2001, 91, fig. 3:4). 5. Ikh-Bulag, 16 (Derevianko et al., 2001, 127, fig. 75:3).

5.2. Correlation and chronology of the assemblage

On the basis of their technological features, the cores from the deposit may be generally ascribed to central Asian Levallois industries; these, as is well documented in today's Mongolia, appear at ca. 90 ka in the lower horizons of the *Tsagaan Agui* cave (Derevianko et al., 2000) and disappear in the Early Upper Palaeolithic at ca. 30 ka (Zwyns et al., 2014). Research carried out in the Flint Valley (Derevianko et al., 2002) and on the northeastern slopes of Arts Bogdyn Nuruu (Derevianko et al., 2001) by teams led by A.P. Derevianko facilitates more detailed stylistic and comparative analysis of the deposit; it also helps in narrowing the chronological ranges of its emergence. A similar chronological pattern, based on the preservation of the artefacts, was applied in the case of the specimens collected on the surface around Arts Bogdyn Nuruu (Derevianko et al., 2001, 2002). Flint assemblages from the Flint Valley and jasper artefacts from Arts Bogdyn Nuruu, acquired during the research mentioned above, display close analogies to the cache of 11 cores

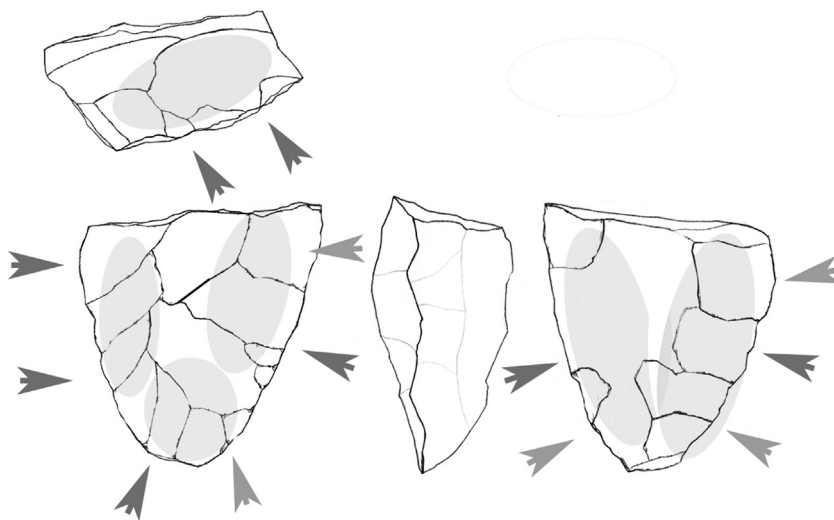


Fig. 9. Outline of the preparation of pre-cores from the deposits. Flaking platform prepared centripetally, back of the core prepared with flakes knapped transversally to the product's axis. Striking platform prepared on the flaking platform's side with flakes oblique to the core's back (drawing: Mirosław Masojć).

Fig. 9. Contour de préparation des pré-blocs provenant des dépôts. Plate-forme d'écaillage préparée à l'arrière du bloc préparé par écaillage transversalement à l'axe du produit. Plate-forme de frappe préparée sur le côté de la plate-forme d'écaillage avec des écailles obliques par rapport au dos du bloc (dessin : Mirosław Masojć).

(Fig. 8). Analogous sub-triangular and sub-quadrangular forms of Levallois pre-cores have been encountered at the sites of *Mukhar-Bulag* 1, 2, 21; *Ikh-Bulag* 12, 16 on the eastern slopes of *Arts Bogdyn Nuruu* (Derevianko et al., 2001, figs. 2–4, 10, 46, 69, 75, 76); and in each of the five excavated sites in the Flint Valley (Derevianko et al., 2002, figs. 35, 59, 68–69, 78, 94–98).

Technological features of the cache correspond to the series of moderately and lightly abraded artefacts from the Flint Valley, with a considerably greater contribution of the artefacts from the latter series. In this light, the series of moderately abraded artefacts would correspond to the Levallois-Mousterian Central Asian assemblages, while the series of lightly abraded ones is represented by transitional assemblages from predetermined technologies to the Upper Palaeolithic. In the case of southern Mongolia, the time when climatic conditions (considerable cooling) enabled the development of the series of the moderately abraded artefacts is dated to ca. 45 ka and to ca. 33 ka for the lightly abraded series (Derevianko et al., 2001; Lehmkuhl, 1998). The cache of cores from the *Arts Bogdyn Nuruu* massif may thus be placed within these chronological ranges. Since the criteria based on abrasion used by Derevianko's team could be arguable, the dating of the cache to the late Pleistocene seems more accurate. In view of genetic research of the remains of an individual from Ust'-Ishim in western Siberia it is quite possible that the deposit resulted from the activity of a modern human (Bae et al., 2017; Fu et al., 2014), even though during that period stone industries from the turn of the Middle Palaeolithic/Initial Upper Palaeolithic in Asia could have been produced by more than one hominin taxon (Kuhn and Zwyns, 2014). Because no features of cores heralding the emergence of new Upper Palaeolithic flint working (narrow-face cores and prismatic cores) were observed and because only the characteristic

Levallois cores predominate (at the same time bearing in mind the preservation status of analogous cores from the Gobi Altai), the deposit should be recognised as connected with the final stages of the existence of communities of Levalloisian traditions in central Asia.

5.3. Functional analysis

Two artefacts from the cache were examined under a microscope to conduct a functional analysis (Fig. 10), which aimed at establishing whether the artefacts display traces of use.

The first core displayed features of a utilitarian nature, situated on an intensely prepared edge, similar to a rounded, carenoidal end-scraper front. They are also visible on the rounded, prominent part of the block, where they are more intense, and on its lateral parts (Fig. 10:1A). They are traces of polishing, as seen under a smaller magnification and traces of gloss. Their character suggests that the tool was used to scrape meat off bones. However, no traces of a handle were found, which suggests that the tool may have been used without one. The other block displayed changes of a utilitarian nature. Their location overlaps with the retouch at both transverse edges of the core (Fig. 10:1B). Traces, in the form of missing bits on the edges and bright, smooth burnishing seen on the edges, resulted from scraping bones. Just as in the case of cores, traces of burnishing are seen as concentrations or individual blotches covering the most protruding points of the artefact surface.

Both artefacts displayed changes that were intentional in character. The traces are clearly visible and the surfaces of the artefacts are well preserved. The tools were used to cut animal carcasses. It is difficult to conclude whether the tools were used at the place where they were deposited. Assuming that the cores were not produced where they

Table 1Characteristics of the cores from the deposit in the *Arts Bogdyn Nuruu* massif.**Tableau 1**Caractéristiques des blocs en provenance du dépôt dans le massif *Arts Bigdyb Nuruu*.

No.	Category	Description	Size (length × width × thickness) in millimetres	Core tool	Figure
1	Pre-core	On a flake; bright-red, striped jasper; convex, triangular initial flaking platform, prepared on the whole surface; present remains of calcareous cortex, initial striking platform prepared from one direction; back of the block partially prepared, along one edge, second edge partially prepared, preparation of initial flaking platform and back of the core forms two bifacial edges (crests)	66 × 58 × 36	–	6:1; 7:3
2	Pre-core	Dark-brown jasper; initial flaking platform slightly convex, formed circularly, prepared initial striking platform, partially prepared back of the core	67 × 54 × 36	–	6:2; 7:4
3	Pre-core	On a flake; red, striped jasper; convex, triangular initial flaking platform, prepared on the whole surface, present one negative of blade removal, prepared striking platform, partially prepared back, preparation of flaking platform and back forms two bifacial edges (crests), high rounded carenoidal end-scraper front made on the block on the flaking platform's side (18 mm)	58 × 52 × 34	Side scraper, evidence of use, scraping bones	6:3; 7:7; 10A
4	Pre-core	On a flake, brown jasper; convex, triangular initial flaking platform, prepared on the whole surface on both sides, initial striking platform prepared on the initial flaking platform's side, raw back of the block	61 × 54 × 38	Side scraper (?)	6:4; 7:2
5	Pre-core	Red, striped jasper; convex, rectangular initial flaking platform, prepared from two perpendicular edges, raw central part, raw back of the block, quadrangular initial striking platform prepared circularly	74 × 51 × 33	Side scraper (?)	6:5; 7:1
6	Core	Red, striped jasper; sub-triangular flaking platform, prepared on two edges, quadrangular striking platform prepared on flaking platform's side, two negatives of removed flake and blade visible on the flaking platform, back of the core prepared along one of the edges, preparation of the flaking platform and the back forms a bifacial edge (crest)	72 × 56 × 33	–	6:6; 7:5
7	Core	Red jasper; flake core with changing orientation, three flaking platforms, one raw, absence of preparation	42 × 64 × 37	–	6:7; 7:8
8	Pre-core	Brown jasper; convex quadrangular flaking platform, prepared on the whole surface on two edges, sub-triangular initial striking platform prepared on one side, back of the core partially prepared on one edge	74 × 57 × 48	Side scraper (?)	6:8; 7:6
9	Pre-core	Brown jasper; amorphous pre-core, prepared initial striking platform; fragmentarily prepared initial flaking platform; raw back	66 × 55 × 28	Side scraper, evidence of use, scraping bones	6:9; 10B
10	Pre-core	Brown jasper; amorphous block with two prepared edges, majority of the remaining surfaces are natural, partly cortical	87 × 50 × 34	–	6:10
11	Core	Red jasper; flake core with changing orientation, devoid of preparation, cortex is present, orientation changed several times, negatives of isolated flake removals	48 × 44 × 31	–	6:11

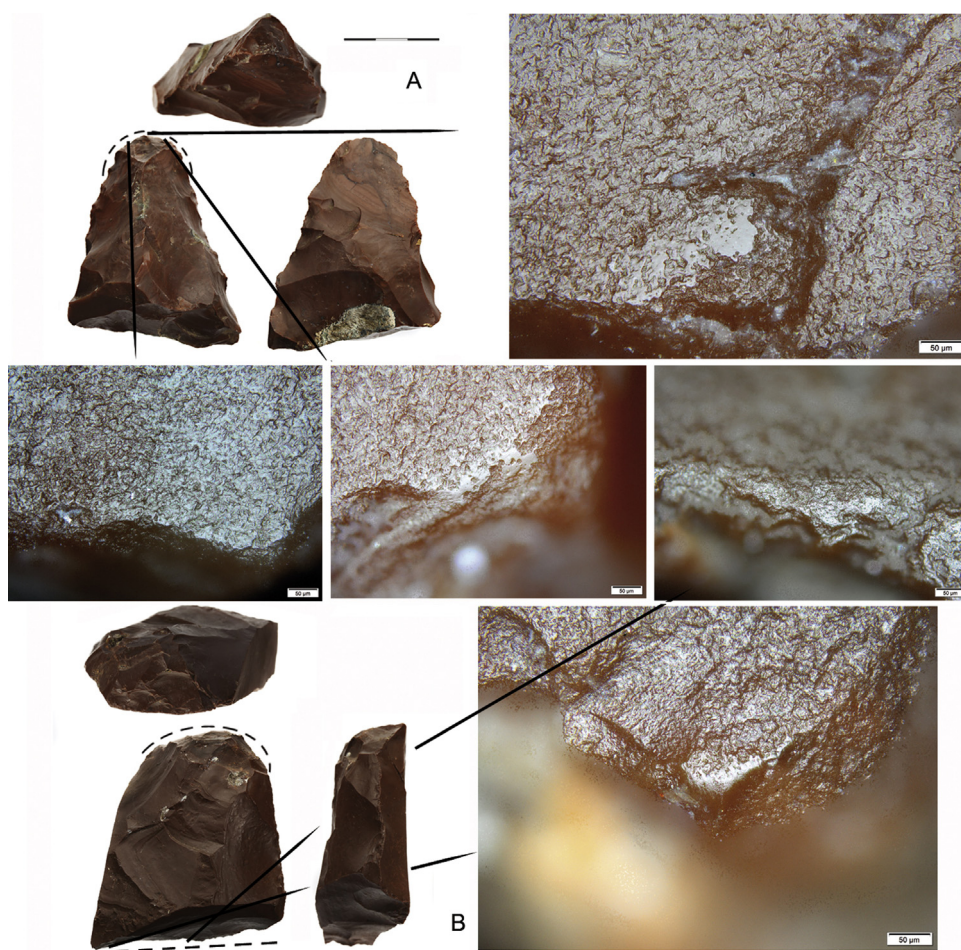


Fig. 10. Functional analysis of the deposit. Traces of use on two cores from Arts Bogdyn Nuruu (artefacts number 3 and 9 from [Table 1](#)). A. Core with a worked edge. Photographs of microscopic traces resulting from scrapping bones and flesh. B. Core with worked crosswise edges. Photographs of microscopic traces resulting from scrapping bones (photograph by Maciej Jórdeczka and Małgorzata Winiarska-Kabacińska).

Fig. 10. Analyse fonctionnelle du dépôt. Traces d'usure sur deux blocs provenant d'Arts Bogdyn Nuruu (artéfacts numéros 3 et 9 du [Tableau 1](#)). A. Bloc avec bord travaillé. Photographies de microtraces résultant d'os et de chair râclés. B. Bloc avec bords travaillés en croix. Photographie de traces microscopiques résultant d'os râclés (photos : Maciej Jórdeczka et Małgorzata Winiarska-Kabacińska).

were found (no remains of debitage), they may have been used, for instance, at their place of manufacture. The use of products constituting a cache of tools is known from Tolbor – so far, the only Palaeolithic cache found in Mongolia. Several of the 57 flakes of dark-grey chert constituting the deposit display traces of occasional work ([Tabarev et al., 2013, 18–19](#)). The artefacts from other Palaeolithic caches from the Far East, e.g., Nogawa in Japan ([Kanomata, 2006, 2010](#)) or Ustinovka-3 ([Kononenko, 2001](#)) also displayed traces of use.

6. Concluding remarks

The Palaeolithic cache of jasper initial cores from the *Khutul Usny* valley in the Gobi Altai massif differs considerably from the remaining sites situated around the Flint Valley. There are no premises for recognising it as the remains of an encampment or a manufacturing workshop. The jasper cores had been prepared in one place and were deposited in another (originally perhaps in an organic

container, e.g., they were wrapped in tree bark or animal hide). A stone may have been put on top, possibly to mark the place. Except for the cores, no other artefacts were found, e.g., debitage products, small flakes, scales, etc. Jasper is the raw material commonly found at the Palaeolithic sites in the *Arts Bogdyn Nuruu* area. No other evidence for the presence of Pleistocene hominins was recorded around the place where the deposit was found. The connection between the deposit and the nearby caves, where no evidence of human activity was found, cannot be determined. On a wider scale, there was intense Palaeolithic settlement in *Arts Bogdyn Uruu* and its piedmonts, whose chronology is the same as that of the deposit. Numerous remains of settlement occur in the massif's piedmont, usually at a height of 1100–1300 m a.s.l. (the deposit was discovered at a height of ca. 1500 m a.s.l.). However, there are much higher mountains in the vicinity—on the other side of the valley. The deposit was not situated on the top part of the mountains, but at a place that offers a perfect lookout over the main valley and the two adjoining smaller



Fig. 11. Pleistocene cache of jasper cores from the Arts Bogdyn Nuruu massif. Reconstruction of a possible original arrangement of the deposit (drawing: Maria Czarnecka).

Fig. 11. Cache pléistocène de blocs de jaspes provenant du massif d'Arts Bogdyn Nuruu. Reconstitution d'un arrangement originel potentiel (dessin: Maria Czarnecka).

ones. The find is unique in the entire massif, which suggests that the area may have been occasionally penetrated by hunters. All of the above constitutes an argument for the functional nature of the deposit, being a part of a logistically organized system. The jasper pre-cores were hidden by hunters in the mountains, at a strategic vantage point, as a stock of jasper raw material ready for reduction to meet the needs of further hunting activity in the area (Fig. 11).

Stone products, including cores, were elements of portable equipment used by hunters-gatherers during shorter or longer stays in a given territory, which was a manifestation of the various ways of exploiting a given area (Kuhn, 1992). It is assumed that Eurasian Middle Palaeolithic hominins usually carried artefacts over a distance of up to 50 km, though occasionally the distance may have been much longer. Complete products, such as tools and only sporadically Levallois cores were usually transported over a distance exceeding 10 to 20 km. Transporting materials in bulk over a distance greater than a few kilometres seems doubtful (Kuhn, 2004). However, deposits of various raw materials situated at a short distance from encampments are a constant element of exploitation of the environment and together with encampments as well as sites performing various other functions, they constitute a logistic system of organisation of space used by hunters-gatherers (Binford, 1980, 1982). The cache from

the *Khutul Usny* valley is a manifestation of hunting activity of a Palaeolithic community functioning within a relatively small area; at the same time, it constitutes an element of a still relatively poorly known system of environment exploitation comprising the *Arts Bogdyn Uruu* massif and its piedmont. The remaining elements of the system comprise the workshops in Flint Valley, human settlement on water reservoirs, possibly caves, and the whole network of sites around the massif.

The deposit of jasper initial cores discovered in the *Khutul Usny* valley in the *Arts Bogdyn Uruu* massif is connected with the hunting activity of Late Levallois-Mousterian communities in central Asia. It was situated in an already archaeologically well reconnoitered area, merely a few kilometres away from one of the more important centres of Palaeolithic human settlement in Asia—the Flint Valley. Previous research in the Flint Valley and around *Arts Bogdyn Nuruu* enabled the development of a model for the relative determination of the age of Palaeolithic stone artefacts on the basis of their preservation status. According to the model, the artefacts from the series of moderately and lightly abraded ones are connected with the younger phases of the Middle Palaeolithic and the beginning of the Upper Palaeolithic. The pre-cores from the deposit display direct analogies to the initial core forms known from both series, while due to absence of Upper Palaeolithic elements in the deposit they should be recognised as originating before the Upper Palaeolithic stage. The location of the deposit and its character testify to the penetration of the massif by Pleistocene hunters from the *Arts Bogdyn Uruu* piedmont, who hid the jasper raw material indispensable for the production of elements of hunting weapons in a strategic place.

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