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ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

Horse sacrifice in the Üzüür Gyalan Tomb: An Altai Mountain Kurgan*

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Abstract
This study evaluated the horse sacrifice results and tomb remains of the Üzüür Gylan tombs which were recovered in 2015 at a location 35 km North-West from the centre of the Mönhhairhan province of Hovd in western Mongolia.
A woman's corpse buried with her clothing, some goods for daily life, a mummified horse skeleton and its harness as well as sheep remains were all recovered from a rock carved tomb. Radiocarbon dating placed the tomb as the 10th century A.D. Isotope analysis carried out on the horse showed that the horse lived in an environment comprising of C3 plantation with ample water and vegetation.
There were markings on the Frontal region of the horse's skull showing that it had been killed by being struck with a hard instrument as a sacrifice for the funeral ceremony. The tomb remains have given information about the style of living of the Altay people during the period of the 10th century A.D. and place and influence of horse in their lives.

Keywords
Horse • Kurgan • Sacrifice • Altai Mountain • Mongolia

Üzüür Gyalan Mezarında At Kurban Edilmesi: Bir Altay Dağı Kurganı

Öz
Bu çalışmada, 2015 yılında, Batı Moğolistan'ın Hovd vilayeti Mönhhairhan ilçe merkezine 35 km mesafede kuzeybatı tarafında, Altay dağlarının 2803 m yüksekliğinde keşfedilen Üzüür Gyalan mezarında at kurban edilme ve mezar bulguları değerlendirildi. Arkeologlar tarafından kaya oyuğu içerisinde bulunan bu mezarda yürütülen arkeolojik kazı çalışmalar sonucunda kıyafetleri ile gömülmüş kadın ile birlikte günlük yaşamda kullandığı malzemeler, mumifiye olmuş at iskeleti ile buna ait koşum takımları ve bazı koyun kalıntıları tespit edildi. Mezar örneklerinden radyokarbon tarihlendirme yapıldığında, mezar dönemsel olarak MS.10 yy'a ait olduğu saptandı. İzotop analizleri, atın C3 diye ifade edilen sulak iklim şartlarında yaşayan otlarla bu atın beslendiğini göstermekteydi. Cenaze ritüeli içinde atın kurban edildiğini gösteren, kafanın Frontal kemiği üzerinde atın öldürülmeden önce sert bir darbe ile alnına vurulduğunu gösteren bulgu bulunmaktaydı. Mezar bulguları MS. 10 yy Altay toplumunun yaşam biçimi ile bu toplumda atın yeri hakkında önemli bilgiler sunmaktadır.

Anahtar Kelimeler
At • Kurgan • Kurban • Altay Dağı • Moğolistan

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Introduction

The Context of The Üzüür Gyalan Findings

Located in the vast and high landscape of the Eurasian continent,[1] the Altai Mountains host a wide array of archeological sites that range from the Paleolithic to Late Medieval periods.[2] The most significant of all of the archaeological discoveries from this region is the Scynthian Frozen Tomb complex,[3] which can be dated back to circa 450-250 BC and represents the apex of the Pazyryk culture.[4] Unfavorable to agriculture, the region hosted nomadic communities of hunter-gatherer pastoralists.[5] In the hard climatic condition of the mountains, the very same environmental factors which made life extremely challenging, helped preserve the tombs into which they were interned following the death.[6] These are known as 'the frozen Kurgan burials', and in many of these burials (e.g. Berel2, Ak-Alakha, and Olon-Kurin-Gol), leaked water in the tomb accumulated and ultimately froze due to the environmental factors and preserved the entire burial materials, the dead body, garments and accessories as well as the horse harness materials.[7] A special type of architectural feature of the burial site was also a key to these preserved conditions.[8]

Not having this unique architectural feature, the tomb that was unearthed within the borders of the Hovd province of West Mongolia, is one of the Kurgan tombs which have survived untouched until today with all of its grave goods thanks to the climatic conditions. The nomadic steppe tradition of the Altai art is seen in the entire findings of the tomb (i.e. wood, leather, textile, and mummy).[9]

The tomb was discovered in 2015, 35 kilometers to the North-West of the Mönhhairhan city center in Hovd province, at 2803 meters altitude in the Altai Mountains (G. 1). The burial was completed by digging the soil to the left of a large rock in a location called Üzüür Gyalan.[10] (G. 2).

1 Henri Paul Francfort, "Ancient Altai culture and its relationship to historical Asian Civilizations", **Preservation of The Frozen Tombs of The Altai Mountains,** Ed. by J. Han, Paris 2008, p. 35-36.

2 Vyacheslav I. Molodin, "The Frozen Scythian Burial Complexes of teh Altai Mountains: Conservation and Survey Issues", **Preservation of The Frozen Tombs of The Altai Mountains**, Ed. by J. Han, Paris 2008, p. 25.

3 Vyacheslav I. Molodin, **Ibid,** p. 25.

4 Henri Paul Francfort, **Ibid,** p. 35-36.

5 Henri Paul Francfort, **Ibid,** p. 35-36.

6 Henri Paul Francfort, **Ibid,** p. 35-36; Vyacheslav I. Molodin, **Ibid,** p. 25; Jorge Vasquez, "Excavation and Sampling Techniques in the Frozen Tombs of Kazakhstan", **Preservation of The Frozen Tombs of The Altai Mountains**, Ed. by J. Han, Paris 2008, p. 67.

7 Henri-Paul Francfort, **Ibid,** p. 35-36; Hermann Parzinger, "The Scythians: Nomadic Horsemen of The Eurasian Steppe", **Preservation of The Frozen Tombs of The Altai Mountains**, Ed. by J. Han, Paris 2008, p. 22.

8 Vyacheslav I. Molodin, **Ibid,** p. 25.

9 Henri-Paul Francfort, **Ibid,** p. 35-36.

10 Çuluunbat Mönhbayar, "Üzüür Gyalan Rock Cemetery, Archaeological Excavation Research", **Rock Cemetery Culture (ХАДАН ГЭРИЙН СОЁЛ)**. Eds. by S. Dagvadorj, B. Jamsranjav, E. Galbadrah, National Museum of Mongolia, Ulanbator 2017, p. 29-33.

G.1. The Location of the Üzüür Gyalan Tomb With Respect to Other Tombs.

This burial site, which is claimed to be from the Göktürk period, is located 35 kilometers to the north-west of the Mönhhairhan city center and at coordinates 48°33'33.3"N 91°28'06.4"E.

Upon excavating the rock hole (G. 2), the archeologists found a burial of a woman who was buried with her garments, some materials she had used in her daily life, a mummified skeleton of a horse along with its tack materials, and some sheep remains. The lower part of the skull, neck and back of a dried human body could easily be seen while entering into the bottom right side of the tomb.[11] These exposed parts were contaminated by the outside environment. The garment and felt at the back of the dead body, were eaten away by animals and – inevitably - had lost their original condition.

G.2. The Location of The Female Mummy With Horse[12]

11 Çuluunbat Mönhbayar, **Ibid,** p. 29-33

12 Çuluunbat Mönhbayar, "Üzüür Gyalan Rock Cemetery, Archaeological Excavation Research", **Rock Ce-**

In an effort to fully recover the findings, the tomb was excavated from behind and at 1.5 meters depth, the remains of a horse skeleton, as well as the fleece, skull, and feet of a sheep were revealed. At 1.90 meters depth, there were 4 large stone slabs covering the tomb. Beneath these, were placed the body of a female individual, her belongings, as well as the harness of the horse including the bridles.[13] The findings were brought to the Hovd museum for a detailed examination and the necessary restoration and conservation. In 2016, all of the findings from the tomb were brought to Ulan Bator from the Hovd Museum's Heritage Institute for further analysis within the framework of an agreement between the Mongolian Directorate of Cultural Heritage and TIKA. The analyses were carried out at the Directorate of Cultural Heritage of Mongolia, supervised by Veysel Çiftçi, the coordinator of the Turkish Cooperation and Coordination Agency (TIKA) in Mongolia.

Results

Radiocarbon Dating and Isotope Analyses

Nine samples, consisting of human, animal, and textile materials, were subjected to radiocarbon dating and isotope analysis. In order to cross-check the results, these samples were selected in sets of two (Table 1).

metery Culture (ХАДАН ГЭРИЙН СОЁЛ). Eds. by S. Dagvadorj, B. Jamsranjav, E. Galbadrah, National Museum of Mongolia, Ulanbator 2017, p. 31.

13 Çuluunbat Mönhbayari, **Ibid,** p. 31; Şaravdorj Enhtuya, "Registration of The Üzüür Gyalan Artifacts", **Rock Cemetery Culture (ХАДАН ГЭРИЙН СОЁЛ)**. Eds. by S. Dagvadorj, B. Jamsranjav, E. Galbadrah, National Museum of Mongolia, Ulanbator 2017, p. 34-55.

Table 1. Results of Radiocarbon Dating and Isotope Analyses

Analysis	Materials	No	Conventional age	Stable isotopes & CN δ13C(‰)	C3:-20 to -35‰ (-27) C4: -9 to -17‰ (-13)	Calibration	Cal BP	Intercept of radiocarbon age with calibration curve
ONLY ISOTOPE ANALYSIS	Horse (Bone/skin)	1 1A		δ 13C(‰) -26,4 δ 15N(‰) +15,5	C3			
	Horse (Hair)	2 2A		δ 13C(‰) -21,2 δ 15N(‰) +8,4	C3			
RADIOCARBON DATING AND ISOTOPE ANALYSIS	Sheep (Tissue)	3 3A	1100±30 BP	δ 13C(‰) -19,2	C3	Cal AD 885 to 1015	Cal BP 1065 to 935	Cal AD 970
	Horse (Bone Collagen)	4 4A	1120±30 BP	δ 13C(‰) -20,6 δ 15N(‰) +7,0 CN +3,3 Wt %C +42,02 Wt %N +14,94	C3	Cal AD 780 to 785 Cal AD 880 to 990	Cal BP 1170 to 1165 Cal BP 1170 to 960	Cal AD 900 Cal AD 925 Cal AD 945
	Textile	5 5A	1180± 30 BP	δ 13C(‰) -20,0		Cal AD 770 to 900 Cal AD 925 to 945	Cal BP 1180 to 1050 Cal BP 1025 to 1005	Cal AD 780-880
	Textile	6 6A	1000±30 BP	δ 13C(‰) -20,0		Cal AD 990 to 1045 Cal AD 1095 to 1120 Cal AD 1140 to 1145	Cal BP 960 to 905 Cal BP 855 to 830 Cal BP 810 to 805	Cal AD 1020
	Textile	7 7A	1100±30 BP	δ 13C(‰) -10,3		Cal AD 885 to 1015	Cal BP 1065 to 935	Cal AD 970
	Human (Hair)	8 8A	1110±30 BP	δ 13C(‰) -18,5	C3/C4	Cal AD 885 to 995	Cal BP 1065 to 955	Cal AD 905-965
	Human (Tissue)	9 9A	1110±30 BP	δ 13C(‰) -25,4 δ 15N(‰) +16,7	C3	Cal AD 885 to 995	Cal BP 1065 to 955)	Cal AD 905 Cal AD 920 Cal AD 965

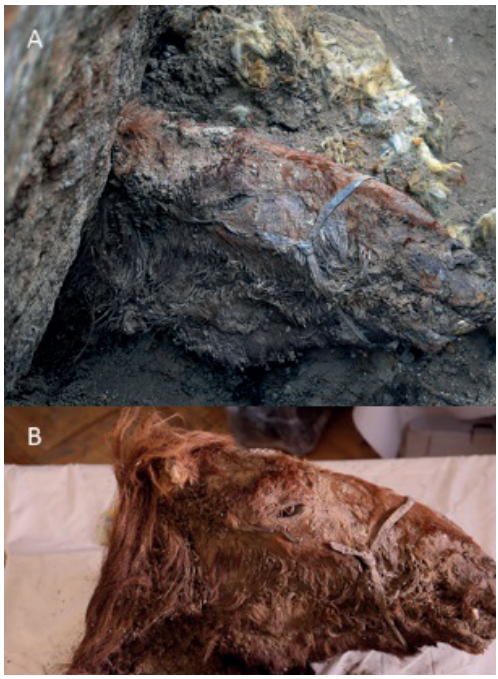
A general evaluation of the data obtained by the calibrated radiocarbon dating traced the findings to the 10th century AD. Both the human and horse remains showed a similar date. Although exposed to the external environment and contamination which partially caused a fluctuation in the texture, the textile materials, also showed the date traced back to 10th century AD.

Three different samples from the horse were used in the isotope analyses. When isotope C and N values were assessed, the results ranged between δ 13C (‰) -20.6 and -26.4 (mean -22,73), δ 15N(‰) +7.0 and 15.5 (mean +10.3).

Horse Stature and Morphology

The horse skeleton was mummified. Its fore and hind limbs were extended, and it was laid leftwards (G. 3 and G. 4). Buried with a simple leather halter attached to its head, the horse was covered by a layer of skin and hair (G. 3). The coat color of the horse is likely to be chestnut. It was a male horse of approximately 15 years of age (with distinct canine teeth). A close examination of the skeletal remains – especially the lack of a tuberculum pubicum dorsale in pelvis and a pit in this area – strongly suggested that it had been castrated.

G. 3. The Üzüür Gyalan Horse from The Hovd Province, Mongolia (Picture from: V. Onar)



G. 4. The Leather Bridle of The Üzüür Gyalan Horse. A. *In situ* Skull, B. Skull After Being Cleaned (A: Picture From Ç. Mönhbayar, B: Picture From: V. Onar)

It was observed that the horse had no discernible pathology (except for its front metacarpal, and its dental and skeletal structure were in good condition. As a result of the ossification of the ligamentum interosseum, it was determined that a bone fusion occurred between Mc2 and Mc3 in the left metacarpal. However, fusion did not take place between Mc4 and Mc3 (G. 5). A similar condition could be observed in the right metatarsal. While the ligamentum interosseum between Mt2 and Mt3 was ossified, no trace of pathology could be discerned between Mt4 and Mt3. Each piece of data suggested the existence of medial splints in both the fore and hind metapodials.

G.5. Left Metacarpus. Arrows: The Ossification of The Lig. Interosseum (Picture from: V. Onar)

An examination on the skeleton revealed that the legs of the horse lacked some bones in the extremities. It seems likely that these bones went missing either during the excavation or when the Üzüür Gyalan tomb findings were being transferred from the Hovd province to Ulan Bator.

Measurements were taken from all possible bones suitable for osteometric measurement. The measurements are presented in tables 2 and 3. Some mummified tissues are still present on the horse skeleton, however, so as not to damage them, it was not possible to take measurements from some of the bones.

Table 2. Osteometric Measurements of The Üzüür Gyalan Horse

Bone	Side	GL	GH	GB	GLC	GL1	L1	DC	Bp	Dp	SD	Bd	Dd
Coxae	Total	417.62											
Femur	right										43.29	97.28	
	left	396.68			354.54			57.98	125.79		41.66	97.82	
Tibia	right	352.92					321.32		103.41		40.53	76.02	45.04
	left	355.32					323.20		100.90			75.4	45.37
Patella	left	71.73		70.85									
Calcaneus	right	108.97		54.24									
	left	108.65		54.27									
Astragalus	right		59.61	64.93									
	left		60.48	64.27									
Metacarpus	left	225.00*									34.71	49.26	
Metatarsus	right	265.32				261.11	258.04		50.53	43.76	31.22	50.77	39.30
	left	264.14				260.05	256.87		49.45	44.79	30.96	50.03	39.57
Phalanx I (P)	right	84.67							58.98	38.17	33.08	46.39	
Phalanx II (P)	right	49.95							53.07	33.40	44.26	48.86	
Phalanx II (A)	right								53.84	32.95			
	left								53.68	32.76			
Phalanx III (A)	left	81.89		77.18									

Table 3. Osteometric Measurements of The Üzüür Gyalan Horse (continued)

Bone	Side	DD	LmT	BFp	BFd	LA	LAR	LS	SB	LFo	GBA	GBTi	SBI
Coxae						68.73	60.05	181.09	30.57	65.39	219.69	207.86	110.40
Femur	right												
	left												
Tibia	right												
	left												
Patella	left												
Calcaneus	right												
	left												
Astragalus	right		58.96		53.13								
	left		60.65		52.32								
Metacarpus	left	20.73											
Metatarsus	right	25.04											
	left	24.93											
Phalanx I (P)	right			53.73	42.63								
Phalanx II (P)	right			46.14									
Phalanx II (A)	right			47.73									
	left			47.40									

Osteometric Measurements[14]:

GL-greatest length; GH-greatest height; GB-greatest breadth; GLC-greatest length from caput femoris; GL1-greatest length of the lateral part; L1-lateral length on the outer side; DC-greatest depth of the caput femoris; Bp-breadth of the proximal end; Dp-depth of the proximal end; SD-smallest breadth of the diaphysis; Bd-breadth of the distal end; Dd-depth of the distal end; DD-depth of the diaphysis; LmT-length of the medial part of the trochlea tali; BFp-breadth of the facies articularis proximalis; BFd-breadth of the facies articularis distalis; LA-length of the acetabulum including the lip; LAR-length of the acetabulum on the rim; LS-length of the symphysis; SB-smallest breadth of the shaft of ilium; LFo-inner length of the foramen obturatum; GBA-greatest breadth across the acetabula; GBTi-greatest breadth across the tuber ischadica; SBI-smallest breadth across the bodies of the ischia.

The average withers height of the Üzüür Gyalan horse was estimated to be 1.39 m. This suggests it to be a medium size horse in comparison to modern data.[15] Assessed by metacarpal and metatarsal slenderness indices (SD/GL*100), the horse proved to have a typological structure that ranged from slightly slender legged to slender legged (Tables 4 and 5).

Table 4. Estimated Withers Height by Long Bone Measurements

Bone	Withers height (According to the May' cooeficients)[1]
mur	1.39
Tibia	1.40
Metacarpus	1.37
Metatarsus	1.39
Mean	1.39

Table 5. Metapodial Indices of The Üzüür Gyalan Horse

Reference	Breed	Withers heights	Metacarpal*			Metatarsal*		
			SD/GL	**BP/GL**	**Bd/GL**	**SD/GL**	**BP/GL**	**Bd/GL**
Üzüür Gyalan	Pony	1.39	15.43 Slightly slender legged	-	21.89	11.74 Slender legged	18.88	19.04

*:Index value was measured as *100

14 Angela von den Driesch, "A Guide to the Measurement of the Animal Bones from Archaeological Sites", **Peabody Museum Bulletin1**, Massachusetts 1976.

15 V.O. Vitt, "Die Pferde der Kurgane von Pasyryk (Russisch)", **Sovjetskaja Arch., Moskau**, I.16, 1952, p.163-205.

The Mt/F*100 index,[16] which is deemed indicative of Paleo-environmental changes, could be determined by the measurements of the Üzüür Gyalan horse's left femur and left metatarsal bones alone and yielded a value of 66.59.

An examination of its right anterior hoof (*capsula ungulae*) suggested that the horse had never been shod in its lifetime (G. 6). The hoof's maximum width was 104.71 mm, and its maximum length was 136.27.

G. 6. The Right Fore Hoof (*capsula ungulae*) of The Üzüür Gyalan Horse With Bones (*phalanges*) (Picture From: V. Onar)

A preliminary morphological evaluation of the horse skeleton revealed that its inner organs had not been removed before it was placed into the tomb. Due to the Üzüür Gyalan rock tomb's exposure to the external environment from the bottom and the resulting contamination,[17] and a large amounts of rodent feces being found on the skeleton as well as in all the cavities of the horse body suggests that some parts of its body had been consumed by rodents.

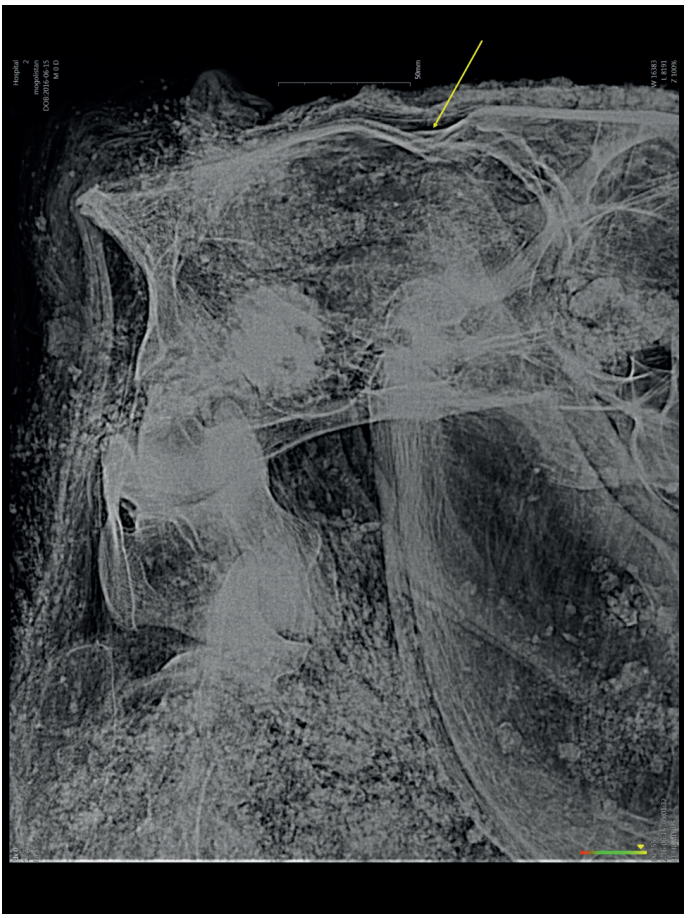
To determine the horse's cause of death, all its body parts were subjected to radiographic scanning by utilizing an X-ray device with DR system and a flat panel detector (G. 7).

16 N. Bourova, "Horse Remains From The Arzhan-1 and Arzhan-2 Scythian Monuments", **Impact of the Environment on Human Migration in Eurasia**, Eds. by E.M. Scott, A.Y. Alekseev, G. Zaitseva, Dordrecht 2005, p. 329.

17 Çuluunbat Mönhbayar, "Üzüür Gyalan Rock Cemetery, Archaeological Excavation Research", **Rock Cemetery Culture (ХАДАН ГЭРИЙН СОЁЛ)**. Eds. by S. Dagvadorj, B. Jamsranjav, E. Galbadrah, National Museum of Mongolia, Ulanbator 2017, p. 29-33.

G.7. Radiographic Shots (Picture from: V. Onar)

An evaluation of the radiographs indicated a pre-mortem fracture in the forehead section (frontal area) of the horse's skull (G. 8). The horse's (frontal) data strongly suggested that it suffered a hard blow to its forehead right before its death. Given that its entire body was covered with mummified skin, the collapse in the horse's forehead was not visible to the naked eye and could only be detected through radiographic scanning.



G. 8. The Radiograph of The Üzüür Gyalan Horse Skull and Its Depressed Broken Part (arrow) (Picture From: V. Onar)

The Harness Remains of The Horse

Along with the horse skeleton, the Üzüür Gyalan tomb contained a saddle and a set of bit with bridles (G. 9). Consisting of a browband and noseband, the bridles were made of leather, which partially featured metal ornaments. The snaffle-bit of the bridle was made with a twisted iron part - not a curb bit – rather a corkscrew (twisted)-shaped bridle that was used to control horses of calm temperament. To the right and left of the bit, there were check-pieces made of bone. There was neither a chin strap nor a curb chain. The joints of the bridle featured metal reliefs resembling flowers.

G. 9. The Horse Harness (left: bridle; right: saddle) (Picture from: S. Küçük)

The saddle is supported by wooden material that made it more conducive for riding than for using the horse for transport and labor. The stirrups are made of metal and tied up with a strap made of leather. Supported by wood, the front of the straps stands higher than the rear side. The metal stirrups to the left and right side of the saddle are approximately 14 cm long.[18]

Discussion

The high altitude of the Üzüür Gyalan Tomb at 2803 m has not only served well for its preservation by natural causes but also prevented it from being plundered, despite the tomb's exposure to the surrounding area.[19] In most cases of frozen Kurgan tombs[20], the hard climate conditions in the Altai Mountains[21] have helped preserve the tomb with all its contents: Body, garments, accessories, horse skeleton and horse

18 Şaravdorj Enhtuya, "Registration of The Üzüür Gyalan Artifacts", **Rock Cemetery Culture (ХАДАН ГЭРИЙН СОЁЛ)**. Eds. by S. Dagvadorj, B. Jamsranjav, E. Galbadrah, National Museum of Mongolia, Ulanbator 2017, p. 34-55.

19 Çuluunbat Mönhbayar, "Üzüür Gyalan Rock Cemetery, Archaeological Excavation Research", **Rock Cemetery Culture (ХАДАН ГЭРИЙН СОЁЛ)**. Eds. by S. Dagvadorj, B. Jamsranjav, E. Galbadrah, National Museum of Mongolia, Ulanbator 2017, p. 29-33.

20 Henri Paul Francfort, "Ancient Altai Culture and Its Relationship to Historical Asian Civilizations", **Preservation of The Frozen Tombs of The Altai Mountains,** Ed. by J. Han, Paris 2008, p. 36; Hermann Parzinger, "The Scythians: Nomadic Horsemen of The Eurasian Steppe", **Preservation of the Frozen Tombs of The Altai Mountains**, Ed. by J. Han, Paris 2008, p. 22.

21 Henri Paul Francfort, **Ibid,** p. 36; Vyacheslav I. Molodin, "The Frozen Scythian Burial Complexes of The Altai Mountains: Conservation and Survey Issues", **Preservation of The Frozen Tombs of The Altai Mountains**, Ed. by J. Han, Paris 2008, p. 25; Jorge Vasquez, "Excavation and Sampling Techniques in The Frozen Tombs of Kazakhstan", **Preservation of The Frozen Tombs of The Altai Mountains**, Ed. by J. Han, Paris 2008, p. 67.

tack. The findings obtained from this tomb provide researchers with significant information about the Altai people of 10th century AD, their lives, horses and horse sacrifice rituals among many other burial customs.[22]

Besides providing the meat, milk, hide, and manure as a farm animal,[23] horses served as one of the most vital means of transport for people.[24] They allowed people to develop both in farming and transportation,[25] as well as playing a significant role in mobile pastoralism.[26] Mongolian shepherds prevented overgrazing by moving from one place to another with only the help of their horses.[27]

While the role of horse in human-horse relationships is often straightforward, it sometimes elicits more attention. Burial findings, in particular, can shed new light on this relationship. The features of the well-preserved horse tack equipment, saddle, and bridle materials[28] from Kurgans such as Pazyryk, Bash Adar, and Ak-Alakha 3, for instance, supply researchers detailed information about how horses were used. Moreover, the paleo-pathologic clues from the horse skeletons in these tombs can potentially supply evidence to illustrate how these animals were exploited by humans.[29]

Towards the end of the Bronze Age (1300-700 B.C.), the ritual of horse sacrifice in many Kurgans (e.g. Deer Stone-Khirigsuur, Pazyryk, Berel)[30] are encountered from the archaeological evidence of horseback riding nomads in the eastern Eurasian steppes.[31]

22 Vyacheslav I. Molodin, **Ibid,** p. 25

23 William Taylor, 2017. "Horse Demography and Use in Bronze Age Mongolia", **Quaternary International**, V. 436, Part A., 2017, p. 270-282.

24 Bat-Ochir Bold, **Eques Mongolica**, Reykjavik 2012.

25 Ann T. Bowling, Anatoly Ruvinksy, "Genetic Aspects of Domestication, Breeds and Their Origins", **The Genetics of Horse**, Eds. by A.T. Bowling, A. Ruvinsky, Cabi Publishing, U.K. 2000, p. 31-32.

26 William Taylor, **Ibid,** p. 270-282.

27 Clyde E. Goulden, Banzragch Nandintsetseg, Lkhagva Ariuntsetseg, "The Geology, Climate and Ecology of Mongolia", **Mapping Mongolia: Situating Mongolia in The World From Geologic Time to The Present**, Ed. by P. Sabloff, Philadelphia 2011, p. 87–103.

28 Sergei I. Rudenko, **Frozen Tombs of Siberia: The Pazyryk Burials of Iron-Age Horsemen**, Berley, 1970; Marsha A. Levine, Geoff N. Bailey, Katherine E. Whitwell, Leo B. Jeffcott, "Paleopathology and Horse Domestication: The Case of Some Iron Age Horses From The Altai Mountains, Siberia", **Human Ecodynamics. Symposia of The Association for Ervironmental Archaeology**, Eds. by G. Bailey, R. Charles, N. Winders, York 2000, p. 123-133.

29 Marsha A. Levine, Geoff N. Bailey, Katherine E. Whitwell, Leo B. Jeffcott, "Paleopathology and Horse Domestication: The Case of Some Iron Age Horses From The Altai Mountains, Siberia", **Human Ecodynamics. Symposia of** T**he Association for Ervironmental Archaeology**, Eds. by G. Bailey, R. Charles, N. Winders, York 2000, p. 123.

30 William Timothy T. Taylor, Jamsranjav Bayarsaikhan, Tumurbaatar Tuvshinjargal, "Equine Cranial Morphology and The Identification of Riding and Chariotry in Late Bronze Age Mongolia", **Antiquity,** V. 89, I.346, 2015, p. 854-871; Sergei I. Rudenko, **Frozen Tombs of Siberia: The Pazyryk Burials of Iron-Age Horsemen, Berley**, 1970; Sebastien Lepetz, "Horse Sacrifice in a Pazyryk Culture Kurgan: The Princely Tomb of Berel'(Kazakhstan). Selection Criteria and Slaughter Procedures", **Anthropozoologica**, V.48, I.2, 2013, p. 309-321.

31 William Timothy T. Taylor, Jamsranjav Bayarsaikhan, Tumurbaatar Tuvshinjargal, **Ibid,** p. 854.

Radiocarbon dating of the Üzüür Gyalan tomb remains yielded evidence that significantly diverged from the Scynthian tombs.[32] It was striking that none of the animal motifs[33] on the carved wood pieces were seen in the horse tack equipment, ornaments, or even in the garments of the Pazyryk Scynthian culture, which are also usually carved onto the Ibex masks[34] placed on the head of the horse in the ceremonial rituals that were peculiar to the kurgans of the Pazyrk culture were found in this tomb. However, the radiocarbon dates from the Üzüür Gyalan tomb represent a time period different from the Pazyryk Scynthian culture.

The Altai Mountains host archaeological sites of immense richness.[35] Many sites from the Paleolithic to the Medieval Ages have been discovered here. However, the Sycnthian frozen tomb complexes of the Pazyryk culture are considered the most significant of all.[36] It is, however, a well-established fact that the Kirghiz culture coexisted with the Scynthians in the Altais.[37] Unlike other tribes of the Kirghiz period (i.e., the Strostki), Turkic tribes lived in the mountainous regions of the Altais and interacted with the Kirghiz around 9-10 centuries AD.[38] The shape and manufacturing features of the bridles discovered in the Üzüür Gylaan tomb are very similar to those of the Kurgan 13 among the Yenisei Kirghiz kurgans[39] (G. 10). The bit has a folding pivot, its interior ends are hook shaped and the exterior ends are formed in a figure of 8. The bit closely resembles the Kirghiz bit with its figure of 8 exterior ends. As well as the radiocarbon dating, it is significant that this kind of bit has been reported[40] in many of the early Middle Age (9-10th century AD) archaeological sites in Altai, Tuva, Khakassia, and Eastern Kazakhstan, which also corresponds to the historical period of the Üzüür Gyalan Tomb.

32 Vyacheslav I. Molodin, "The Frozen Scythian Burial Complexes of The Altai Mountains: Conservation and Survey Issues", **Preservation of The Frozen Tombs of The Altai Mountains**, Ed. by J. Han, Paris 2008, p. 25; Hermann Parzinger, "The Scythians: Nomadic Horsemen of The Eurasian Steppe", **Preservation of The Frozen Tombs of The Altai Mountains**, Ed. by J. Han, Paris 2008, p. 19-24; Sergei I. Rudenko, **Ibid.** p.13-44.

33 Fredrik T. Hiebert, "Pazyryk Chronology and Early Horse Nomads Reconsidered", **Bulletin of The Asia Institute, New Series**, V. 6, 1992, p. 122; Hermann Parzinger, **Ibid,** p. 22.

34 Henri Paul Francfort, "Ancient Altai Culture and Its Relationship to Historical Asian Civilizations", **Preservation of The Frozen Tombs of The Altai Mountains,** Ed. by J. Han, Paris 2008, p. 36; Sebastien Lepetz, 2013, **Ibid,** p. 318; Sergei I. Rudenko, **Ibid,** p. 179-184; Jorge Vasquez, "Excavation and Sampling Techniques in The Frozen Tombs of Kazakhstan", **Preservation of The Frozen Tombs of The Altai Mountains**, Ed. by J. Han, Paris 2008, p. 68.

35 Vyacheslav I. Molodin, "The Frozen Scythian Burial Complexes of The Altai Mountains: Conservation and Survey Issues", **Preservation of The Frozen Tombs of the Altai Mountains**, Ed. by J. Han, Paris 2008, p. 25.

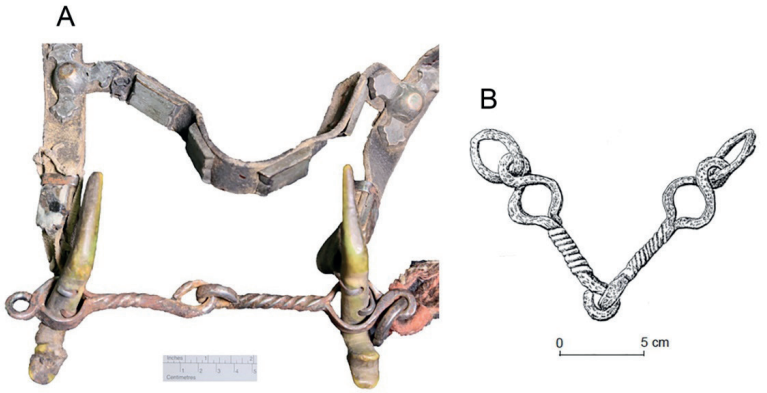
36 Vyacheslav I. Molodin, **Ibid,** p. 25; Hermann Parzinger, "The Scythians: Nomadic Horsemen of The Eurasian Steppe", **Preservation of The Frozen Tombs of The Altai Mountains**, Ed. by J. Han, Paris 2008, p. 22.

37 Petry K. Dashkovskiy, "Kurgans of The Yenisei Kyrgyz at The Chineta II Burial Ground in The Altai", **Archaeology Ethnology and Anthropology of Eurasia**, V. 42, I. 2, 2014, p. 86.

38 Petry K. Dashkovskiy, **Ibid,** p. 86.

39 Petry K. Dashkovskiy, **Ibid,** p. 86

40 Petry K. Dashkovskiy, **Ibid,** p. 86



G. 10. A Comparison of The Horse Bridle From Üzüür Gyalan Tomb. A. Üzüür Gyalan Horse Bridle (Picture From: V. Onar), B. Horse Bridle of The Kırghız period[41]

The bridle found in the Üzüür Gyalan tomb had features that differed from all Altai Pazyryk bridles. While none of the Altai Pazyryk bridles had no straps at the chin or across the forehead,[42] the bridle of the Üzüür Gyalan horse featured a forehead strap. The straps under the horse's neck likely allowed the rider to halt the horse and could be tied up behind the ears. It was observed that the halter and the snaffle-bit of the Üzüür Gyalan horse are similar to those of the Turkic period;[43] however, it is worth noting that they also resemble the bridles of the Kirghiz period. Besides the bridle in the tomb, the horse also had a simple and coarse leather bridle that was tied up with a knot known as "Buhiin dör".[44] Notwithstanding that the majority of organic materials are unlikely to be preserved in archaeological contexts;[45] the abovementioned leather halter was placed on the horse's head at burial.

It was observed that the mummified human body found in the Üzüür Gyalan Tomb belonged to a 30-40 year old woman (personal communication with anthropologist Yasemin Yılmaz, 2016; personal communication). The architectural style of the tomb, however, does not reflect the distinct architecture of the Eurasian steppe

41 Petry K. Dashkovskiy, **Ibid,** p. 84, fig. 5

42 Sergei I. Rudenko, **Frozen Tombs of Siberia: The Pazyryk Burials of Iron-Age Horsemen**, Berley 1970, p. 120.

43 Çuluunbat Mönhbayar, "Üzüür Gyalan Rock Cemetery, Archaeological Excavation Research", **Rock Cemetery Culture (ХАДАН ГЭРИЙН СОЁЛ)**. Eds. by S. Dagvadorj, B. Jamsranjav, E. Galbadrah, National Museum of Mongolia, Ulanbator 2017, p. 29-33.

44 Gayabazar Pürevdorj, "The Historical Ethnic Origin of The Üzüür Gyalan Monument", **Rock Cemetery Culture (ХАДАН ГЭРИЙН СОЁЛ)**, Eds. by S. Dagvadorj, B. Jamsranjav, E. Galbadrah, National Museum of Mongolia, Ulanbator 2017, p. 59-60.

45 Sandra L.Olsen, "Early Horse Domestication on The Eurasian Steppe", **Documenting Domestication: New Genetic and Archaeological Paradigms**, Eds. by M.A. Zeder, D.G. Bradley, E. Emshwiller, B.D. Smith, Berkeley, Los Angeles, California 2006, p. 245-269.

kurgans, especially those of at Berel, Ak-Alakha, Pazyryk, Arzhan.[46] The hole dug to the left side of a large rock suggests that the burial was a simple and straightforward event. The sacrifice of the horse, however, indicates that the tomb still experienced some traditional burial practices. The strongest evidence is that the horse was sacrificed as part of a burial ritual. This is understood from the radiographic images of a forcefully delivered strike mark on the forehead, showing that the animal suffered a hard blow to its (frontal) skull immediately before its death (G.8). However, no axe like tool, which is common in the tombs of the Pazyrk culture (i.e., Berel'),[47] has been found in Üzzür Gyalan. The radiographic images, nevertheless, suggest that the horse was sacrificed with an axe of this kind. However, because the corpse of the horse is covered with mummified skin, the skull fracture is invisible to the naked eye.

According to some researchers, Kurgan clans or families mark their land.[48] It is also striking that, in excavation culture (e.g. the Kazakhs and Kirghizs), the dead are buried only near or next to the winter grasslands.[49] The horse and sheep remains of the Üzüür Gyalan tomb provide insights about 9-10th-century burial practices. The fact that the horse and sheep wool were found in this tomb, suggests that the burial ceremony was likely performed in winter time. Moreover, the cut marks in the ear of the horses (representing ownership in the Pazyryk culture),[50] is also present in the ear of the Üzüür Gyalan horse.[51] Also significant from a burial ritual perspective, is that the horse, which was approximately 15 years of age, was sacrificed as a symbolic practice[52] to celebrate its long abiding partnership with its female owner, who is thought to have ridden this male (yet castrated) horse in her lifetime. The castration

46 Henri Paul Francfort, "Ancient Altai Culture and Its Relationship to Historical Asian Civilizations", **Preservation of The Frozen Tombs of The Altai Mountains,** Ed. by J. Han, Paris 2008, p. 36; Hermann Parzinger, "The Scythians: Nomadic Horsemen of The Eurasian Steppe", **Preservation of The Frozen Tombs of The Altai Mountains**, Ed. by J. Han, Paris 2008, p. 22; Sergei I. Rudenko, **Frozen Tombs of Siberia: The Pazyryk Burials of Iron-Age Horsemen**, Berley, 1970; Tsagaan Törbat, Pierre-Henri Giscard, Dunbüree Batsükh, "First Excavation of Payryk Kurgans in Mongolian Altai", **Current Archaeological Research in Mongolia**, Eds. by J. Bemmann, H. Parzinger, E. Pohl, D. Tseveendorzh**,** Bonn 2009, p. 221-230.

47 Sebastien Lepetz, "Horse Sacrifice in a Pazyryk Culture Kurgan: The Princely Tomb of Berel'(Kazakhstan). Selection Criteria and Slaughter Procedures", **Anthropozoologica**, V. 48, I. 2, 2013, p. 309-317, fig. 8; Sandra L. Olsen, **Ibid,** p. 259; Tsagaan Törbat, Pierre Henri Giscard, Dunbüree Batsükh, **Ibid,** p. 227, fig.10.

48 N.V. Polosmak, **Steregushchiye Zoloto Griphy.** Novosibirsk: Nauka ("Guarding The Gold Griffins"), 1994, p. 14.

49 Sergei I. Rudenko, **Gornoaltaiskiye Nakhodki i Skify**. Moscow Leningrad: Izdatelstvo AN SSSR ("Scythian Period Discoveries in The Altai Mountains"), 1952; Ludmila Koryakova, "Some Notes About the Material Culture of Eurasian Nomads", **Kurgans, Ritual Sites, and Settlements Eurasian Bronze and Iron Age,** Eds. by J. Davis-Kimball, E. M. Murphy, L. Koryakova, L. T. Yablonksy, BAR International Series 890, 2000, p. 16.

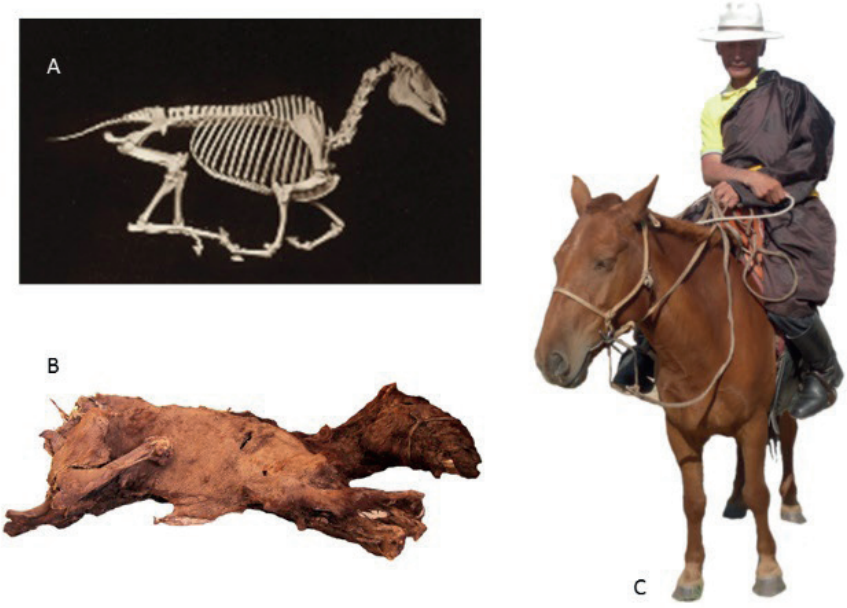
50 Fredrik T. Hiebert, "Pazyryk Chronology and Early Horse Nomads Reconsidered", **Bulletin of the Asia Institute, New Series**, V.6, 1992, p. 127.

51 Gayabazar Pürevdorj, "The Historical Ethnic Origin of The Üzüür Gyalan Monument", **Rock Cemetery Culture (ХАДАН ГЭРИЙН СОЁЛ)**, Eds. by S. Dagvadorj, B. Jamsranjav, E. Galbadrah, National Museum of Mongolia, Ulanbator 2017, p. 59-60.

52 Sebastien Lepetz, "Horse Sacrifice in a Pazyryk Culture Kurgan: The Princely Tomb of Berel'(Kazakhstan). Selection Criteria and Slaughter Procedures", **Anthropozoologica**, V.48, I.2, 2013, p. 320.

is likely to have made the temperament of horse calmer and facilitated its control, which were preferable qualities especially for a female rider. It is further important to note that this horse was barely larger than a pony, a type relatively easier to control.[53]

The osteometric measurements of the Üzüür Gyalan horse yielded an approximate withers height of 1.39, which places it in the upper spectrum of Mongolian horses, also known as "Mongolian ponies" (G. 11). The sex (male) and castration is thought to play an important role in this. The predominant manifestation of stallions[54] in the Kurgan traditions of the Scythian Pazyry culture – Berel', Pazyryk, Arzhan1 and 2, for instance – was also the case in the 10th century AD. The Üzüür Gyalan tomb is located in the same geographic region. However, the present day shaggy Mongol horse very closely resembles the Üzüür Gyalan horse in terms of physical features (see G. 11).



G.11. The Horse Skeleton Found in The Hovd Province of Mongolia. A. Representative Skeleton Position, B. Üzüür Gyalan Horse, C. Contemporary Mongolian Horse and Its Rider (Picture from: V. Onar).

53 Gail Brownrigg, 2006. "Horse Control and The Bit", **Horses and Humans: The Evolution of Human-Equine Relationships**, Eds. by S. L. Olsen, S. Grant, A.M. Choyke, L. Bartosiewicz, BAR International Series 1560, 2006, p. 167.

54 N. Bourova, "Horse Remains From The Arzhan-1 and Arzhan-2 Scythian Monuments", **Impact of The Environment on Human Migration in Eurasia**, Eds. by E.M. Scott, A.Y. Alekseev, G. Zaitseva, Dordrecht 2004, p. 323-324; Sebastien Lepetz, **Ibid,** p. 318.

When comparing the approximate withers height of the 10th-century AD Üzüür Gyalan horse to the data of the horses found in the Kurgans of Eurasian steppes and Altai region, it was determined that their size had remained more or less unchanged since Iron Age Pazyryk culture (Table 6). Although the environmental factors may, in some cases, cause changes in the size of same horse races (e.g. as argued for the Arzhan 1 and 2 cases- according the Bourova[55]), we have observed that the Üzür Gyalan horse bears the morphological features of the local horses.

Table 6. The withers Height of The Üzüür Gyalan in Compare to The Reference Data

Bone	Withers height (According to the May' cooeficients [2])						
	Üzüür Gyalan	Altai*	Pazyryk*	Berel'*	Arzhan-1*	Arzhan-2*	BTG and TSK1*
Femur	1.39	1,33	1,39	1,40	1,29	1,41	1,34
Tibia	1.40	1,36	1,42	1,41	1,31	1,42	1,36
Metacarpus	1.37	1,35	1,35	1,37	1,37	1,39	1,34
Metatarsus	1.39	1,38	1,40	1,41	1,37	1,41	1,37
Mean	1.39	1,36	1,39	1,40	1,34	1,41	1,35

*:Means Value From Francfort and Lepetz[56]

The Üzüür Gyalan horse is found a little larger than a Przewalski horse if we compare the withers height and metapodial indices to the modern pony (Table 7), and stands as a medium size horse, on the upper limit of modern ponies. However, the Üzüür Gyalan horse's structure was quite solid by the racial standards of ponies, thanks to it adapting well to the environmental conditions in the Altai Mountains. Although it is logical to relate the pathological data from the metapodium to transport or riding activity, we cannot necessarily conclude that the horse was unhealthy or ill. This unshod horse manifested a medial splint caused by push-type of the foot.

55 N. Bourova, "Horse Remains From The Arzhan-1 and Arzhan-2 Scythian Monuments", **Impact of The Environment on Human Migration in Eurasia**, Eds. by E.M. Scott, A.Y. Alekseev, G. Zaitseva, Dordrecht 2004.

56 Henri Paul Francfort, Sebastien **Lepetz, "**Les Chevaux de Berel' (Altaï) - Chevaux Steppiques et Chevaux Achéménides: Haras et Races", **Histoire d'équidés : Des Textes, Des Images et Des Os**, Eds. by N. Boulbes, A. Gardeisen, E. Furet, (Monographies d'Archéologie Méditerranéenne), Montpellier 2010, p. 69, fig. 11.

Table 7. The Withers Height of Üzüür Gyalan Horse Compared With Other Horse Races

Reference	Breed	Withers heights	Metacarpal			Metatarsal		
			SD/GL	BP/GL	Bd/GL	SD/GL	BP/GL	Bd/GL
Üzüür Gyalan	**Pony**	**1386.60**	**15.43**	**-**	**21.89**	**11.74**	**18.88**	**19.04**
From Johnstone, 2004[3]	Pony	997.78	16.45	23.09	24.43	12.04	0.00	19.76
	Pony	1152.97	17.11	23.02	23.07	12.60	0.00	18.72
	Pony	1367.09	15.48	23.82	22.49	12.31	18.41	18.64
	Pony	1235.73	14.47	22.50	21.86	11.52	19.32	18.41
	Pony Exmoor	1334.00	15.52	23.81	22.76	0.00	19.92	18.83
	Pony Icelandic	1341.87	14.96	21.63	21.73	12.12	17.58	17.98
	Pony Mongolian	1348.46	14.62	21.03	19.23	11.82	18.29	18.99
	Pony Mongolian	1321.89	13.85	21.21	21.49	11.56	18.73	17.88
	Pony Mongolian	1343.05	15.10	23.20	21.32	12.23	19.59	18.08
	Pony New Forest	1213.49	14.79	22.00	20.42	11.50	18.67	17.96
	Pony New Forest	1376.05	13.78	22.57	20.87	11.09	18.84	17.28
	Pony Norwegian	1439.62				11.54	19.29	18.79
	Pony Tonkin	1289.01	14.12	22.39	21.80	14.72	17.85	18.33
	Pony Welsh	1187.79	13.51	22.89	21.19	20.34	19.14	18.36
	Pony WelshA	1205.91	16.46	22.48	22.64	12.16	18.10	18.57
	Pony Mean	**1276.98**	**15.02**	**22.55**	**21.81**	**11.17**	**16.25**	**18.44**
	Przewalski	1314.91	13.30	22.84	21.70	10.42	19.31	18.19
	Przewalski	1288.76	13.66	20.74	21.67	10.95	18.73	18.02
	Przewalski	1289.68	14.64	22.09	20.10	11.80	18.44	17.16
	Przewalski	1279.84	14.46	21.40	20.11	11.70	18.52	17.45
	Przewalski	1336.31	15.00	23.00	21.27	12.19	19.54	18.39
	Przewalski	1351.03	14.92	22.12	21.40	11.72	18.63	18.02
	Przewalski	1237.84	16.60	23.15	22.39	13.25	19.77	18.37
	Przewalski	1295.78	14.15	21.99	20.21	11.90	19.12	17.21
	Przewalski	1322.60	15.36	22.81	21.89	12.56	19.41	17.38
	Przewalski	1329.71	14.86	22.01	21.32	12.30	18.91	17.69
	Przewalski	1310.11	13.95	23.26	22.01	10.30	20.03	18.45
	Przewalski	1327.11	14.95	23.18	21.05	11.83	19.09	17.41
	Przewalski	1259.98	14.23	23.42	22.24	11.22	20.89	18.40
	Przewalski	1314.74	14.32	22.81	21.57	11.34	19.03	17.93
	Przewalski	1300.96	14.76	21.95	21.71	12.06	19.39	17.67
	Przewalski	1345.56	14.16	22.16	20.69	11.1	18.65	17.26
	Przewalski Mean	**1306.56**	**14.58**	**22.43**	**21.33**	**11.67**	**19.22**	**17.81**

The C and N values ranged between δ 13C (‰) -20.6 and -26.4 (mean -22.73), δ 15N (‰) +7.0 and 15.5 (mean +10.3). This data suggests that the horse had been nourished with CO_2-saturated grass (also known as C3 and usually found in watery climate conditions). This kind of vegetation has adapted to climate conditions with less light and less heat but with higher humidity. These values were also in line with the data obtained from a study[57] of C3 and C4 vegetation found in the inner regions

57 Chunfu Zhang, Yang Wang, Tao Deng, Xiaoming Wang, Dana Biasatti, Yingfeng Xu, Qiang Li, "C4 Expansion in The Central Inner Mongolia During The Latest Miocene and Early Pliocene", **Earth and Planetary**

of Mongolia. However, a more comprehensive study is necessary for the evaluation of δ13C and δ15N values.

The Mt/F*100 index,[58] which is considered to be an indicator of paleo-environmental changes and claimed to have an impact on animal size, presents a value of 66.59 to the Üzüür Gyalan horse. It was observed that this value (66.59) was lower than the Arzhan-II (mean 67.30) and Arzhan-I (71.60) values.[59] Considering the fact that humid climes produce lower indexes and higher indexes are characterized by drier climes,[60] the vegetation system seemed to correlate with the results of isotope analyses. A low Mt/F*100 index value such as 66.59 points to a relatively humid climate, which in turn, reinforces the probability that the horse had consumed C3 vegetation adapted to colder and humid climate conditions. When compared with the data from Arzhan I and II, [61] Altai and Berel',[62] our obtained data suggests at least two phases of changes in the environmental conditions with a gradual shift to a humid climate condition from the end of the Bronze Age to the 10th century AD.

In conclusion, the Üzüür Gyalan tomb provides crucial information about the customs and rituals of the 10th-century AD Altai people, especially their burial practices related to horse sacrifice. We suggest that a comprehensive research including anthropology, archeology and ethnographical approaches for the Üzüür Gyalan tomb, also known as the "female mummy with horse", will help better understand the significance of the tomb in the Altai culture.

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Science Letters, V. 287, I.3-4, 2009, p. 311-319.

58 N. Bourova, "Horse Remains From The Arzhan-1 and Arzhan-2 Scythian Monuments", **Impact of The Environment on Human Migration in Eurasia**, Eds. by E. M. Scott, A. Y. Alekseev, G. Zaitseva, Dordrecht 2004, p. 329.

59 N. Bourova, **Ibid,** p. 329.

60 V.O. Vitt, "Die Pferde der Kurgane von Pasyryk (Russisch)", **Sovjetskaja Arch.**, Moskau, 16, 1952, p. 163-205; N. Bourova, **Ibid**, p. 329.

61 N. Bourova, "Horse Remains From The Arzhan-1 and Arzhan-2 Scythian Monuments", **Impact of The Environment on Human Migration in Eurasia**, Eds. by E.M. Scott, A.Y. Alekseev, G. Zaitseva, Dordrecht 2004, p. 329.

62 Henri Paul Francfort, Sebastien **Lepetz, "**Les Chevaux de Berel' (Altaï) - Chevaux Steppiques et Chevaux Achéménides : Haras et Races", In: **Histoire d'équidés : Des Textes, Des Images et Des Os**, Eds. by N. Boulbes, A. Gardeisen, E. Furet, (Monographies d'Archéologie Méditerranéenne), Montpellier 2010, p. 67, fig. 9.

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(Footnotes)

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