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SUPERIMPOSITION AT KHURUUGIIN UZUUR: ESTABLISHING THE RELATIVE CHRONOLOGY OF INCISED IMAGERY IN CENTRAL MONGOLIA

Jamiyan-Ombo Gantulga, Chimiddorj Yeruul-Erdene and Jérôme Magail

Abstract. This article presents a study on the petroglyphic superimpositions found at the Khuruugiin Uzuur site in the Ikhtamir soum of the Arkhangai province. The site features around three thousand petroglyphs created over several generations of ancient history. While we have previously published a monograph on the petroglyphs at this site, we have not yet conducted a thorough examination of the petroglyphic superimpositions. Therefore, in this study, we have selected sixteen superimpositions from the site in an attempt to establish the relative chronology of the incised images. While the techniques used to engrave the images at the Khuruugiin Uzuur site differ from those at other major rock art sites, the body proportions, shapes, head, neck, legs and other details of the represented animals are remarkably similar. This likeness provides evidence that these images were created during the same epoch. To establish their relative chronology, a comparison was made with images from other sites, particularly rock art sites in the Mongolian and Russian Altai Mountains.

1. Introduction

Overview of Mongolian rock art research. Mongolia has a rich rock art heritage, and research in this field has been ongoing for over 130 years, resulting in numerous articles and books published on rock art in the country. However, in the past decade, research on the Bronze Age in Mongolia has expanded to focus on the chronology, cultural connections, grouping and classification of newly discovered archaeological monuments other than rock art, leading to the identification of many new types of monuments and their ethnic and cultural connections. While progress in rock art research has been slow in Mongolia, notable research has been conducted in western Mongolia since the mid-1990s, particularly on petroglyphic complexes such as Tsagaan Salaa-Baga Oigor, Upper Tsagaan Gol complex, and Aral Tolgoi of Mongolian Altai, resulting in their inscription on the UNESCO World Heritage List (Jacobson et al. 2001, 2006; Kubarev et al. 2005; Tseveendorj et al. 2005).

Significance of deer stone and khirgisuur. Initially, Bronze Age monuments in Mongolia were defined by a few types, such as petroglyphs, *khirgisuur*, deer stones and slab burials. Among the most exciting, elegant and valuable heritage structures are the deer stone monuments, dating from c. 1200 to 600 BCE. These monuments are frequently found within the context of larger complexes, often including *khirgisuur* (elaborate burial mounds) and sacrificial altars. Deer stones belong to a class of Bronze Age monuments commonly referred to as menhirs. The deer stones of Mongolia are particularly significant and represent one of the most remarkable elements of the world's megalithic ceremonial and funerary cultures.

Each deer stone is a large stele, sometimes reaching up to 4 m in height, typically engraved with stylised depictions of stags. These monoliths are elaborately decorated and can be found either standing alone or grouped together. Structurally, they are vertically divided into three sections: the upper section, which often includes a head; the middle section, representing the torso; and the lower section, which depicts the area below the belt. Mongolian deer stones are unparalleled within the Bronze Age monumental heritage in terms of ornamentation, cultural significance, and archaeological and landscape contexts. Their uniqueness also lies in their broader cultural associations.

Research on deer stones began approximately 100 years ago, and to date, more than 1600 deer stones have been discovered across the Eurasian steppe, with over 1300 of them found in Mongolia alone. Three distinct types of deer stones have been identified: (1) the Mongol-Transbaikal type, characterised by stylised stag imagery; (2) the Sayan-Altai type, which features more realistic depictions of animals; and (3) the Eurasian type, which is generally non-figurative and less well-defined.

The concentration of deer stone monuments

alongside *khirgisuur* burial mounds represents one of the most outstanding examples of early human artistic and architectural activity. *Khirgisuur* structures typically feature a large stone mound at the centre, surrounded by circular or square stone fences. Deer stones may be found within these fences' perimeter or some distance away. Together, *khirgisuur* and deer stone complexes display high craftsmanship and represent a complete and sophisticated ritual and funerary culture of the Bronze Age nomadic peoples of northern Asia. These structures also exhibit symbolic and cosmic significance, reflecting the period's advanced technical knowledge and skills.

The combination of *khirgisuur* and deer stone monuments is often set within breathtaking landscapes defined by rivers, valleys and mountains, further highlighting the creative genius of pre-Historic peoples. According to recent studies, 244 (20%) of Mongolia's deer stone complexes are associated with *khirgisuur*. Moreover, 55% of all deer stones are situated near *khirgisuur*, excluding those initially located in separate ritual complexes not far from *khirgisuur* (Bayarkhuu and Tslekhagarav 2021: 193–200).

Figure 1a. *Map of Mongolia with the location of the Khuruugiin Uzuur site, Khoid Tamir Valley.*

Figure 1b. *Aerial photograph and distribution of rock art at the Khuruugiin Uzuur site.*

Recently, there has been a shift in focus towards the detailed study of rock art. As of 2020, approximately 1000 petroglyph sites have been registered in Mongolia, with 90% of them dating to the Bronze and Early Iron Ages (Terguunbayar and Ankhsanaa 2019: 65–78). In an effort to contribute to this study, we have selected sixteen superimpositions from the Khuruugiin Uzuur site in central Mongolia, which offer instances of relative chronology.

2. Khuruugiin Uzuur site

Located in the North Tamir Valley, the Khuruugiin Uzuur site is the largest site in the area and is known for its high artistic value (Figs 1a, 1b). It was first discovered in the summer of 1969 by V. V. Volkov, E. A. Novgorodova and D. Navaan, with some of the first images published by D. Dorj and E. A. Novgorodova in their book *Petroglyphs of Mongolia* (1975: 7, 26–27, 38–46, Table XVII, Fig. 1–4, Table XVIII, Figs 1–14).

In 1993 and 1995, Sanjmyatav published a few images of the Khuruugiin Uzuur site in his books *Ancient historical and cultural monuments in Arkhangai Province* and *Rock art of Mongolia*, with plans to eventually

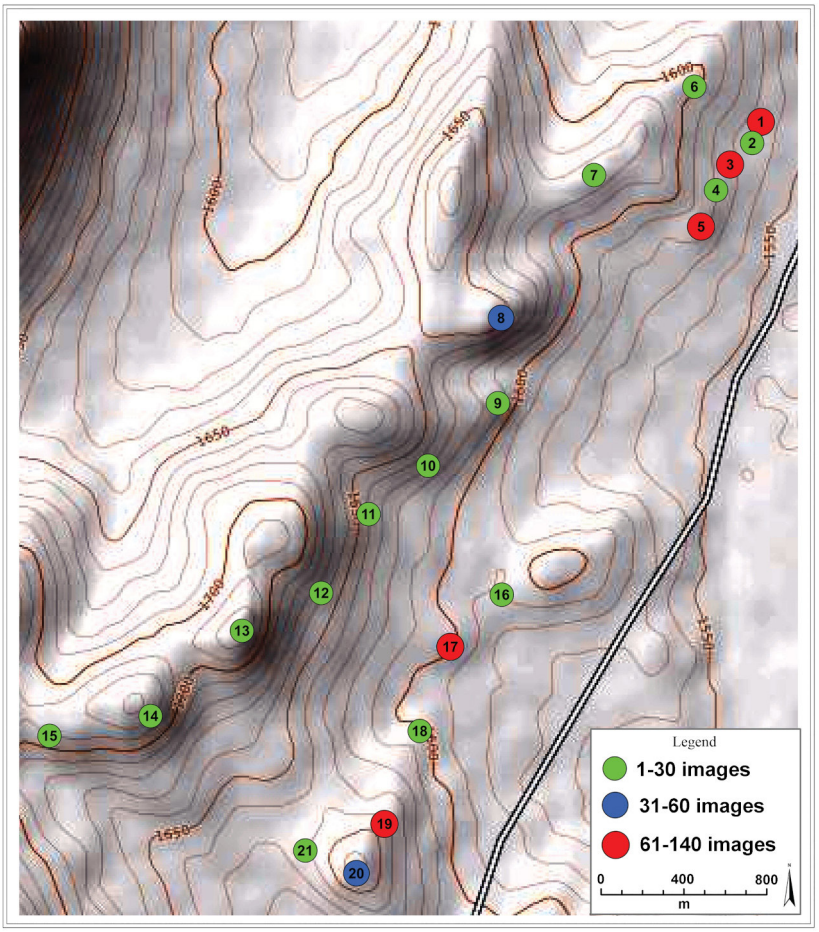

Figure 1c. *Distribution of rock art sites and images at Khuruugiin Uzuur.*

publish all the images together. These researchers believed that many of the petroglyphs at the site depict animal themes and date back to the Bronze and Early Iron Ages.

Since 2010, researchers from the Mongolian-Monaco Joint Khoid Tamir-Khunui Archaeological Project have been working at the site. In 2018, they published a monograph titled *Research on petroglyphs of Khuruugiin Uzuur: archaeological research in the valley of Khoid Tamir-II*.

The site contains abundant petroglyphs on slabs, with an estimated eight hundred compositions and about three thousand images in twenty-one sections (sections I–XXI are numbered with Roman numerals) stretching three kilometres along the river from east to west. The largest cluster among the 21 (XXI) sections is section I, with 140 compositions, while section XV has the fewest, with only one image. Each panel contains anywhere from a single figure to dozens of characters and 'scenes'. Section XIV has one to thirty images, most of which are located on the plateau, while section II has thirty-one to sixty images on the plateau, and section V contains sixty-one to 141 images, all located in the lowlands. The distribution of rock art suggests that the images were created on rocks with naturally flat surfaces suitable for engraving, rather than being carved in any systematic manner (Fig. 1c). Most of the images at this site are depicted in a semi-realistic manner, employing common techniques such as incising, scratching, pounding and engraving, within the framework of contour and silhouette methods. Some superimpositions at the Khuruugiin Uzuur site, which differ in theme and composition, depict animals, objects and unidentified figures but share the same method of depiction. They are made using an archaic contour technique and are heavily weathered, covered by a dark grey-black patina.

The animal depictions at the site are realistic and include 'ibex, cattle, horses, birds' and more. Some images of animals have faded, with later additions of animals and people, indicating a chronological difference. Most of the animals were tentatively identified based on certain parts of their bodies. In addition to animals, there are also specific and unidentified images, such as net-like grates depicted next to some animals (Figs 5, 6, 11), as well as chaotically scribbled images of unrecognisable objects (Figs 4–6, 8–11, 13). These images are always found next to animals; some appear disordered or incomplete (Gantulga et al. 2018).

Geographical and cultural context. The Khangai Mountain range occupies a significant portion of central and north-central Mongolia, with the highest peak being Otgon-tenger, which reaches a height of 3905 m (Batchuluun 2020: 3). The region has a long history of human settlement, dating back to the Late Pleistocene. The basin of the North Tamir River is one notable area of human habitation, with numerous Stone Age sites such as Tsatsyn ereg, Khuruugiin Uzuur, Sonor khairkhan, Erdene Tolgoi, Kharuul Tolgoi, Elstein Am, Yargait, Tuulgait, Baga ulaan Tolgoi, Taikhar chuluu and Avdar Khad (Tsatsyn ereg-2) (Gantulga et al. 2016). Excavations at the Avdar Khad site have established a radiocarbon date of 32,030–20,160 CalBP, providing evidence of continuous human occupation in the area over a long period (Simonet et al. 2011).

During the late middle Holocene, the landscape of central Mongolia took on its current mountain steppe character, and the herding of domestic animals became the dominant economic activity. As a result, these valleys became important year-round grazing grounds, leading to the establishment of seasonal residences in the region and the presence of rich archaeological monuments from the Bronze and Early Iron Ages. These valleys were particularly sought after for whole-year pastures during the transition to full horse-riding nomadism in the 1st millennium BCE and thereafter.

Number of panel	Image No.	Motifs				
		Incised images	**Silhouette images**			
		Earliest layer	Second layer	Third layer	4th layer	5th layer
1.1	320	Some parts of the horse's body (neck, chest, front leg, back)	'Ibex' and 'wolf'(?)			
1.2	323	Some parts of the horse's body (back, rump, body, hind leg), and unclear lines	'Human', three 'deer'			
1.3	510	'Bull with corrugated horns'	'Human', four 'ibexes'			
1.4	656	'Ibex'?	Two 'ibexes', 'young goat'			
1.5	535	'Horse (back, body, hind leg)'	'Horse', four 'ibexes', unknown animal	'Ibex, wolf, horse' and unknown animal	'Ibex, human'	'Ibex'
2.6	563	Three anthropomorphs, 'net' and unclear lines	'Moose, deer, two ibexes, three horses, predator' and unknown images			
2.7	668	Three 'horses' and unclear lines	Human(?), two predators and unknown images			
2.8	677	'Horse (back, front leg and body)' and unclear lines'	Stylised 'deer'	'Horseman, hunter with bow, dog(?), five tamgas', runic inscription and three unknown aminals		
2.9	679	'Bull', two 'ibexes' and unclear lines'	'Human, five ibexes, four predators, deer, camel, tamga(?)', unknown animals			
2.10	683	'Ibex and net(?)'	Two 'deers and ibex'	'Human or tamga, three ibexes', dots and unknown animal		
2.11	785	'Horse' decorated zig-zag pattern	Two 'ibexes'			
2.12	787	'Ibex and net(?)'	Dots			
2.13	788	'Ibex', unclear lines and 'net'				
2.14	789	'Horse', two 'bulls'	Unknown animals and 'tamga'			
2.15	791	'Horse' (no head) and unclear lines	Two 'ibexes' and unknown image			
2.16	792	'Horse' and unclear lines	Unknown animal			

Table 1. *Description of petroglyph sequences.*

Numerous compositions and images from the Early Nomadic Period, the Scythian Period, and the later Xiongnu and Mongol Empire periods attest to the presence of significant populations in these valleys. These findings indicate the region's importance in the evolution of early pastoral societies into horse-riding nomadic empires with highly militarised ideologies, as evidenced by the abundance of horse sacrifices and deer stone sites associated with warrior cults.

In summary, the North Tamir River valley offers significant opportunities for studying the transformation of early pastoral societies into horse-riding nomadic empires with militarised ideologies. It also serves as a reliable source for comparison with archaeological sites from the Palaeolithic, Bronze Age and Medieval periods in neighbouring and other regions.

The Khuruugiin Uzuur site has sixteen superimpositions consisting of several layers of images. These

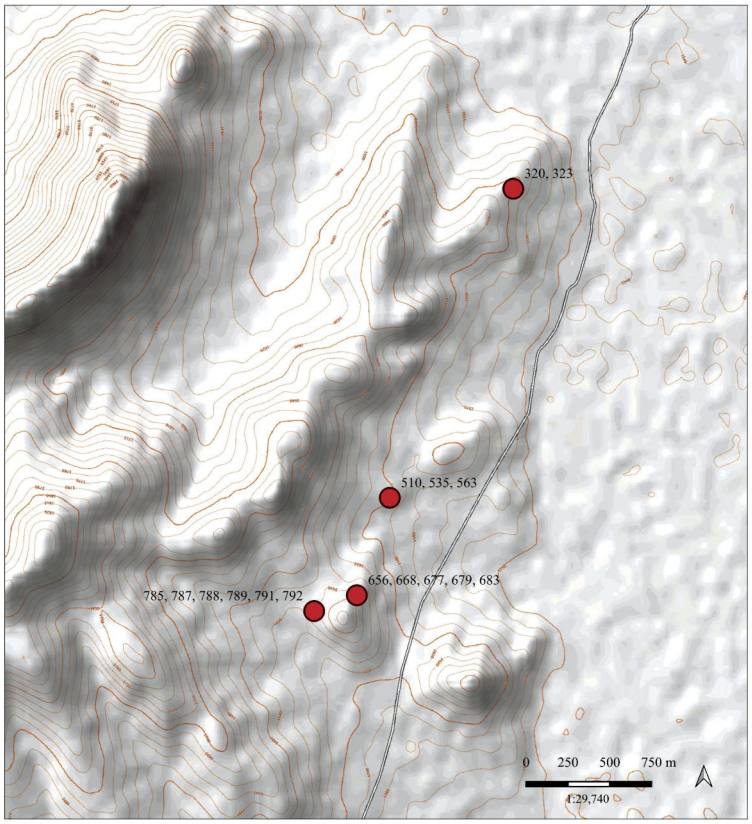

Figure 2. *The location of superimposition images at the Khuruugiin Uzuur site.*

superimpositions are located in four sections of the site, specifically VI (No. 320, 323), XVII (No. 510, 535, 563), XIX (No. 656, 668, 677, 679, 683), and XXI (No. 785, 787–789, 791, 792), with section XXI having the highest number of superimposed images (Fig. 2). A table describing the sixteen images is presented in Table 1.

3. Research methodology

Identification and documentation of superimposed images. Identifying the superimposed images at this site was relatively easy compared to other petroglyph sites, where it can often be more challenging. This is because the older images were delicately drawn with fine lines, while the more recent ones were created using the silhouette technique, placed over the earlier engravings.

Analytical process. The analysis of the superimposed images was carried out in three steps. First, the images were traced onto polyethylene films, with photo documentation done using a Canon 60D camera. A magnifying glass was used for detailed descriptions. Next, the tracings and photos were carefully checked for accuracy. Finally, the images were processed using Adobe Photoshop and Illustrator CC, and the distribution map was produced using QGIS version 3.26.

4. Results

Superimpositions and layers of petroglyphs. Despite the faded and inconspicuous nature of the incised images at Khuruugiin Uzuur, identifying the superimposition of sixteen images was not difficult. This is because multiple engraving techniques were used, making it easier to recognise the different layers. However, identifying superimposition images executed with only one method proved to be quite challenging. For instance, some images showed three-layer superimpositions (Figs 4.8, 10; 6; 7), while others exhibited five-layer superimpositions (Figs 3.5; 8).

One example of a three-layer superimposition depicts the incomplete fine lines of the backs and front legs of two large animals on the first layer, with scribbled vertical and horizontal lines on top. Above this layer, stylised deer were depicted using the silhouette method, and on the last layer, a horseman, a hunter with a bow and arrow, deer, dog(?), three unknown

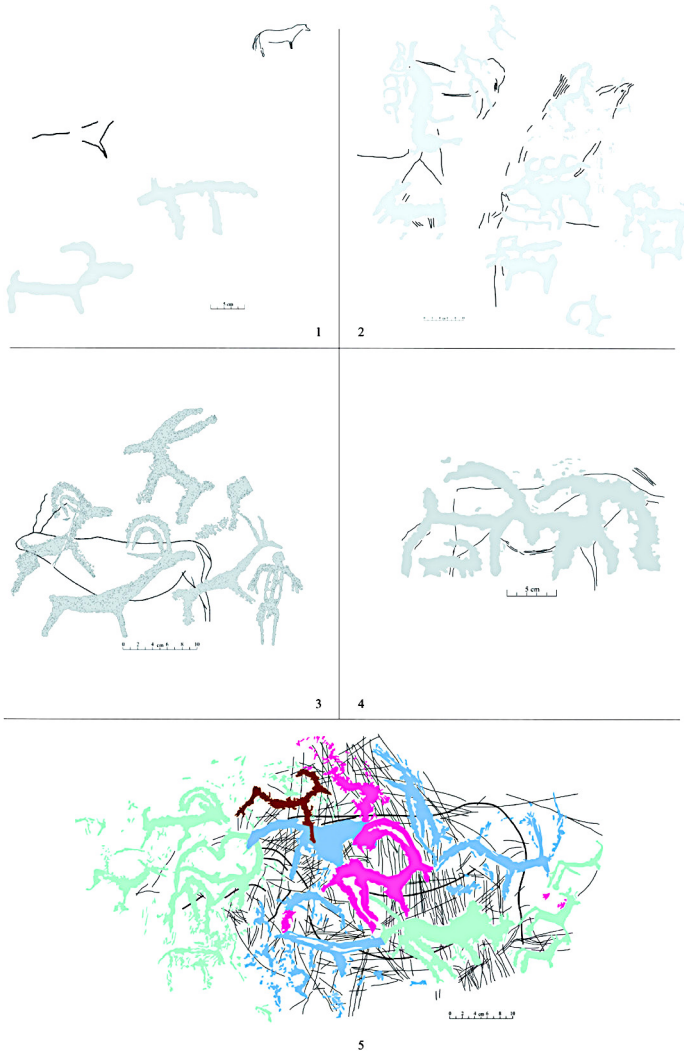

Figure 3. *Depictions of 'horse, bull and ibex'. Tracing by JOG.*

Figure 4. *Depictions of anthropomorph, 'horse, ibex and bull'. Tracing by JOG.*

animals, five signs (tamgas, i.e. seals or ownership emblems), and runic letters (9?) marked with fine lines were depicted (Fig. 4.8; 6.c, d). The inscription on this layer has not yet been deciphered.

Another example is the most layered image (No. 535), which shows five generations of superimposition (Fig. 8.a–f). The first layer depicts the back, body and hind legs of a large zoomorph with scattered fine lines and scribbled vertical and horizontal lines on top (Fig. 8.a). The second layer shows four 'ibex', four 'horses' and one unknown animal pecked on the big 'horse' (Fig. 8.b). The third layer depicts 'ibex, wolf, horse' and one unknown animal (Fig. 8.c). The fourth layer shows a possible anthropomorph seated on a 'horse' of the third layer, with an 'ibex' with big horns 'behind' him (Fig. 8.d). The last layer shows an 'ibex' with short horns pecked on top (Fig. 8.e).

Animal depictions. Let us compare the selected images with those from other rock art sites.

'Horses'. The depiction of equids at the Khuruugiin Uzuur site is varied, with three distinct methods used. The first method involves the use of the contour technique, as seen in Figures 3.1, 3.2, 3.4, and 3.16. The second method combines the contour technique with straight, long lines, as depicted in Figures 4.7 and 5.12. The final method involves the contour technique, paired with a unique zigzag motif, as shown in Figure 5.11. Interestingly, this horse image style has only been found at the Khuruugiin Uzuur site.

'Ibexes'. The Khuruugiin Uzuur site displays two distinct methods of depicting 'ibex'. The first method involves using thin lines to outline the outer part of the body, as shown in Figure 4.9. The second method combines thin lines for the outer part of the body and straight long lines for the inner space, as depicted in Figures 5.13 and 5.14.

'Bovids'. There are two distinct styles in which presumed bulls are depicted at the Khuruugiin Uzuur site, as can be seen in Figures 3.3, 4.9, and 5.15. The first style shows the outer part of the body as a thin line, with narrow, long, wavy horns, a thick neck, a wide chest and a short tail, as depicted in Figure 3.3. The second style features three 'bulls' without heads, with the outer part of the body shown as a thin line and the inner part of the body depicted with a straight long line, as seen in Figures 4.9 and 5.15.

Other depictions and anthropomorphs. Next to the animal depictions at the Khuruugiin Uzuur site, there are numerous intricate and abstract lines that can be difficult to identify. Some of these lines resemble partially depicted animal body parts, such as those seen in Figures 3.2, 4.7, and 8. Others appear to be net-like patterns, as shown in Figures 3.5 and 4.10.

Figure 5. *Depictions of 'horse and ibex'. Tracing JOG.*

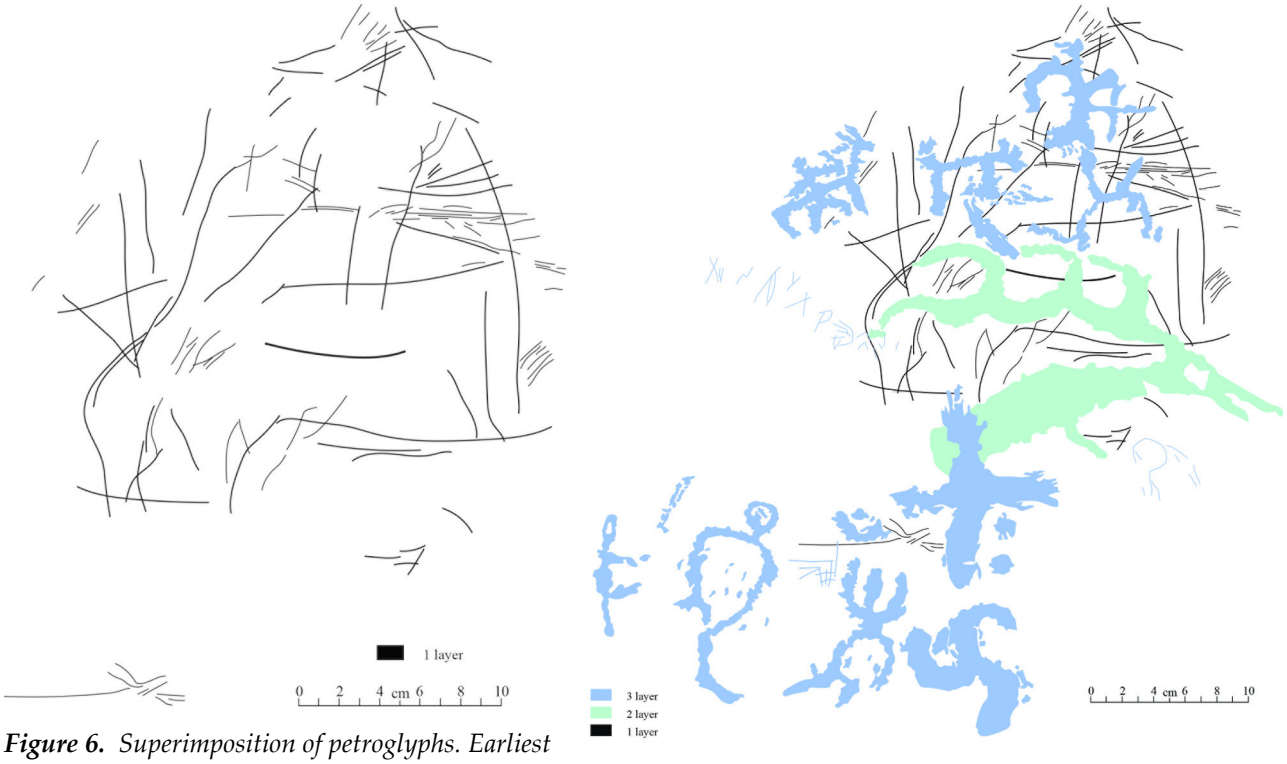

Figure 6. *Superimposition of petroglyphs. Earliest layer on left, all three layers on right. Tracing by JOG.*

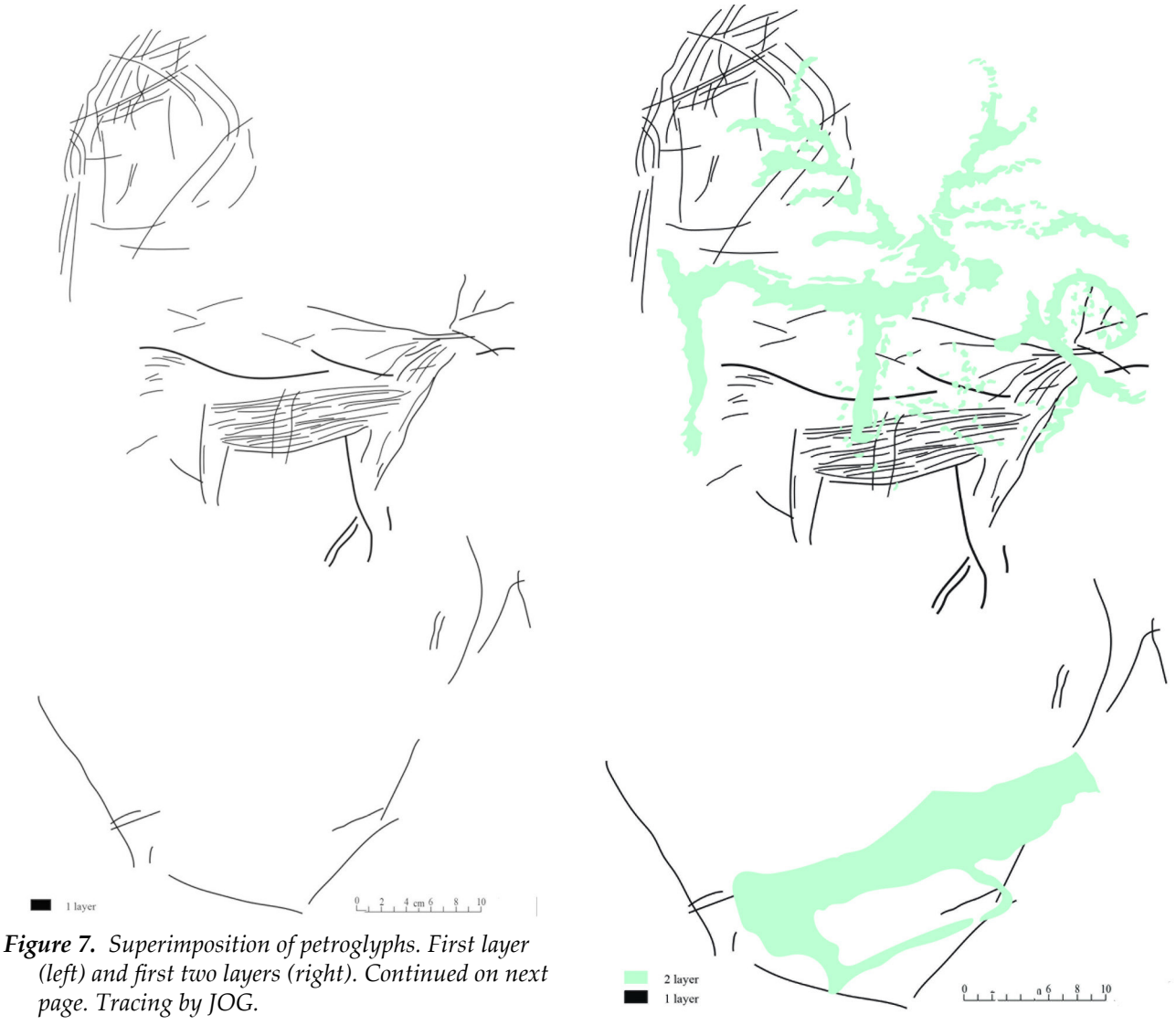

Figure 7. *Superimposition of petroglyphs. First layer (left) and first two layers (right). Continued on next page. Tracing by JOG.*

Figure 7 (continued). *All three layers (left) and view of petroglyph panel.*

Additionally, some are executed as random straight and curved lines, as depicted in Figures 4.6–9 and 5.12.

One fascinating composition at the Khuruugiin Uzuur site shows three human-like images adorned with straight cross lines, zigzag patterns and net-like elements, as depicted in Figure 4.6. The animals were then depicted over these anthropomorphs.

5. Discussion and conclusion

Superimposition studies and relative chronology. Petroglyphs found at various sites are often not contemporaneous and may have been depicted on top of each other over generations. Recent theoretical work by Rebecca O'Sullivan has provided insights into how and why superimposition rock art is created and replicated, using the example of Tsagaan Salaa and Baga Oigor sites in western Mongolia (2021: 387–412). In addition, researchers from Russia, Mongolia and France have conducted superimposition studies at this site to determine the relative dating of the archaic images (Molodin et al. 2020: 134–150).

However, superimposition studies have not been extensively conducted in the rock art sites of central Mongolia, not because superimposition images do not exist in the region, but rather due to limited research and superficial studies conducted in the area. Therefore, we aim to fill this gap by focusing on the Khu-

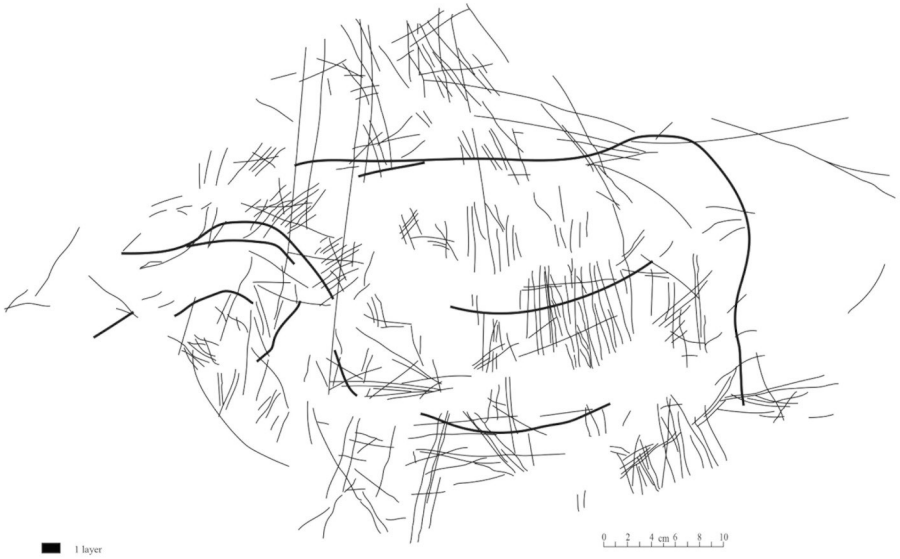

Figure 8. *Superimposition of petroglyphs (five layers). This is the earliest layer; continued on next page. Tracing by JOG.*

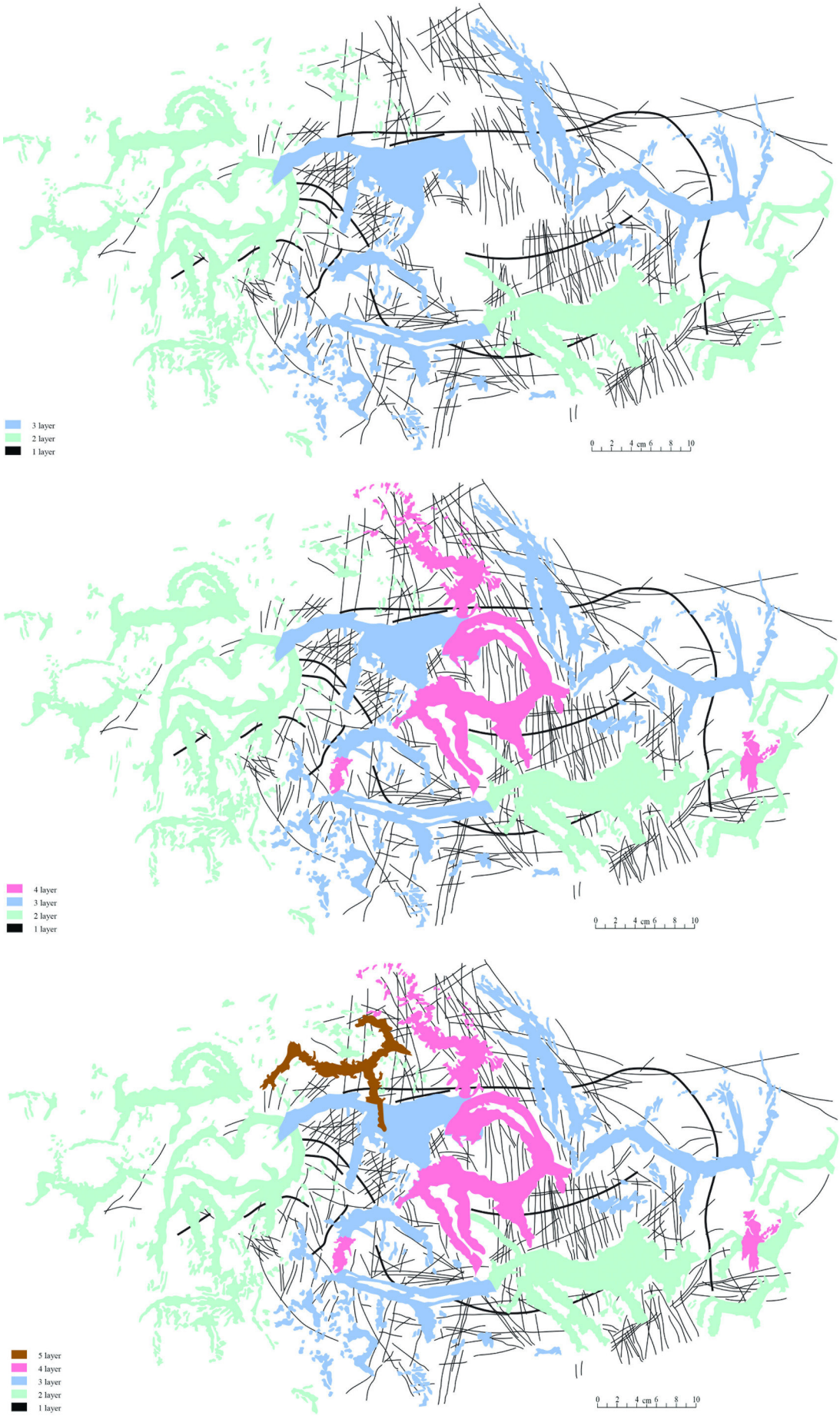

Figure 8 (continued). *The three early layers (top), four layers (middle) and all layers (bottom).*

Figure 8 (continued). *The analysed petroglyph panel.*

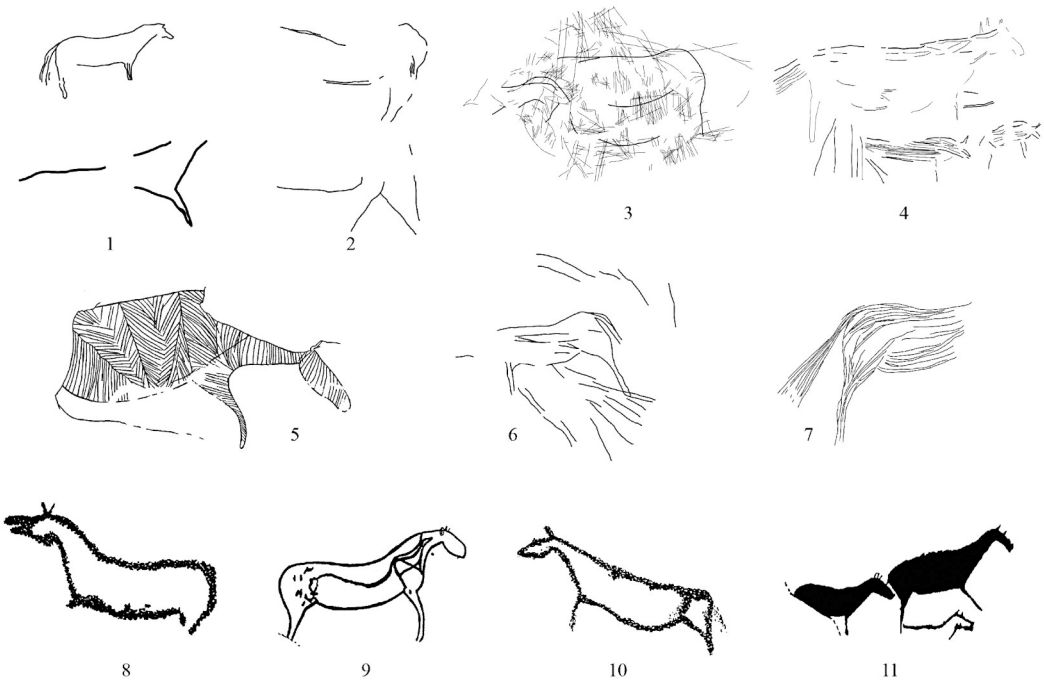

Figure 9. *'Horses': 1–7 - Khuruugiin Uzuur, central Mongolia; 8–10 - Aral Tolgoi, Mongolian Altai (Tseveendorj et al. 2005: Table 12; Kubarev 2007); 11 - Kalbak Tash I (Kubarev 2011: Fig. XIII.9).*

ruugiin Uzuur site in central Mongolia to determine the relative chronology of the petroglyphs through a superimposition analysis. We aim to develop a model representing central Mongolia in the superimposition study of rock art.

In this discussion, we will focus specifically on the relative chronology of the earliest, incised images.

The Khuruugiin Uzuur site is an exceptional

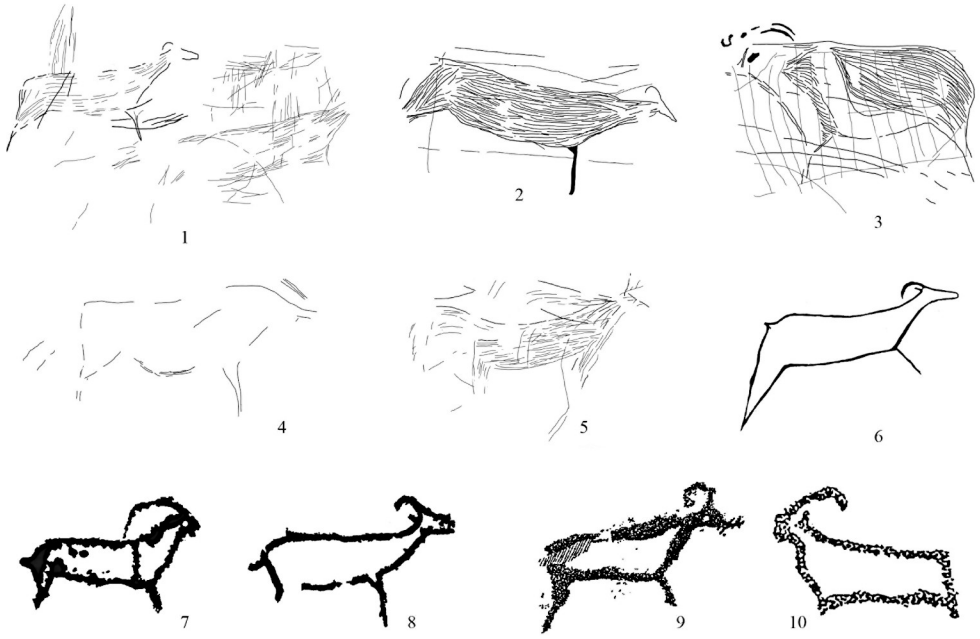

Figure 10. *'Ibexes': 1–5 - Khuruugiin Uzuur, central Mongolia; 6 - Baga Oigor V, Mongolian Altai (Jacobson et al. 2001: Fig. 1284); 7, 8 - Kalbak Tash I (Kubarev 2011: Fig. 1.12, 17); 9, 10 - Aral Tolgoi, Mongolian Altai (Tseveendorj et al. 2005: Table 8.1, 15; Kubarev 2007).*

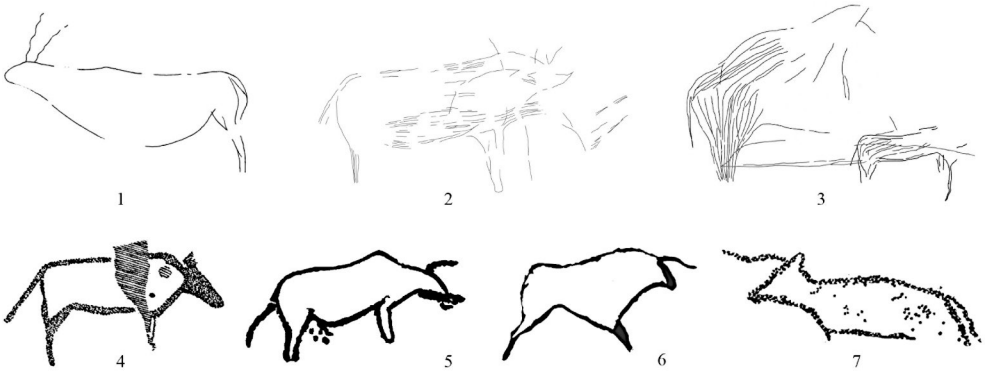

Figure 11. *'Bulls': 1–3 - Khuruugiin Uzuur, central Mongolia; 4 - Aral Tolgoi, Mongolian Altai (Tseveendorj et al. 2005: Table 11.6; Kubarev 2007); 5 - Kalbak-Tash I (Kubarev 2011: Fig. 36.7, 37.2); 6, 7 - Tsagaan Salaa II, IV, Mongolian Altai (Kubarev et al. 2005: 523, Fig. 32.1, 2).*

monument that comprises a complex of structures from different periods of ancient history. The petroglyphs at the site are engraved in two or five layers and form a superimposition. To establish a relative chronology, we compared these images with those from other sites, including Tsagaan Salaa, Baga Oigor, Shiveet Khairkhan Mountain of Upper Tsagaan Gol complex, and Kalbak Tash. Many scholars concur on the dating of the petroglyphs from these sites, as they share similar images.

Cultural and chronological connections. While the techniques used to engrave the images at the Khuruugiin Uzuur site differ from those at other major rock art sites, the body proportions, shapes, heads, necks, legs and so on of the represented animals are remarkably similar. This likeness provides evidence that these images were created during the same epoch.

'Horses'. The 'horse' and other animal images found at the Khuruugiin Uzuur site were executed using the contour method on the outer part of the body, similar to the archaic 'horse' images found in the Mongolian Altai Mountains. For example, similar depictions of 'horses' in terms of body proportions and shape can be found in rock art at Tsagaan Salaa and Baga Oigor (Jacobson et al. 2001: Fig. 144, 145, 375), Khar Salaa of Upper Tsagaan Gol complex (Kubarev 2009: Fig. 165, 477), Aral Tolgoi (Tseveendorj et al. 2005: Table 12; Kubarev 2007), Tevsh Uul (Okladnikov 1980: Table 116.1) and Kalbak Tash (Kubarev 2011: Fig. XIII.9), all associated with the Late Neolithic and pre-bronze periods (Fig. 9).

Notably, a fragment of pottery with a zigzag motif was found near one of the horse images at the Khuruugiin Uzuur site (Fig. 13.2). This zigzag motif is considered the main decoration and identification marker of pottery from the Afanasievo culture (Gryaznov 1999; Vadetskaya et al. 2014). These findings provide evidence of monuments related to the Afanasievo culture in the North Tamir Valley, which is significant for determining the dating of the petroglyphs (Esin et al. 2012: 205–211; Esin et al. 2021) (Fig. 13). The discovery of the zigzag motif on pottery is important because it links the petroglyphs to the Afanasievo culture, providing valuable information for dating the site's rock art. Also, some burials excavated in the Altansandal Mountain in the North Tamir River Valley have been noted by researchers to be related to the Afanasievo culture (Novgorodova 1989: 81–89). This site is located about 30 km southwest of Khuruugiin Uzuur. Traces of red ochre were found in these burials, a significant

element in the burial rituals of the Afanasievo culture. Furthermore, the presence of burials related to this culture in the North Tamir River Valley suggests that the culture may have had a wider presence in the area than previously thought. These findings open new possibilities for research on the cultural and historical context of the Khuruugiin Uzuur site and its relation to other sites in the region.

'Ibexes'. Numerous images of 'ibex' executed using the contour method can be found in various sites, such as Aral Tolgoi (Tseveendorj et al. 2005: Table 8.9), Baga Oigor (Jacobson et al. 2001: Fig. 483, 1284), Khar Salaa of Upper Tsagaan Gol complex in the Mongolian Altai Mountains (Kubarev 2009: Figs 6, 16, 407, 752–754), and Kalbak Tash in Russian Altai Mountains (Kubarev 2011: Figs 1.12, 17). Therefore, we concur with the suggestions of the aforementioned researchers and propose that these fine-line images be interpreted as dating from the Late Neolithic to the Early Bronze Age (Fig. 10).

Figure 12. *Anthropomorphs: 1 - Khuruugiin Uzuur, central Mongolia; 2 - Dalan turgenii khos tolgoi, western Mongolia (Tserendagva and Tseveendorj 2016: Fig. 488); 3 - Kalbak-Tash I (Kubarev 2011: Fig. 187, 188, 311, 314, 338); 4, 5 - Chuluut gol, central Mongolia (Novgorodova 1984: Fig. 14; Sanjmyatav 1995: Table 22, 23).*

'Bulls'. Similar images of 'bulls', but depicted differently, have been found in other sites, such as Aral Tolgoi (Tseveendorj et al. 2005: Table 11.6), Tsagaan Salaa II and IV sectors (Kubarev et al. 2005: Fig. 32.1, 2) and Kalbak Tash (Kubarev 2011: Fig. 36.7, 37.2). According to V. D. Kubarev, the bull images in the Tsagaan Salaa II and IV sectors are from the Eneolithic period (2005: 60–62). We concur with this idea and believe that the images of bulls in Khuruugiin Uzuur, characterised by narrow, wavy, straight horns, thick necks, wide chests and short tails, are relevant to that time period (Fig. 11).

Anthropomorphs. Depictions of a human image wearing a cloak with fringes have been found in Eneolithic and Early Bronze Age sites in the Minus depression, including Ust-Es, Tesi and Bele (Esin et al. 2012: 205–211, Fig. 3). Some researchers have suggested that these depictions are related to sacrificial flags used by the Shorts, Altai and Teleut of ancient Khakas (Kyzlasov 1986: 196). However, it seems more appropriate to compare them to the anthropomorphs found in rock art sites, such as Tsagaan Asgatyn tokhoi of the Chuluut River (Novgorodova 1984: 40–89, Figs 13, 14; Sanjmyatav 1995: 22–23, Tables 22, 23), Kalbak Tash I (Kubarev 2011: 53, Fig. 187–196, 288, 306, 311, 314, 317, 323, 338, 340, 344, 348, 363, 602), Tsagaan Sa-

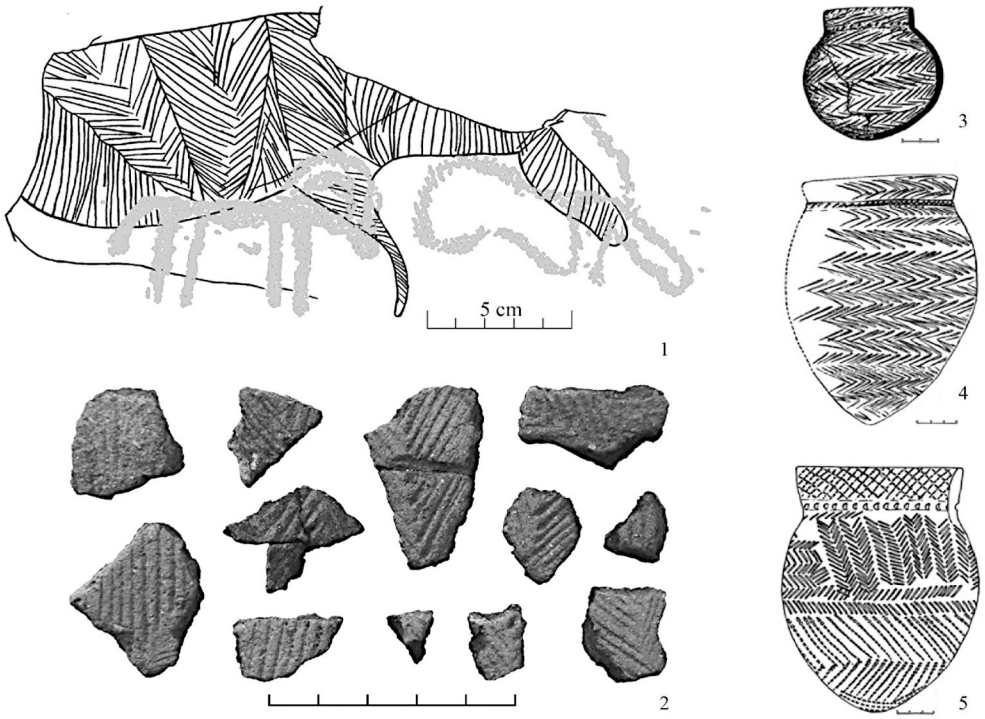

Figure 13. *Comparison of zigzag motifs on the rock art and on the potteries of Afanasievo culture: 1 - Khuruugiin Uzuur; 2 - sherds, Khuruugiin Uzuur (Esin et al. 2012); 3 - pottery, Sal'dyar-1; 4 - Ten'ga-4; 5 - Elo-1, Tuva (Vadetskaya et al. 2014: 49, 50, 65, Figs 7, 8, 23).*

laa (Jacobson et al. 2001: Fig. 476), and Dalan turgenii khos tolgoi (Tserendagva and Tseveendorj 2016: 53, Fig. 488) because human hands can be clearly seen on both sides of them (Fig. 4.6; 12.1).

Other depictions. At present, there is no definitive evidence to accurately date the apparently random lines and net-like images. However, similar images of net-like patterns have been found in other locations, such as Tevsh mountain (Okladnikov 1980: Table 156.11, 12), Baga Oigor (Jacobson et al. 2001: Fig. 1110), Kalbak Tash II (Kubarev 2014: 198–201, Fig. 1), and Khar Salaa I and VII of Upper Tsagaan Gol complex (Kubarev 2009: 10–12, 26–27, Fig. 104, 727).

In conclusion, we hope that the study of these superimpositions can make a valuable contribution to the detailed understanding of rock art. Furthermore, it can serve as a representative example of the petroglyphs in central Mongolia for comparative studies with superimpositions of rock art sites in other regions.

The earliest petroglyphs at Khuruugiin Uzuur site depict horses and ibexes. Subsequently, images of a 'human' in a cloak with fringes and a 'horse' with a zigzag infill appeared. These engraved images are attributed to the Late Neolithic to the Early Bronze Age period. The overlaid engraved images correspond to the Late Middle Bronze Age, the Early Iron Age, and the ancient state period.

Preliminary analysis indicates that multiple layers of rock art images in our study exhibit intentional superimposition, resulting in the effective 'erasure' of earlier representations (Figs 3–8). This observation underscores the necessity for further research on image superimposition dynamics in future studies.

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Dr Jamiyan-Ombo Gantulga[1,*], Dr Chimiddorj Yeruul-Erdene[2], Dr Jérôme Magail[3]

[1] The Department of Anthropology and Archaeology, The Institute of Nomadic Archaeology, National University of Mongolia

[*] Corresponding author: *gantulga.j@num.edu.mn*

[2] Cultural Research Analysts Inc. USA: *yeruul@gmail.com*

[3] Museum of Prehistoric Anthropology of Monaco, Monaco: *jerome.magail@map-mc.com*

REFERENCES

Batchuluun, Ye. 2020. The physical geography of Mongolia. The geography of the physical environment. *Nature*. *https://doi.org/10.1007/978-3-030-61434-8*.

Bayarkhuu, N. and Ts. Tselkhagarav 2021. Deer stones and Khirgisuur. *Deer stones cultures of Mongolia and neighboring regions. Vol. III*, Edit. Ts. Turbat, Munkhiin Useg LLC, Ulaanbaatar (in Mongolian).

Dorj, D. and E. A. Novgorodova 1975. *Petroglify Mongolii*. Izdatelistvo Academiya Nauk Mongoliskaya Narodnaya Respublika, Ulan-Bator.

Esin, Yu., J. Magail, J. Gantulga and Ch. Yeruul-Erdene 2012. K probleme vydeleniya naskal'nogo iskusstva afanas'yevskoy kul'tury Mongolii: novyye materialy i podkhody / Kul'tury stepnoy Yevrazii i ikh vzaimodeystviye s drevnimi tsivilizatsiyami. CPb: IIMK RAN,

Periferiya, Kn. 1: 205–211 (in Russian).

Esin, Yu., J. Magail, J. Gantulga and Ch. Yeruul-Erdene 2021. Chariots in the Bronze Age of central Mongolia based on the materials from the Khoid Tamir River valley. *Archaeological Research in Asia*. *https://doi.org/10.1016/j.ara.2021.100304*.

Gantulga, J., G. Lkhundev, J. Magail and C. Salicis 2016. Mongol-Monakogiin khamtarsan 'Khoid Tamir-Khünüi' *tösliin kheeriin shinjilgeenii angiin 2016 ony ajlyn tailan. ShUA-iin AKhGBS*, Ulaanbaatar (in Mongolian).

Gantulga, J., Ch. Yeruul-Erdene and J. Magail 2018. *Research on petroglyphs of Khuruugiin Uzuur. Archaeological research in the valley of Khoid Tamir-II. Ulaanbaatar* (in Mongolian). Munkhiin Useg LLC, Ulaanbaatar.

Gryaznov, M. P. 1999. *Afanas'yevskaya kul'tura na Yeniseye*. Dmitrii Bulanin Press, Sankt-Petersburg.

Jacobson, E., V. D. Kubarev and D. Tseveendorj 2001. Mongolie du Nord-Ouest: Tsagaan Salaa. In J. A. Sher and H.-P. Francfort (eds), *Baga Oigor. Repertoire des petroglyphs d'Asie Centrale*, Vol. V. 6. De Boccard, Paris.

Jacobson, E., V. D. Kubarev and D. Tseveendorj 2006. *Mongolie du nord-ouest : haut Tsagaan Gol. Répertoire des pé*troglyphes d*'Asie centrale*, Fascicule No. 7. 2 Vols, De Boccard, Paris.

Kubarev, V. D. 2007. Aral Tolgoi—New rock art site in Mongolia. *Archaeology, Ethnology & Anthropology of Eurasia* 1(29): 111–126.

Kubarev, V. D. 2009. *The petroglyphs Shivoot-Khairkhan (in the Mongolian Altai)*. The Institute of Archaeology and Ethnography Press, Novosibirsk.

Kubarev, V. D. 2011. *The petroglyphs Kalbak-Tash I (Russian Altai)*. The Institute of Archaeology and Ethnography Press. Novosibirsk.

Kubarev, V. D. 2014. Graffiti na mestonakhozhdenii petroglifov Kalbak-tash II. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredel'nykh territoriy*. Vol. XX, pp. 198–201 (in Russian).

Kubarev, V. D., D. Tseveendorj and E. Jacobson 2005. *Petroglyphs of Tsagaan-Salaa and Baga-Oigor (Mongolian Altai)*. The Institute of Archaeology and Ethnography Press, Novosibirsk-Ulaanbaatar-Eugene.

Kyzlasov, L. R. 1986. Drevneyshaya Khakasiya (in Russian). Moskow State University, Moskva.

Molodin, V. I., L. V. Zotkina, C. Cretin, D. V. Cheremisin, N. Batbold and D. Tseveendorj 2020. The palimpsest from Tsagaan Salaa sector IV (Mongolian Altai): relative chronology of images. *Kratkiye Soobshcheniya Instituta Arkheologii* 260: 134–150; *https://doi.org/10.25681/IAR-AS.0130-2620.260*.

Novgorodova, E. A. 1984. *Mir petroglifov Mongolii* (in Russian). 'NAUKA', Moskva.

Novgorodova, E. A. 1989. *Drevnyaya Mongoliya* (in Russian). 'NAUKA', Moskva.

Okladnikov, A. P. 1980. *Petroglify Tsentral'noy Azii (Khobd-somon gora Tebsh)* (in Russian). 'NAUKA'Leningradskoe Otdeleniye, Leningrad.

O'Sullivan, R. 2021. Replication in rock art past and present: a case study of Bronze and Iron Age rock art in the Altai, eastern Eurasia. *Journal of Archaeological Method and Theory* 28: 387–412. *https://doi.org/10.1007/s10816-020-09460-z*.

Sanjmyatav, T. 1993. *Arkhangai aimgiin nutag dakhi tüükh, soyolyn dursgal* (in Mongolian). Mongolian Academy of Sciences, Ulaanbaatar.

Sanjmyatav, T. 1995. *Mongolyn khadny zurag* (in Mongolian). Mongolian Academy of Sciences, Ulaanbaatar.

Simonet, A., D. Tseveendorj, J. Magail and C. Salicis 2011. Tsatsyn Ereg 2, un nouveau site du Paléolithique supérieur de Mongolie. *Bulletin du Musée d'Anthropologie Préhistorique de Monaco* 51: 99–108.

Terguunbayar, A. and G. Ankhsanaa 2019. Rock Art in Mongolia. In J. Clottes and B. Smith (eds), *Rock art in east Asia. A thematic study*, pp. 65–78. ICOMOS, Paris.

Tseveendorj, D., V. D. Kubarev and E. Jacobson 2005. *Petroglyphs of Aral Tolgoi* (in Mongolian). Mongolian Academy of Sciences, Ulaanbaatar.

Tserendagva, Ya. and D. Tseveendorj 2016. *Dalan Türgenii khos tolgoin khadny zurag* (in Mongolian). Munkhiin Useg LLC, Ulaanbaatar.

Vadetskaya, E. B., A. V. Polyakov and N. F. Stepanova 2014. *Svod pamyatnikov Afanas'yevskoy kul'tury* (in Russian). AZBUKA, Barnaul.

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