



KEYWORDS: *Mongolia – Gobi Desert – Altai – Petroglyph – Stone structure – Chronology*

## PETROGLYPHS AT KHAR TOLGOI (BLACK HEAD) IN THE GOBI DESERT OF MONGOLIA: ANALYSIS OF IMAGES AND CHRONOLOGY

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**Abstract.** The article discusses the issue of petroglyphs of the Khar Tolgoi (Хар Толгой) mountain, an extensive archaeological site located in the border zone between the Gobi Desert and the Gobi Altai in south-central Mongolia. They are compared with other examples of rock art from the region; the state of preservation of the petroglyphs and their form are discussed, and the results of the analyses of the rock art are presented. The stone structures present in the area of the mountain of Khar Tolgoi and at other sites in the region are also analysed with the aim of determining their chronology and possible connections with the petroglyphs. The stylistic examination of the petroglyphs and the analysis of the engraving techniques resulted in defining stylistic conventions of the engraved images and proposing the timeline of their appearance. The relative chronology was made more precise on the basis of the analysis of the patina covering the petroglyphs.

### Introduction

Today's Republic of Mongolia, comprising the northern part of East Asia, is an area abounding with sites featuring rock art represented by relatively rare paintings and much more numerous petroglyphs. Among the paintings, the oldest in Mongolia are those from the Khoid Tsenkher cave in aimag Khovd in the southwestern part of the country, where there are representations interpreted as pre-LGM fauna (Namnandorj 1953; Dorj and Derevianko 1970; Okladnikov 1972; Vanwezer et al. 2021).

In the case of petroglyphs, most of them are accompanied by stone structures, sometimes related to the period when the images were created, as well as the use of the area, both in the earlier and later periods (Jacobson-Tepfer 2006, 2015, 2023; Batbold 2014; Eregzen 2016; Andreeva and Atwood 2018; Vanwezer et al. 2021; Szykulski and Masojć 2022).

So far, research on Mongolian petroglyphs has focused mainly on the Altai massif, even though numerous sites were recorded at its southern foot and on the boulders present in the Gobi Desert (Batbold 2014; Vanwezer et al. 2021; Jacobson-Tepfer 2023). Due to broad time brackets and various geographical conditions prevailing in particular regions, the petroglyphs occurring there differ considerably in terms of style and subject matter. The iconography on rock blocks depicts people and their material

culture, e.g. yurts, houses, chariots, wagons and—primarily—animals, e.g. occasionally domestic cattle but mainly the game of the forest and the steppe. The petroglyphs present images interpreted as deer and gazelles associated with the animal style of the early nomads, as well as the images of elks, horses, boars, cats (Felidae: snow leopard, manul, lynx), canids (Canidae: wolves, dogs, foxes) and birds. The most frequently encountered iconographic motifs in the Mongolian steppe, the mountains of the Altai and the Gobi Desert are the gazelle *Procapra gutturosa*, easy to identify due to its characteristic horns, as well as the ibex *Capra sibirica* and—sometimes confused with the latter—the sheep *Ovis ammon*, often with stylised horns and symbols associated with the cultural circle native to the creators of the images. Based on the research results to date, it is assumed that the oldest rock carvings in Mongolia are of the Upper Palaeolithic (Pleistocene), becoming common in the Bronze Age and early Iron Age, while the youngest ones are of the Turkish period and the time when Genghis Khan's empire was founded and subsequently expanded (Devlet and Devlet 2005; Jacobson-Tepfer 2015; Rozwadowski 2018; Vanwezer et al. 2021; Szykulski, Masojć 2022). However, it is worth pointing out that some modifications of the rock art and new images, defying the convention of pre-Historic iconography, come from the contemporary times, i.e. 19th – 21st

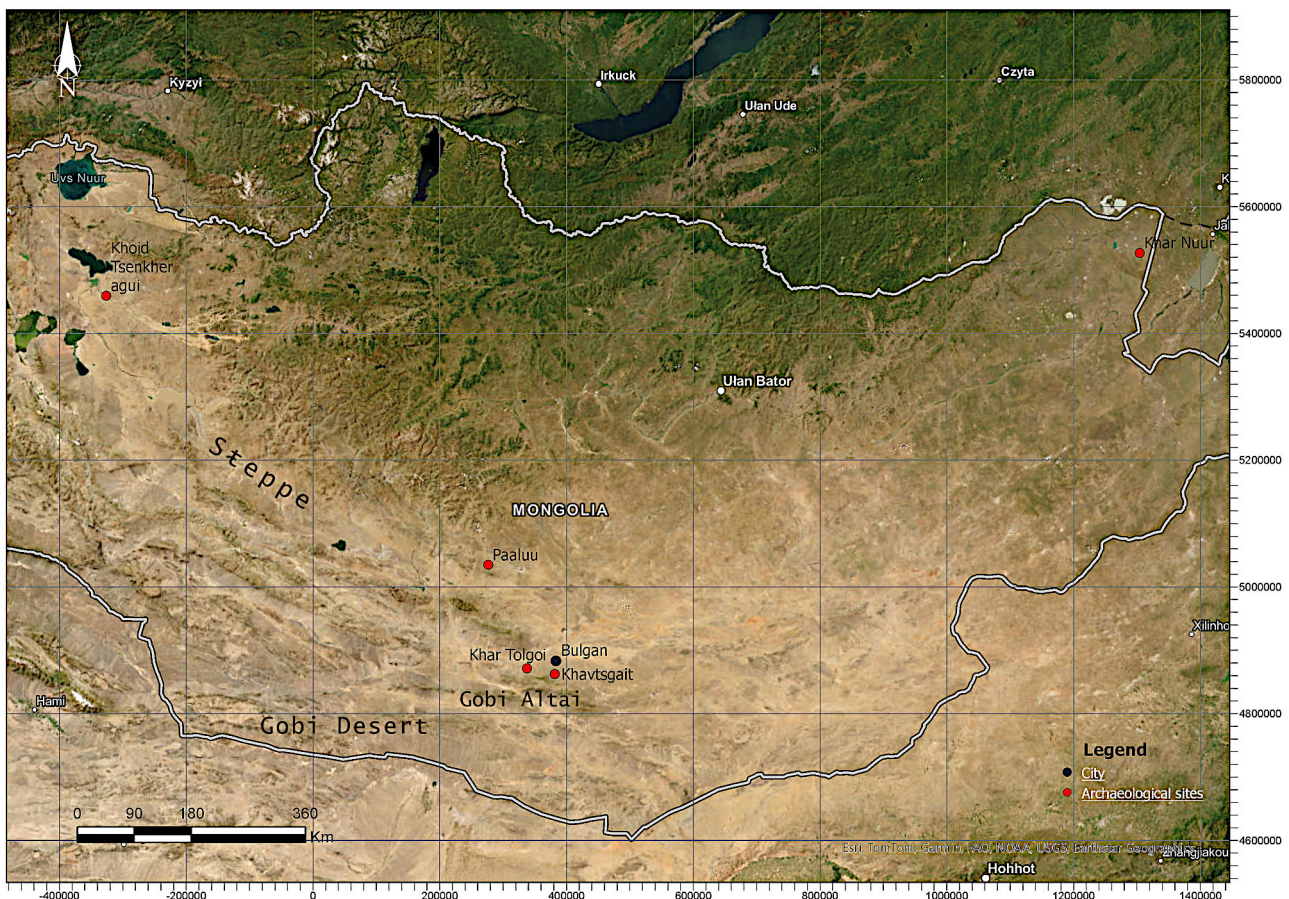


Figure 1. Mongolia: location of site Khar Tolgoi and other sites mentioned in the text (elaborated by M. Szmit).

centuries (O'Sullivan 2020), which is substantiated by the inscriptions accompanying the images, incised in the Mongolian script derived from Uyghur alphabet, and much more recent ones are engraved in the Cyrillic.

In 2023, prospection was carried out on the mountain of Khar Tolgoi (Хар Толгой), or the Black Head, situated in the eastern extremity of the Gobi-Altai Range in south Mongolia (Fig. 1), as part of the research conducted by the Polish-Mongolian Archaeological Expedition, resulting in the discovery of numerous stone structures and boulders with petroglyphs. Documentation work was subsequently carried out at the site in 2024. The results of the research are presented in this study.

### Field research methods

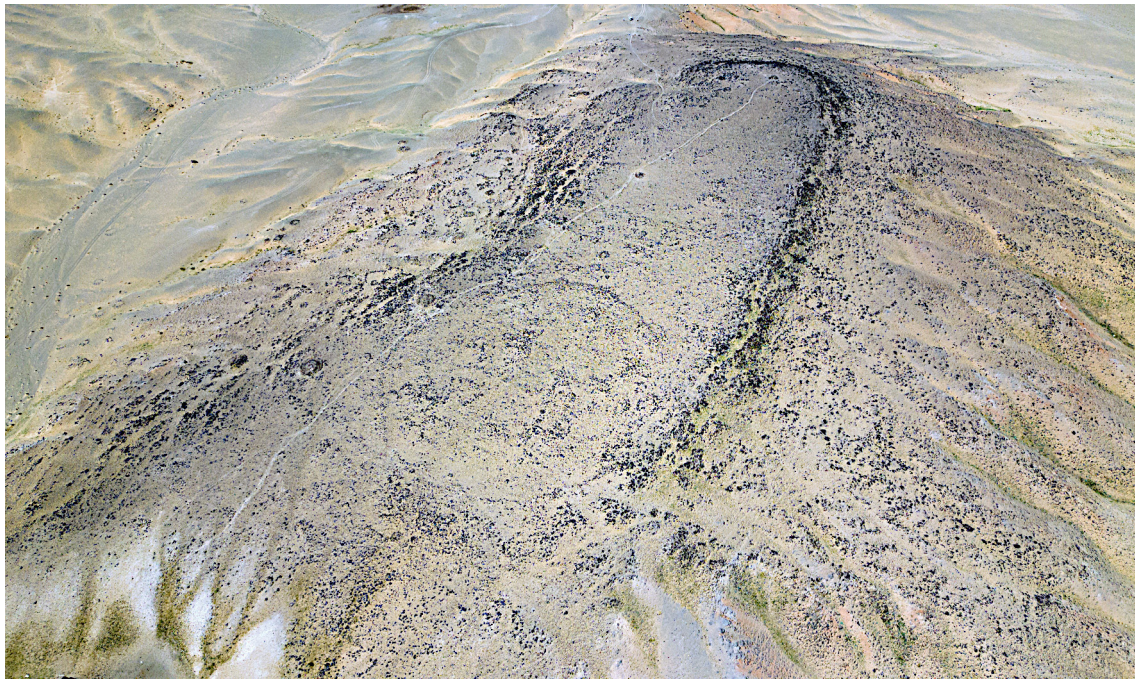
The fieldwork in the mountain of Khar Tolgoi (Хар Толгой) was carried out at its foot, on the slopes and the flat summit area. It consisted of documenting the boulders displaying the petroglyphs, in their majority distinctly visible against the dark, patinated background, as well as the stone structures present at the site. Their geographical coordinates, sizes, absolute height and location in relation to other objects present in the vicinity were recorded. The registration report also includes the objects' inventory numbers (the structures and boulders with petroglyphs), as well as data on the artefacts found at the site, i.e.

both around the stone structures and boulders. Rock samples (natural splinters) were collected from three boulders displaying engravings. Photographic documentation of petroglyphs and their vicinity was made, allowing for different angles of sunrays cast between 9:00 a.m. and 2:00 p.m. A drone was used to obtain photographic documentation of the site's area, its vicinity and individual concentrations of architectural structures.

No excavations were carried out in the area where the petroglyphs were present. Only a probing trench was excavated along the wall surrounding the central construction situated on the platform on the southern slope of Khar Tolgoi to validate the hypothesis that it is a row of individual boulders dug into the ground. A sample of the substance covering the petroglyph on boulder Tolg19 was collected. To determine the tools used to make the petroglyphs, an experiment was done, consisting of engraving the fragments of the rocks of the same characteristics as those displaying the petroglyphs with stone and iron tools.

In order to reconnoitre the region's archaeological context and the rock art present there, the documentation was carried out of the petroglyphs and stone structures occurring at the sites in southern and central Mongolia, Khavtsgait/Khawtsgait in sum Bulgan and Paaluu in sum Guchin Us, aimag Uvurkhangai (cf. Fig. 1).

No documentation or excavations were carried



**Figure 2.** Mongolia, sum Bulgan; photograph from a drone of the mountain site Khar Tolgoi (Хар Толгой) with pre-Historic relics seen on the surface (phot. P. Muntowski).

out at the site Khar Tolgoi (Хар Толгой) prior to the work discussed in this article. There is no information about the site in the literature and the archives of the Institute of Archaeology, Mongolian Academy of Science, in Ulaanbaatar.

#### **Description of site Khar Tolgoi (Хар Толгой)**

Site Khar Tolgoi is situated in the South-Gobi aimag of *Ömnögovь*, the sum of Bulgan, c. 48 km to the south of the town of Bulgan – the sum’s capital. It is an isolated, longitudinal mountain peak with a flat top measuring 360 × 160 m, distinctly sloping towards the east. The mountain is conspicuous in the plain landscape, rising to a height of 201 m, reaching the maximum height of 1609 m asl (Fig. 2). The summit may be relatively easily accessed from the west.

The site is situated c. 23 km to the south of the mountains of Arts Bogdyn Nuruu, constituting the northern range of the Gobi Altai massif, and 44 km from the peak of Boginy Khyar, in the Gurwan Saykhany Nuruu mountain range—the southern section of the Altai, where there is rock rubble with petroglyphs (cf. Fig. 1), known as Khavtsgait/Khawtsgait (Iderkhangai et al. 2017; Andreeva and Atwood 2018).

The flatlands surrounding site Khar Tolgoi are covered by relatively poorly diversified desert flora, mainly xerophytes, while the fauna is represented by gazelles *Procapra gutturosa* and less frequently encountered ibexes *Capra sibirica* and Argali sheep *Ovis ammon*, whose natural habitat is the elevations of the nearby Gobi Altai range. There are also numerous domesticated animals bred on a large scale by today’s nomads.

The surface of mountain Khar Tolgoi is covered

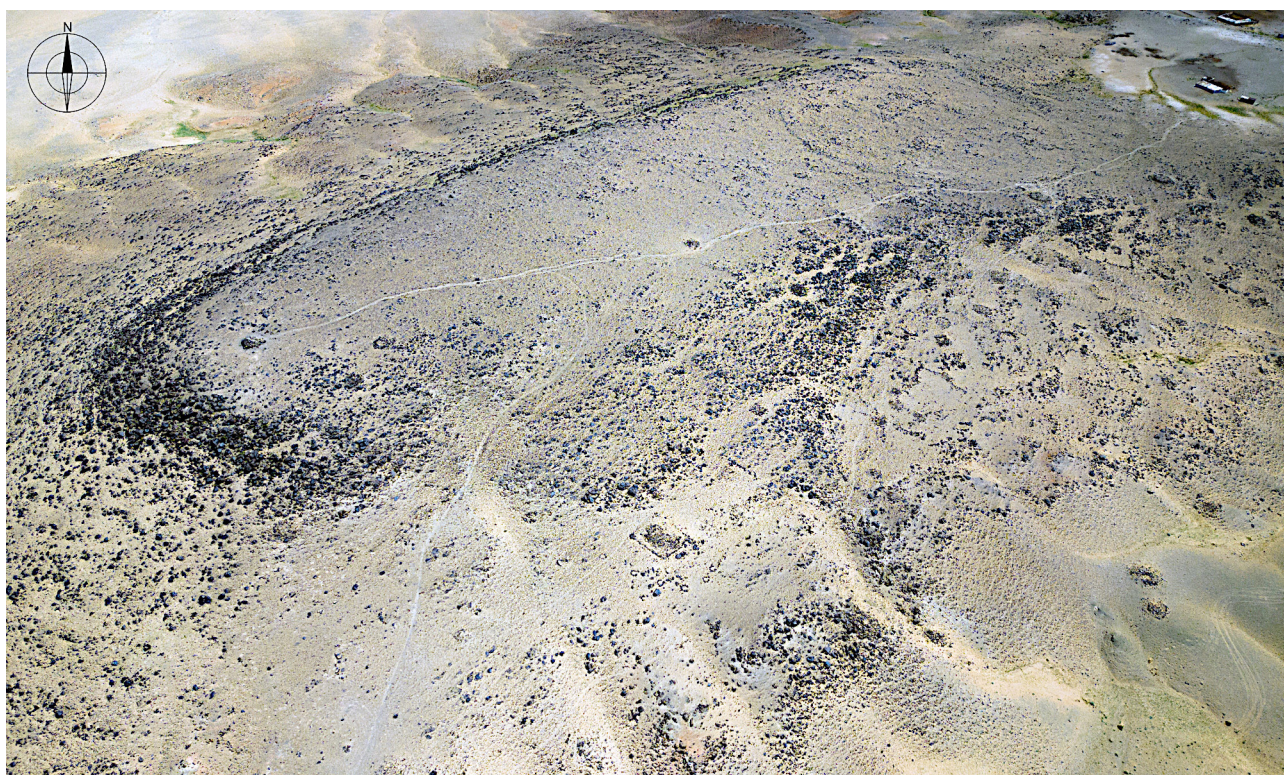
by a layer of rocks, which include fine-grained Upper Cretaceous sandstones (Bombokhoi Formation) intruded by microgabbros and basalts related to the Late Cretaceous-Palaeogene event of the within-plate magmatic activity in southern Mongolia during the Late Mesozoic-Cenozoic period (Barry et al. 2003; Yarmoluk et al. 2007). Due to the long-lasting influence of the sun rays and wind, the sandstones are covered with a thick layer of rock varnish, whose colour ranges from dark brown to black (Fig. 3). The microgabbros and basalts also display a layer of steel blue and black rock varnish (Dorn 1991). Due to the presence of a considerable admixture of iron compounds (oxides, hydroxides), the places where their surface is cracked or scratched have become oxidised, displaying a characteristic brown-rusty colour.

The foot of the mountain and the lower section of the slope are covered by a thick layer of desert drifting sand, whose thickness decreases towards the top. Individual stone artefacts were recorded on the slopes and in the summit section of the mountain. Numerous traces of human activity from various historical periods have been observed. Undoubtedly, the oldest relics, present on mountain Khar Tolgoi and in the whole region, are stone artefacts made by upper-Palaeolithic communities (Masojć et al. 2024). Characteristic Neolithic materials were also recorded, represented by microlithic tools and grinding stones. As far as Neolithic communities are concerned, it is certain that they produced vessels, but in all likelihood, they were not farmers, but rather the populations processing the seeds of the wild-growing plants (Szykulski and Masojć 2022; Masojć et al. 2024; Bobrowski et al. 2025; Michalec et al. 2025).

The prospection and analysis of photographs



**Figure 3.** *Khar Tolgoi (Хар Толгоү), western edge of the summit area; boulders with petroglyphs covered with a thick layer of rock varnish and stones/oooos arranged by the local population (phot. Project Archive).*



**Figure 4.** *Khar Tolgoi (Хар Толгоү); view of the summit area and southern slope with stone constructions (phot. P. Muntowski).*

taken from a drone revealed that at the southern foot of the mountain, there are several mounds and stone

pavements surrounded by boulders arranged in circles (Fig. 4). There are also big, rectangular structures,



Figure 5. Khar Tolgoi (Хар Толгоу); platform on the southern slope with stone constructions (phot. Project Archive).

identified as slab graves. Sixteen barrows surrounded by stone enclosures and eight quadrangular stone structures of a sepulchral nature, known as slab graves, were recorded at the site. It is quite possible that there are many more of them there because the slope is covered by a thick layer of drift sand (cf. Fig. 2 and 4). Individual agglomerations of stone constructions may constitute part of sepulchral architectural layouts associated with a single period in the region's settlement or even one community.

Halfway up the mountain's southern slope, there is a spacious platform. Its centre is occupied by a mound of stones with a quadrilateral enclosure made from boulders dug into the ground. On both sides of the mound, there are two other, less well-preserved structures similar in form to the central structure, which is substantiated by the photographic documentation (Fig. 5).

An ancient narrow path, still used by the local population and tourists, runs around the mountain's peak directly at the slope's border; it is marked by rows of boulders dug into the ground (cf. Fig. 2 and 4). On Khar Tolgoi's northern slope, steeper than the southern one, no stone structures were recorded; neither were they found at the foot of the mountain.

The documentation work carried out on the mountain's peak revealed several stacks of stones. The biggest one is situated at the western edge of the summit area, another – a bit smaller – is located in the area's central part. The structures are linked by a path trodden by the local population (cf. Fig. 2 and 4). Both the mounds' form and the sacrifices of coins, banknotes, food, modern votive figures

and blue ribbons unequivocally prove that they are the so-called ovoos/obos—structures intrinsically connected with shamanism, Bon religion, and now constituting an inherent element of Mongolian Buddhism (Kvaerne 1995; Chuluunii and Erdene-Otgon 2022). As far as the chronology of the recorded ovoos is concerned, it seems that most of them—especially the smaller ones—were made relatively recently. However, it is quite probable that the two biggest structures of this type situated in the centre of the summit area and its western edge may be a bit older.

The photographic documentation of Khar Tolgoi's peak, which confirmed that in its eastern part, there is a circular structure of a diameter of 120 m, invisible from the ground level. It is made from boulders dug into the ground covered by debris and drift sand (cf. Figs 2 and 4). Inside the circle, there are rectangular and oval stone structures. They are probably outlines of buildings, i.e. rows of stones arranged along the walls of yurts or other structures made from impermanent materials. Small ovoos situated at the edges of the circle, sometimes utilising the stones forming it, indicate that the stone ring is older than the mounds associated with modern-day Buddhism. Photographs taken from a drone revealed the presence of individual ovoos inside the circle.

Numerous boulders with petroglyphs were recorded within the site Khar Tolgoi, most of which were recorded on the southern slope and at the border between the slope and the flat summit area. At the same time, at the northern edge, they occur at the border between the slope and the summit. Stones

were deposited on most of the boulders, which proves that the local population treats them as cult objects, performing the function of ovoos/obos (cf. Fig. 3). Their function as ovoos was also confirmed by conversations with nomads living in the region.

### The issue of interpretation and chronology of stone structures from Khar Tolgoi (Хар Толгой)

As far as chronology is concerned, the rectangular slab graves and stone mounds are thought to have been created by the nomadic peoples from the Bronze Age and the early Iron Age (Eregzen 2016). However, the structures noted on the platform halfway up the slope Khar Tolgoi are in all probability a sepulchral layout consisting of a central mound with a stone casing and two external mounds. Structures of this type, called *kheregsuur* or *khirgisüür* in Kazakh, are thought to be an element of funerary rites of nomadic peoples from the late Bronze Age (Lymer et al. 2014; Jacobson-Tepfer 2023).

A much later chronological position should be assigned to a circular structure with a diameter of 120 m, located on the eastern side of the flat top of the mountain. It displays features similar to the defensive structures from, e.g. the Khitan-Liao empire (916–1125 CE), such as the Khan Nuur stronghold in north-eastern Mongolia (cf. Fig. 1). However, such structures were also erected in later times until the emergence of Genghis Khan's empire (Amartuvshin et al. 2018; Shelach-Lavi et al. 2020).

In this context, the stone mounds, known as ovoos/obos, should be considered the latest structures. Although the artefacts found within them (coins, banknotes, metal and plastic objects, as well as fragments of fabric) seem to indicate that the two large structures of this type predate the smaller mounds; in all cases, however, these are modern structures. The oldest likely date comes from the turn of the 19th/20th century, as confirmed by the presence of Chinese coins. The smaller mounds containing offerings in the form of plastic objects are the work of recent decades.

### Analysis of petroglyphs from Khar Tolgoi (Хар Толгой)

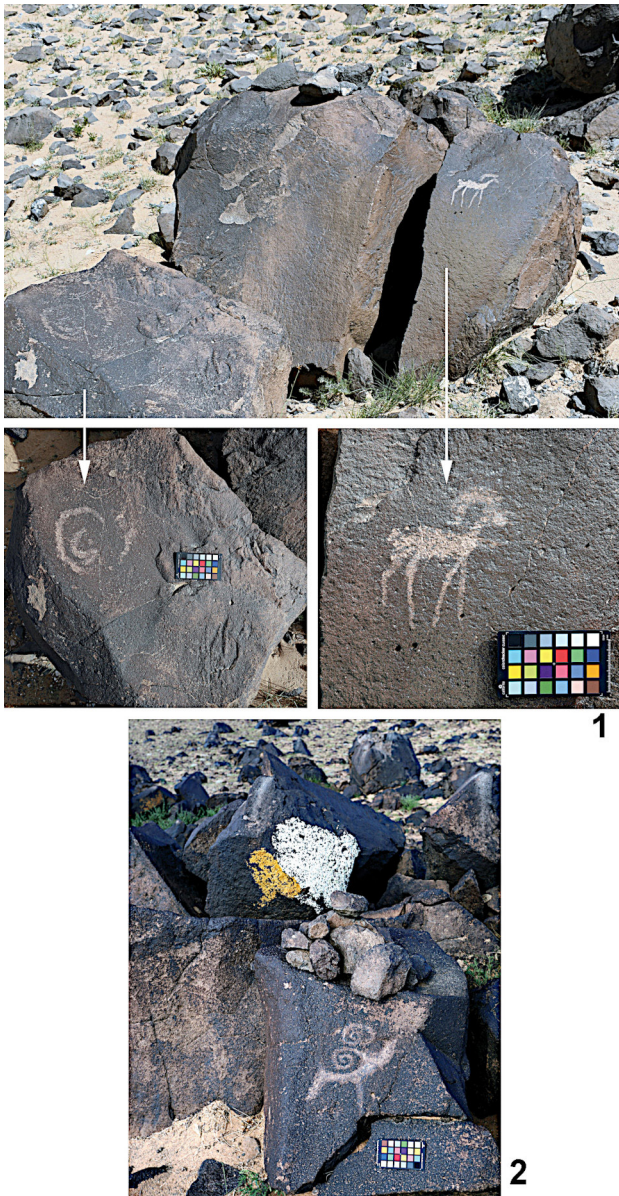
The research carried out at the Khar Tolgoi site revealed the presence of 32 boulders with petroglyphs in various conditions. Their analysis confirmed that two techniques with different variations were used to engrave them, primarily due to the tools used.

The first (1) technique consists of



Figure 6. Khar Tolgoi (Хар Толгой). Petroglyphs from the site's western part: (1) Tolg1, (2) Tolg2, (3) Tolg3 (phot. M. Jórdeczka).

pecking rock fragments (pecked images); both direct and indirect percussion were presumably employed. The more technologically advanced method of indirect percussions resulted in a more precise shape of the image and a more even surface in the pecked area. The technique of pecked images was employed to produce petroglyphs emerging as a result of pounding the image's whole surface; it was also employed to make linear (as stick figures with fairly thick lines) and



**Figure 7.** Khar Tolgoi (Xap Толгоү). Petroglyphs from the site's western part, (1) Tolg4a and Tolg4b, (2) Tolg5 (phot. M. Jórdeczka).

contour images, i.e. resulting from pecking along the lines displaying the image's outlines (Jacobson-Tepfer 2015). When pounding bigger surfaces, they were sometimes evened out by additional abrading/smoothing with a stone tool.

The other (2) technique consisted of engraving lines forming the contour of the image. Relatively shallow and wide engraved lines were observed, possibly made with narrow flat stones. The other, narrow and deep lines resulting from the use of this method must have been made with chisels, knives or other metal tools.

**Petroglyphs in the site's western part:** they are concentrated at the western edge of the mountain's summit. Rock blocks with petroglyphs were recorded as Tolg1 – Tolg5 (Figs 6 and 7).

**Tolg1:** it is situated in the debris of boulders

deposited at the western edge of the mountain's summit. On the rock, there is one, not very precise, pecked image made in the technique of direct percussion on the entire surface of the image. It seems to depict a deer with clearly represented antlers, genitals, ears, tail and legs with characteristically cleft hooves. The petroglyph's surface is covered with a uniform patina of brown-rusty hue. Above the image, irregular pecking covered with similar patina is visible (Fig. 6/1).

**Tolg2:** a cracked block situated 140 cm from petroglyph Tolg1, presenting four images of hoofed animals and a fragment of another image made as stick figures with fairly thick lines. Due to its shape, the rock is divided into two panels. The smaller one presents a schematic pecked image of a 'gazelle' made in the technique of indirect percussion. The bigger panel displays another petroglyph of a similar form created in the same technique. Above, there is another image, but made in the technique of direct percussion. To the right of it are remains of another image surviving in vestigial form. Above is a pecked image made in the technique of direct percussion, but representing a different style than the remaining ones. It probably represents a gazelle (Fig. 6/2). The surface of all the images is covered with a patina of uniform brown-rusty hue.

**Tolg3:** a block deposited at the western edge of the mountain's summit. On its surface are two pecked images, one above the other, made in the technique of direct percussion followed by abrading the surface. The images, not very clear, seem to represent hoofed animals (Fig. 6/3). Their surface is covered with a patina of a brown-rusty hue.

**Tolg4:** contiguous blocks. The one situated more towards the west (*Tolg4a*) displays a naturalistic pecked image of a gazelle made in the technique of direct percussion of the image's whole surface. The pounded image on the rock below (*Tolg4b*), made in the technique of direct percussion, displays a spiral or concentric circles with the central point and the characteristic considerably skewed S-shaped end of the outer ring (Fig. 7/1). Both petroglyphs are covered with a patina of a brown-rusty hue.

**Tolg5:** a block with a pecked image representing an 'ibex' with characteristically spiralled horns (Fig. 7/2). The petroglyph, made in the technique of direct percussion of the image's whole surface, is covered with a patina of brown-rusty hue. Above the image are impact marks made later. This is evidenced only by the slightly patinated surface of the marks.

**Petroglyphs at the northern edge of the summit:** blocks with carvings registered as Tolg6 – Tolg10 (Fig. 8)

**Tolg6:** a cracked block with an image of a rider on a horse. An arching line is visible, running from the animal's mouth to the base of the neck, representing reins. It is the only anthropomorph among the petroglyphs in Khar Tolgoi. It was made in the

method of shallow indirect percussion and was additionally polished by abrading. The colour of the patina matches the colour of the unmarked rock (Fig. 8/1).

*Tolg7*: a block with an indistinct, patinated representation of a hoofed animal (deer?) made as a pounded image in the technique of direct percussion (Fig. 8/2).

*Tolg8*: a cracked block with a damaged or unfinished engraved contour of a hoofed animal (deer?) with distinct antlers (Fig. 8/3). The petroglyph has a patina of a brown-rusty hue.

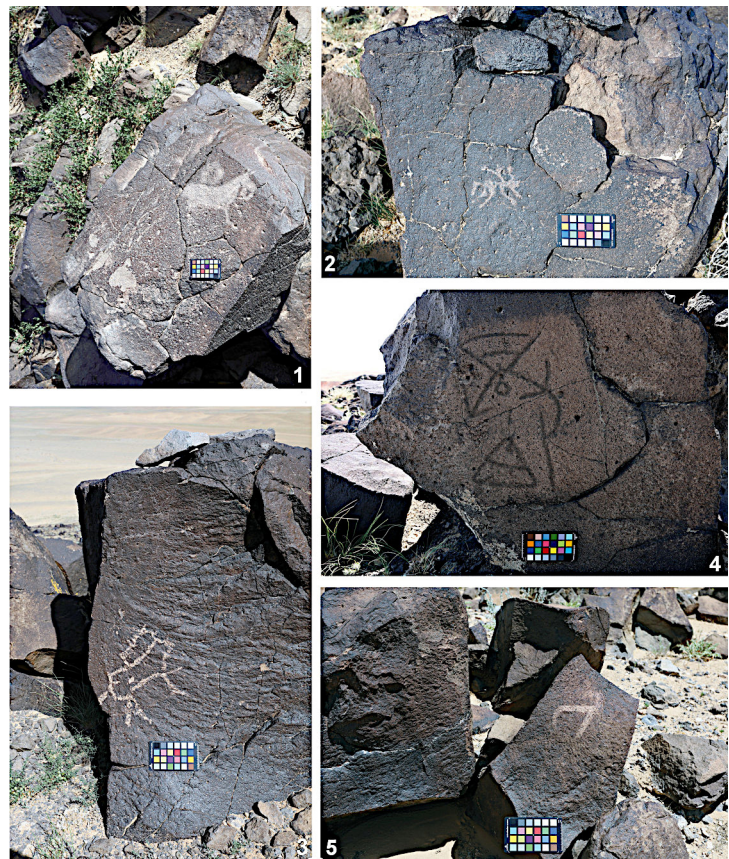
*Tolg9*: a cracked block with engraved complex geometric symbols made with a narrow stone or iron chisel (Fig. 8/4). Deep, deeply patinated engravings are darker than the rock base. In the image's upper part are two linear engravings forming an angle oriented downwards. These are linked by parallel arching lines. Below, there is a small ring. Arching lines with engravings in the form of arrows branch off from the angle's lower part. One of the lines displays an extension terminating with a vertical linear groove. Below this composition are two linear engravings forming an angle oriented upwards. Similar to the representation in the petroglyph's upper part, the engravings are linked by arching lines.

*Tolg10*: a block with several engraved lines forming a schematic representation of a hoofed animal. The slightly patinated lines were made with a metal tool (Fig. 8/5).

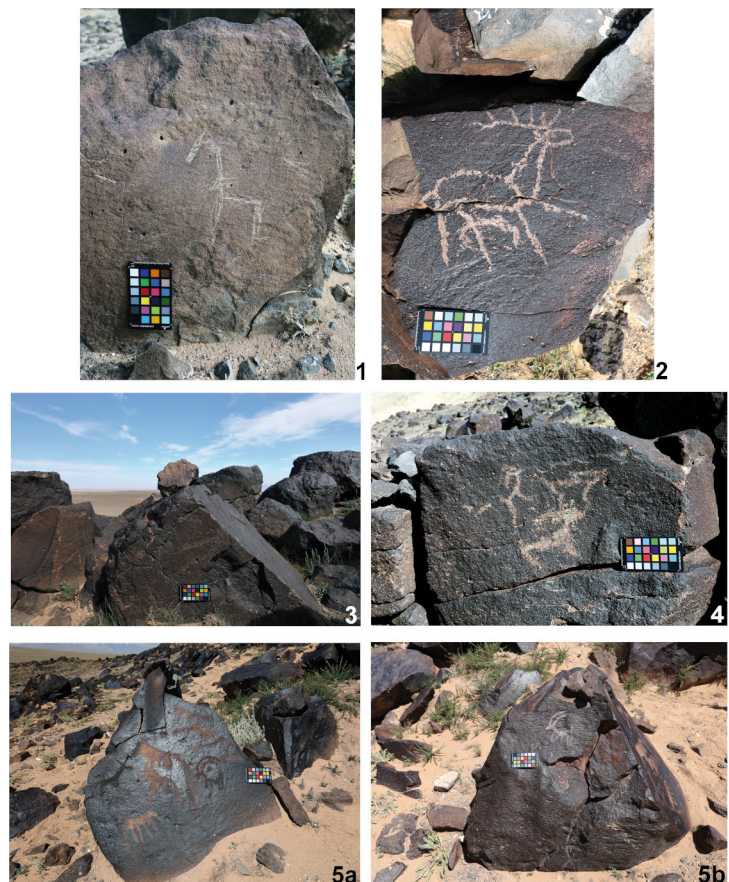
**Petroglyphs on the southern slope and at the south edge of the summit:** rock blocks with engravings registered as *Tolg11* – *Tolg21* (Fig. 9 – 11)

*Tolg11*: a block with a concentration of thin parallel engraved lines forming a schematic representation of a hoofed animal with a long neck (Fig. 9/1). A slightly patinated image was made with a metal tool. In terms of its form, execution technique and type of patina, the image is similar to the petroglyph on the rock block *Tolg10*.

*Tolg12*: a block with a naturalistic contour representation interpreted as a cervid. Below the animal's abdomen is an oval outline. Grooves were made with a narrow, probably stone tool struck by a percussion tool (Fig. 9/2). The carvings are covered with a patina



**Figure 8.** *Khar Tolgoi (Хар Толгоүй).* Petroglyphs from the northern edge of the summit area: (1) *Tolg6*, (2) *Tolg7*, (3) *Tolg8*, (4) *Tolg9*, (5) *Tolg10* (phot. M. Jórdeczka).



**Figure 9.** *Khar Tolgoi (Хар Толгоүй).*

*Petroglyphs from the southern part of the summit area and slope; (1) Tolg11, (2) Tolg12, (3) Tolg13, (4) Tolg14, (5) Tolg15* (phot. M. Jórdeczka).



**Figure 10.** Khar Tolgoi (Xap Толгой). Petroglyphs from the southern part of the summit area and slope; (1) Tolg16, (2) Tolg17, (3) Tolg18, (4) Tolg19, (5) Tolg20 (phot. M. Jórdeczka and Project Archive).

of uniform brown-rusty hue. Below the animal's legs and neck, there are slightly patinated engraved lines made with a metal tool.

*Tolg13*: a cracked block with conjoining strips made by carving and abrading the rock's surface. The engraved parts are covered with patina, partly merging with the rock base (Fig. 9/3). The image's form, execution technique and type of patina are similar to those of petroglyphs Tolg10 and Tolg 11.

*Tolg14*: a block with three pecked images made in the technique of direct percussion. The lowermost image seems to represent an ibex with characteristic wide-stretching spiralling horns. Above, there are two representations of hoofed animals (gazelle/ibex?). The petroglyphs are covered with a patina of a brown-rusty hue. On the rock, there are grooves covered by similar patina (Fig. 9/4).

*Tolg15*: a cracked block with images made in the techniques of direct and indirect percussion. The rock's surface is considerably patinated. On the front (wider) panel are representations of at least nine animals, interpreted as gazelle, horse, fox/wolf and donkey or onager (Asian wild donkey; *Equus hemionus hemionus*) (Fig. 9/5a). The representations do not form any particular pattern. The proportions between the sizes of individual animals are not maintained. On

the rock's side (the other panel) is a considerably patinated pecked image, probably representing a gazelle with considerably bent antlers forming a circle with the tail and the central point marked inside (Fig. 9/5b). Individual engravings display different hues of the patina. The darker patina covering the 'donkey/onager', the representation of an unidentified animal below and the animal on the lateral panel largely merge with the rock's coating. The remaining representations display the patina of a brown-rusty hue.

*Tolg16*: a block with a schematic, contour representation of a Bactrian camel made by abrading/engraving the rock's patinated surface. The engraved places display only scant patina (Fig. 10/1). It is impossible to determine whether it is a representation of a wild *Camelus ferus* or a domesticated *Camelus bactrianus* (Li et al. 2017). On the rock's surface are other, partly overlapping, distinctly engraved contour representations of two horses, a Bactrian camel and animals with characteristic antlers bending towards the back (gazelles?). There are also two rectangles divided into three parts, engraved lines and

indistinct letters 'MOPI' and 'M3', possibly in the Cyrillic alphabet. The representations were made with an iron tool. There is no patina.

*Tolg17*: a block with a pecked image displaying a circle with a ring-like central point and a spiral line branching off from the circle. The symbol is in its form similar to the representation from rock block Tolg4 and to the horns of the 'gazelle' from block Tolg 15. The petroglyph is covered with a patina of brown-rusty hue (Fig. 10/2).

*Tolg18*: a rock with pecked images of seven animals executed in the technique of indirect percussion in various states of preservation. On the right-hand side, the upper part of the panel is a representation of a 'deer' with wide-stretching antlers. Below is a representation of an 'ibex' with clearly marked genitals. On the left-hand side of the panel, there are three representations of slender animals with long tails and elongated muzzles resembling dogs or jackals. The partly-preserved engravings situated above and below also seem to represent canids Canidae (Fig. 10/3). The brown-rusty patina covering the engravings is slightly lighter than that on the surrounding rock.

*Tolg19*: a block with pecked images executed in the technique of very precise indirect percussion. They include two naturalistic representations of



**Figure 11.** *Khar Tolgoi (Хар Толгоу).* Petroglyphs from the mountain's southern slope (phot. Project Archive).

animals from the family of Equidae, including one male. The animals' proportions, shape of the head and ears, as well as the long tail, suggest that they are representations of donkeys or onagers, *Equus hemionus hemionus*, which still live wild in the Gobi Desert. There is also a partly-eroded representation of another member of the Equidae family, as well as another, damaged engraving of a member of the Equidae family situated above the representation of the male animal. The surface of the petroglyphs, as well as the fragment of the block where they occur, is covered with dark-brown patina similar to the colour of animal hair. It is probably a layer of fat/grease that had merged with the rock base (Fig. 10/4). It is impossible to determine whether the layer is chronologically identical to the time of executing the petroglyph. Bright traces of subsequent percussion/chipping are visible in the block's upper part.

*Tolg20:* a block covered with dark-blue-black patina. On the surface is an indistinct representation of a hoofed animal (male) made in the technique of pecking and abrading the patinated surface (Fig. 10/5). The petroglyph is covered with a patina of brown-rusty hue, much brighter than the rock base.

*Tolg21:* boulders with pecked petroglyphs executed as stick figures with fairly thick lines in the technique of indirect percussion (Fig. 11). On boulder *Tolg21a*, there is a representation of a 'gazelle' with characteristically bent horns. On boulder *Tolg21b* are two representations of 'gazelles' situated one above the other. The upper one displays long, bent horns almost reaching the protruding tail (cf. Fig. 11).

Indistinct evidence of later percussion may be seen on the rock's side. The engravings are covered with a patina of brown-rusty hue.

#### **Styles/stylistic conventions of the petroglyphs from Khar Tolgoi (Хар Толгоу) in the context of the region's rock art**

The petroglyphs from Khar Tolgoi (Хар Толгоу), similar to those from other sites in Mongolia, were made in different periods. The representations from the same period display differences in the quality and precision of workmanship, which resulted from the differences in manual skills of their creators. Yet, the stylistic conventions that they followed are evident. This regularity is evident in other cultural circles (the art of the Neolithic, the art of the Old and New Kingdoms of Egypt, Scythian art, Romanesque art, etc.), where there are outstanding works of art and those made for the needs of everyday life. Yet, all of them display the features of the stylistic convention of a given era.

The analysis of the petroglyphs from site Khar Tolgoi resulted in defining four styles (stylistic conventions) of the images present there and the implemented technique of their execution. Their main theme is animals (Fig. 12). However, individual boulders feature representations in various states of preservation, which makes it challenging to identify a particular stylistic convention implemented in their case. This occasionally concerns representations of animals, but mainly it is true in the case of symbolic images and the motifs that seem to be modern-day








Styles variants	Sites																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1		X					X							X	X						X
2								X				X				X					
3/1		X	X												X			X			
3/2				X	X									X	X			X			X
3/3							X												X		
4/1										X	X		X								
4/2																X					

Figure 12. Division of petroglyphs from Khar Tolgoi (Хар Толгой) into styles/stylistic conventions and variants (elaborated by N. Lenkow).

3 includes three stylistic variants (cf. Fig. 12). Variant 3/1 is the representation of animals that are difficult to define, which largely results from the fact that they were made carelessly as pounded images in the technique of direct percussion. This variant is represented by petroglyphs from rock Tolg1, Tolg3, Tolg15 and Tolg18. Variant 3/2 is the naturalistic representations with clearly marked anatomical features of the animal from blocks Tolg4, Tolg5, Tolg14, Tolg15, Tolg18 and Tolg20. They were made using both direct and indirect percussion techniques. The third variant (3/3) is represented by

emulations of pre-Historic petroglyphs.

Style one show stick figures with fairly thick lines of hoofed animals, which, due to the shape of antlers, are suggested to represent ‘gazelles’ or ‘ibexes’. The images were made using direct and indirect percussion techniques. Style one is defined by the petroglyphs on rock blocks Tolg2, Tolg4 and Tolg21 (cf. Figs 6, 7 and 11).

Style two is represented by rare contour petroglyphs, whose shape is rendered by a line outlining the animal’s contour. This style is represented by the petroglyphs on boulders Tolg8, Tolg12 and Tolg16 (cf. Figs 8 – 10). Tolg8 represents a damaged or unfinished image of a ‘deer’, where the contour outline was made with a stone chisel (flat stone) struck with a percussion tool. The same technique was implemented in making the naturalistic petroglyph Tolg12, representing a deer. On the other hand, the representation of a Bactrian camel on the boulder Tolg16 was made by outlining the contour with a stone. Absence of patina and the image’s form suggest that it is a modern-day emulation.

Style three is represented by more or less naturalistic representations of animals made by removing the whole surface of the image. They include pecked images created in the techniques of direct as well as indirect percussion, sometimes additionally polished by abrading. Apart from the images that are difficult to identify, the remaining ones have been interpreted as ‘deer’, ‘gazelle’, ‘ibex’ with spirally shaped horns, ‘donkey or onager’ and the animals that probably belong to the family of Canidae (cf. Figs 6 – 11). They may be representations of hunting dogs, intrinsically connected with the tradition of nomadic peoples of Asia (Jacobson-Tepfer 2013, 2015). Style

individual petroglyphs on rock blocks Tolg6 and Tolg19 made in the techniques of indirect and direct percussion, additionally polished by abrading. In Tolg6 it is a rider on a horse (Fig. 8/1), and in Tolg19 it is a representation of three ‘donkeys’ or possibly ‘onagers’ (Fig. 10/4).

Style four is represented by the petroglyphs of animals made with a metal tool alien to the pre-Historic stylistic convention. In terms of the form and execution technique, two variants are distinguished. Variant 4/1 is represented by the petroglyphs from blocks Tolg10, Tolg11 and Tolg12 (Fig. 8/5, 9/1, 9/3), displaying concentrations of engraved parallel lines forming sharply bent stripes, schematically representing animals. Variant 4/2 is represented by the petroglyphs from block Tolg16, displaying naturalistic contour images of horses, gazelles, lines, geometric symbols and letters (Fig. 10/1). The engravings were made with an iron tool, as confirmed by analysis of the engravings under a magnifying glass.

The comparison of the petroglyphs from Khar Tolgoi (Хар Толгой), representing the styles/stylistic conventions mentioned above with other examples of rock art in south-central Mongolia, reveals obvious similarities to some representations from the site Khawtsgait situated further east of Khar Tolgoi and the engravings from the site Paaluu in the sum of Guchin Us, aimag Uvurkhangai, located much further to the north-east (cf. Fig. 1). This fact is the basis for determining more precise time brackets when different types of images were made.

Unlike the petroglyphs from Khar Tolgoi that we examined, the petroglyphs on the rocks at site Khawtsgait are characterised by a much greater diversity of the subject matter and technique of execution. They display ‘gazelles, ibexes, Argali sheep, galloping horses, camels’, wagons on wheels,

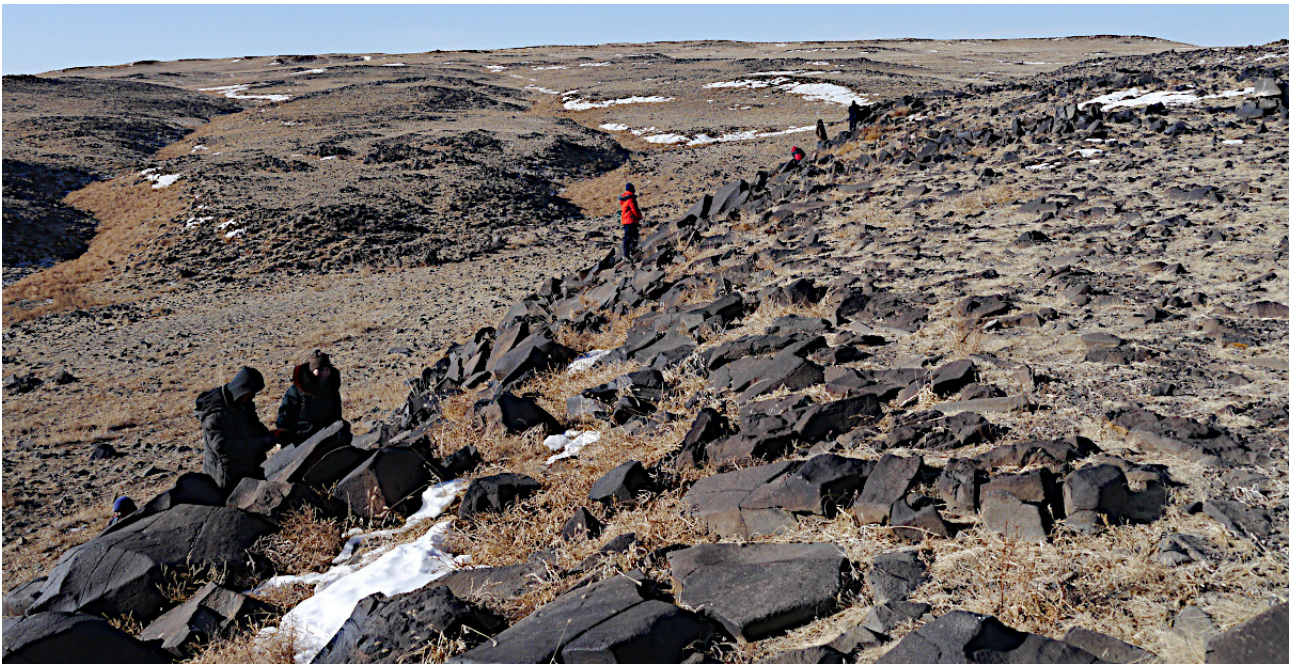


Figure 13. Site Paaluu, sum Guchin Us, aimag Uvurkhangai; slope covered with basalt boulders displaying petroglyphs (phot. Project Archive).

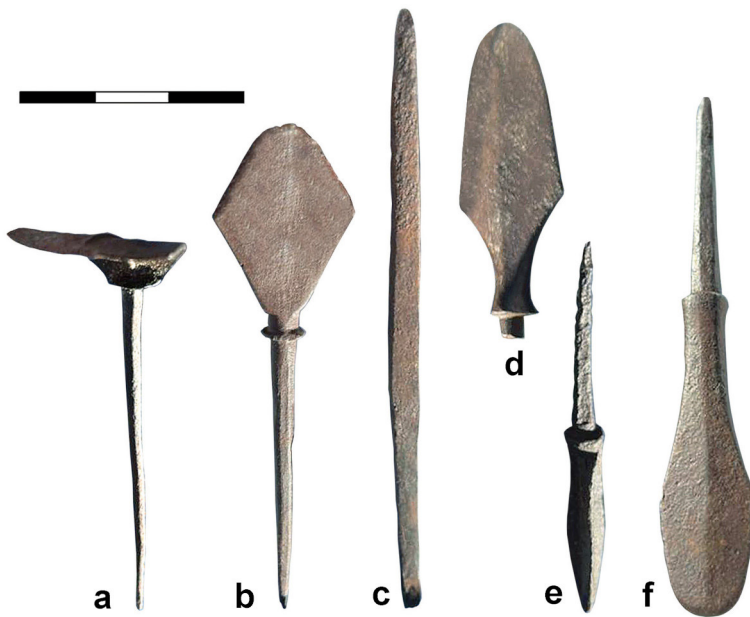
motifs in the form of engraved lines and circles, as well as people ‘performing rites’ and a rider shooting arrows (Iderkhangai et al. 2017; Andreeva and Atwood 2018). It is worth noting that the subject matter, form and composition of images are more diversified in Khawtsgait than in Khar Tolgoi. The rocks display together concentrations of engravings, whose technique of execution, subject, style and patina of different intensity suggest that they were made in different time brackets. They include a whole range of typical representations of individual animals made as stick figures with fairly thick lines, contour petroglyphs and those made by removing the entire surface of the image (Andreeva and Atwood 2018: Figs 1–4). In Khawtsgait, a significant number of petroglyphs depict people and their material culture—motifs alien to the rock art from Khar Tolgoi, with the notable exception of a single petroglyph, Tolgoi 6 (cf. Fig. 8/1). Similarly, as in Khar Tolgoi, in Khawtsgait,

there are stone grave constructions attributed to the Bronze and Iron Ages. These included seven grave constructions in the shape of figures (*shorgooljin*), six so-called *kheregssuur*, three slab graves, ten graves in the form of a circle (*dugui daraastai*) and two other destroyed stone constructions (Andreeva and Atwood 2018; Iderkhangai et al. 2017: 318).

Site Paaluu in sum Guchin Us, aimag Uvurkhangai, situated to the north-west of Khar Tolgoi, is a spacious archaeological complex on a hill covered with debris of basalt blocks and microgabbro with petroglyphs (Fig. 13) as well as rectangular and oval structures, walls and stone paths situated on the flat terrain at the hill’s foot (Biamba-Ochir and Bat-Erdene 2020; Szykulski and Masojć 2022). Similarly as in the case of Khar Tolgoi and Khawtsgait, these structures are attributed to the Bronze and Iron Ages, even though the place had a special cult significance also in later periods, which is substantiated by the presence of piles



Figure 14. Paaluu, sum Guchin Us; basalt block with a phrase engraved in Uyghur alphabet (phot. Project Archive).



**Figure 15.** Site Paaluu, sum Guchin Us, aimag Uvurkhangai; medieval (emergence of the Mongol empire) iron artefacts collected by local nomads (phot. Project Archive).

of stones (ovoos/obos) and the engraved phrases in Uyghur alphabet (Fig. 14). The significance of the place also in the Middle Ages is substantiated by numerous metal artefacts from the Bronze Age and the period of emergence of the Mongol empire, found by local nomads (Fig. 15).

The petroglyphs from Paaluu are much diversified in terms of style and subject matter. Similarly, as in Khawtgait, individual blocks display motifs whose

technique of execution, style and subjects suggest different cultural backgrounds of their creators. Only occasionally are there representations of individual standing animals made as stick figures with fairly thick lines or as contour outlines. The most frequently encountered are the petroglyphs made as a result of removing the image's whole surface (intaglio or infilled figures) (Fig. 16). A few were made as pounded images in the technique of direct percussion, but most were made by engraving contours in the technique of direct percussion or with a metal tool; then the fragments of the rock inside the outline were removed and the surface was polished. In Khar Tolgoi, this method may be attributed only to the image from Tolg19 (cf. Fig. 10/4). Apart from wild animals, the petroglyphs from Paaluu made in this way primarily represent 'horses', 'dogs', 'cattle' as well as 'narration scenes' and elements of 'material culture', including a symbol that seems to represent a cart (Novozhenov 2012; Andreeva and

Atwood 2018: Fig. 10) or totem (Fig. 17).

#### Discussion

The recurring problem in the research on rock art, which also concerns the petroglyphs from Khar Tolgoi (Хар Толгой), is the chronology of the images and linking them with the pre-Historic communities (cultures) of the region. While it is possible to determine the chronology of stone structures present



**Figure 16.** Site Paaluu: pecked images of the Iron Age (phot. Project Archive).



*Figure 17. Site Paaluu: petroglyphs representing animals and a cart or tribal symbols (?) of the late Iron Age (phot. Project Archive).*

at individual sites, there is no direct evidence of their connection with petroglyphs, whose form and character suggest that they come from relatively broad time brackets. It is worth noting that due to inconclusive solution of the problem of chronometric dating, the chronology of the rock art in Mongolia, similarly as in other regions of north parts of east Asia, is determined on the basis of the analysis of subjects, styles and techniques of executing individual representations (Watchman 2000; Dorn 2001; Bednarik 2002, 2004; Rozwadowski and Lymer 2012; Lymer et al. 2014; Jacobson-Tepfer 2013, 2023; Miklashevich 2016; Liu et al. 2018; Wright 2021). In this case, the main factor determining the chronology is the fact that the petroglyphs depict domestic animals (horses, dogs, cattle), people and the elements of their material culture: weaponry, tools, clothes and yurts/houses. However, it is worth noting that distinguishing between domestic and wild animals in the engravings is frequently problematic. Another debatable matter is the moment when the elements of material culture appeared and the time when they remained in use, which are supposed to constitute a chronological determinant.

At site Khar Tolgoi (Хар Толгой), similarly to most Mongolian sites with petroglyphs, the predominant motif is animals, mainly wild hoofed ones belonging to the post-LGM fauna, which suggests that they were created in the Holocene. Most of the registered images are of stationary wild animals, represented both semi-naturalistically and schematically. Nevertheless, thanks to the characteristic antlers or horns, they can usually be identified as representations of a gazelle, deer, ibex and Argali sheep, the latter two being difficult to distinguish in the petroglyphs (as well as in real life). The animals were engraved by direct percussion as stick figures with fairly thick lines, the images whose whole surface was removed and as contour outlines. No petroglyphs of this kind were

ever found to represent scenes depicting an animal and a human being. It is assumed that in the case of pecked images, the outlines of individual animals are characteristic of early-Holocene Mongolian rock art (Jacobson-Tepfer 2006, 2015). However, such images are present in the iconography of the Bronze Age and early Iron Age (Batbold 2014; Iderkhangai et al. 2017), as confirmed by the analysis of pecked images and stone structures from Khar Tolgoi and Paaluu, among others.

As mentioned above, in Khar Tolgoi, there are petroglyphs representing circles and spirals with the central point and characteristically bent ends (Tolg4b and Tolg17), as well as a representation of a hoofed animal whose horns and body together form a circle with the central point. There is also a petroglyph representing an 'ibex' with unnaturally spiralled horns (Tolg5, Tolg15). It is interesting in this context that some stone structures at this site have the shape of a circle or spiral with a central point. It is due to this form that they are attributed to the Bronze Age and early Iron Age. It was also found that the representations of a circle or spiral made in sandstone (Tolg4b, Tolg5, Tolg17) have the same patina as the majority of pecked images of animals representing style 1 – 3 present at this site. Only the representation of a hoofed animal from block Tolg15 displays a slightly different patina, which results from the fact that it was made not in sandstone but in basalt rock. The same patina suggests a similar chronology of their creation, approximating that of the stone constructions from the southern slope of Khar Tolgoi (cf. Fig. 4). Also, at site Paaluu, there are representations of hoofed animals with stylised horns forming a circle or spiral. At the same site, there are also stone rings with pavement or mound in the centre and a structure made from boulders arranged as a circle or spiral ending with an arching row of stones (Fig. 18).

Similar to the structures from other sites, these



*Figure 18. Site Paaluu: stone constructions forming a circle and a spiral situated at the foot of the mountain. Probably from the Bronze Age and early Iron Age (phot. Project Archive).*

constructions are attributed to the communities of the Bronze Age and early Iron Age. This fact proves a similar chronological position of pecked images where a spiral or circle with the central point appear and the related representations of hoofed animals; style 1, 2 and variants 3/1 and 3/2 of style 3 (cf. Fig. 12).

Another chronological position should be attributed to petroglyphs from rock blocks Tolg6 and Tolg19, representing variant 3/3 from Khar Tolgoi. In Tolg6, there is a representation of a rider on a horse with visible reins, unusual for this site. Tolg19 differs in the method of execution, which consisted of making the outline of the contours of the petroglyphs in the technique of indirect percussion or with a metal tool and then removing the fragments of the rock present inside the outline and polishing the whole surface. Petroglyphs representing such subjects and techniques of execution are commonly present at sites in Paaluu and Khawtsgait. They include images of riders, wagons and cattle as well as petroglyphs of narrative character, which seem to represent scenes of rituals, as in the case of rock block 52 from Khawtsgait. These scenes are thought to have originated in the late Iron Age (Andreeva and Atwood 2018: Fig. 2, 5).

Among the petroglyphs recorded at site Khar Tolgoi, undoubtedly the youngest are the images representing style 4 (cf. Fig. 12). These are the animal engravings made with a metal tool, alien to the pre-historic stylistic convention. As far as their form is concerned, the images may be divided into schematic (4/1) and naturalistic-contour (4/2) variants, which seems to suggest a difference in their chronology.

However, in both cases, the engravings were made with a metal (iron) tool in the not very distant past, which is substantiated by the fact that patina had only begun to form. Another proof of their late chronology is the presence of letters carved in Cyrillic script recorded in Khar Tolgoi (Tolg16) and on rock blocks in Paaluu.

### Conclusions

Results of analyses of petroglyphs from Khar Tolgoi (Хар Толгой) suggest the presence of four similar styles/stylistic conventions, within which variants representing similar formal features but differences in the subject matter and technique of execution may be distinguished. A comparison of the research results in Khar Tolgoi with the results of the work carried out in Khawtsgait and Paaluu resulted in the conclusions concerning the periods when the images belonging to particular styles and stylistic variants were made. Determining the chronology was based on the similarities between individual representations and the stone constructions of known chronology present in the area. Another factor was the elements of material culture of a known period of use depicted in the images. Yet another factor in dating the petroglyphs is the analysis of the patina covering them. In the case of Khar Tolgoi, it is facilitated by the fact that most representations were made on similar sandstone boulders, which differ only slightly in the angle of inclination, which guaranteed relatively objective results of the analyses.

In this context, the petroglyphs representing style

1, 2 and variants 3/1 and 3/2 of style 3 are the oldest (cf. Fig. 12). They show individual hoofed animals and geometric motifs, such as spirals or circles with a central point. The patina on these petroglyphs has a similar colour, which confirms the fact that they belong to the same chronological brackets. Due to the method of their execution, pecked images employing the technique of direct percussion and the resulting imprecise form, the oldest (archaic in their appearance) are the petroglyphs belonging to variant 3/1 of style 3. Contrary to this, petroglyphs in styles 1, 2 and variant 3/2 of style 3 represent a more advanced technique of execution, where the dominating method is that of indirect flaking. It is relatively easy to determine here the kind of animal due to its semi-naturalistic representation (style 2, variant 3/2) or precise, sometimes excessive rendering of their antlers (style 1).

The analogies between some images in the petroglyphs and the sepulchral-ritual constructions from the archaeological sites in the region suggest that they originated in the Bronze Age and early Iron Age, when Ulaanzuukh and Slab Grave cultures developed in this area. This chronological position of the petroglyphs representing individual animals is proposed by some researchers (Batbold 2014; Iderkhangai et al. 2017), but it seems that images of this type may have been made in much broader time brackets, originating in the Holocene (Jacobson-Tepfer 2015, 2023). It is worth remembering that the symbols of spirals and circles with the central point connected with representations of animals are common in central Asia in the iconography of the Neolithic.

Individual petroglyphs representing variant 3/3 (Tolg6, Tolg19) from Khar Tolgoi were attributed to a subsequent pre-Historic period. In terms of technique of execution and subject matter, they display similarities to petroglyphs from Khawtsgait and Paaluu connected with the later Iron Age, which display the material culture of the nomads and narrative scenes (Andreeva and Atwood 2018). This fact suggests that this group of petroglyphs is connected with the late Iron Age, whose focal point in this part of Asia was the expansion of the Xiongnu — the people of the steppe — and the emergence of subsequent political entities.

The youngest representations of rock art in Khar Tolgoi are petroglyphs in style 4, alien to the pre-Historic stylistic convention, with its schematic and naturalistic-contour variants (4/1 and 4/2). In both cases, the engravings were made with a metal tool. Traces of relatively new patina on engravings of variant 4/1 and its absence on petroglyphs of variant 4/2 prove that the images were made in modern times, but due to the presence of traces of patina, petroglyphs of variant 4/1 seem a bit older. The representations of variant 4/2 probably originated in the last few decades, which is substantiated by the letters in the Cyrillic alphabet carved in stone. The alphabet was introduced in Mongolia in the mid-20th century, but

it did not become widespread in the provinces until the 1960s and 1970s.

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