NEW DISCOVERIES OF HORSE BURIALS AND DEPOSITIONS IN THE GETIC CEMETERY FROM ZIMNICEA, SOUTHERN ROMANIA

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Abstract: During the previous excavations from Zimnicea – *Câmpul morților* (1948-1974), 14 horse burials and partial depositions were revealed. The recent excavations (2007-2009) brought to light other four such discoveries. Two thirds of these 18 features consist in complete horse burials, usually accompanied by inventory objects; the rest of them are partial horse bone depositions, without inventory. Distinct from other funeral discoveries (Agighiol, Peretu, Jankovo, Sveštari), contemporary with the early phase of the Zimnicea cemetery, dated in the 4th-3rd c. BC, the horse remnants were deposed apart from the human burials, without a visible association with them. We are discussing here the chronology of the recent finds, based on the inventory objects and we present the zooarchaeological study of the horse remains (sex, age, height, butchery marks).

Cuvinte-cheie: Zimnicea, necropolă, înmormântări şi depuneri de cai, arheozoologie, sec. 4-3 a. Chr.

Rezumat: În timpul vechilor cercetări arheologice desfășurate la Zimnicea – *Câmpul morților* (1948-1974), au fost descoperite 14 înmormântări și depuneri parțiale de cai, la care se adaugă încă patru descoperiri asemănătoare rezultate din cercetările recente (2007-2009). Din aceste 18 descoperiri, două treimi constau în înmormântări de cai întregi, predominant cu inventar, restul fiind depuneri parțiale fără inventar. Osemintele de cai sunt depuse separat de mormintele umane, fără o asociere vizibilă cu acestea, spre deosebire de alte descoperiri funerare contemporane (Agighiol, Peretu, Jankovo, Sveštari), cu faza de început a necropolei de la Zimnicea, respectiv sec. 4-3 a. Chr. Discutăm în continuare încadrarea cronologică a descoperirilor pe baza pieselor de inventar și prezentăm analiza arheozoologică a resturilor de cai (vârstă, sex, talie, urme de tranșare).

Research history

The first finds in the Getic necropolis from Zimnicea – *Câmpul Morţilor* originated in the three "archaeological explorations" conducted by Cezar Bolliac between 1871 and 1873, in the area located in the immediate eastern vicinity of "Cetate"[1]. He is the one who named the place "Câmpul de morţi dacic"[2] (Fig. 1). After the researches of Bolliac, in the last quarter of the 19th c., the area was searched by amateurs such as Dimitrie Papazoglu and Dimitrie Butculescu. The first systematic researches were conducted by Ion Nestor (1948-1949)[3], followed by Alexandrina D. Alexandrescu (1967-1974)[4].

There were revealed 165 graves throughout the excavations from the 19th c. and 166 graves during the Nestor and Alexandrescu researches. This makes the Zimnicea necropolis one of the most important in the Getic area up to now. The site is significant for understanding not only the material culture and the funeral practices, but also the chronology of the Second Iron Age at the Lower Danube[5].

The archaeological researches at *Câmpul Morților* started again in 2007 and continued until 2009, followed by an additional campaign in 2015. The initial research team was

[1] Bolliac 1872, 2-4; Bolliac 1873, 1-2; Bolliac 1874, 1-2, 4; Măndescu 2009, 205-213.

[2] Bolliac 1872, 2.

[3] Nestor 1949, 116-125; Nestor 1950, 93-102.

[4] Alexandrescu 1980, 19-126.

[5] Măndescu 2010, 165-182, fig. 22-30.

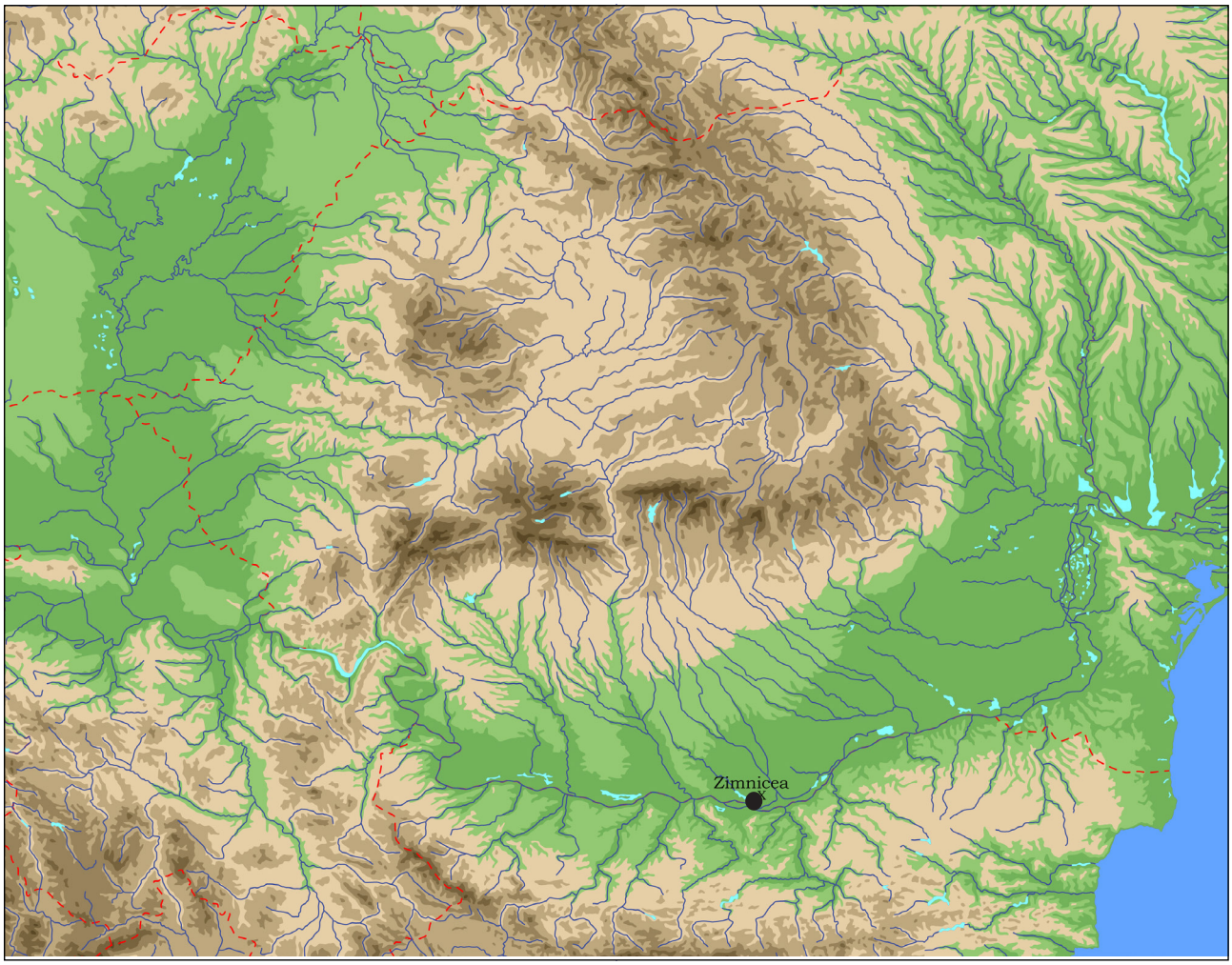

Fig. 1 – Zimnicea – *Câmpul Morţilor* cemetery.

conducted by Mircea Babeș[6]. The last five campaigns were characterised by an emergency trait due to the extension of the present city over the archaeological site. The excavated surface is approximately 0.2 ha and brought to light 52 plane graves, the majority cremated and deposed in urns (Fig. 2).

The horse burials

In addition to the human sepulchres[7], the site also contains numerous horse burials[8]. The excavations conducted by Nestor and Alexandrescu uncovered 14 complete or partial horse burials. The last researches revealed five new features containing horse skeletal parts, this being the main subject of the present study.

To have an overall view, we will discuss these new findings in conjunction with the old ones (Alexandrescu[9], Sergiu Haimovici[10]).

Here is the list of the horse discoveries with a short description of the skeleton's position, depth of the finding, the orientation and the inventory contained by some of the burials. With the exception of horse 17, in all the cases of partial depositions containing the skull, we are dealing in fact with the head, because the mandible is also present.

Horse 1/Z67C10, -1.04-1.30 m, left lateral decubitus. Orientation: S-N. Complete skeleton. ***Inventory:*** Iron bit, *Gesichtsperle*.

Horse 2/Z68C10, -1.00 m, left lateral decubitus. Orientation: E-W. Complete skeleton. ***Inventory:*** iron fibula fragment.

Horse 3/Z68C10, -1.00 m, partial deposition. Orientation: W-E. Skull with metatarsals deposed south of the skull.

Horse 4/Z69C10, -1.20 m, right lateral decubi-

[6] Babeș *et alii* 2008, 331-332; Babeș *et alii* 2009, 232-233; Babeș *et alii* 2010, 208.

[7] We are reffering only to the burials excavated up to the present day. We estimate that the number of graves is much higher but we cannot foresee the dynamics of the future archaeological researches.

[8] Alexandrescu 1983.

[9] Alexandrescu 1983.

[10] Haimovici 1971, 169-185; Haimovici 1983, 79-108.

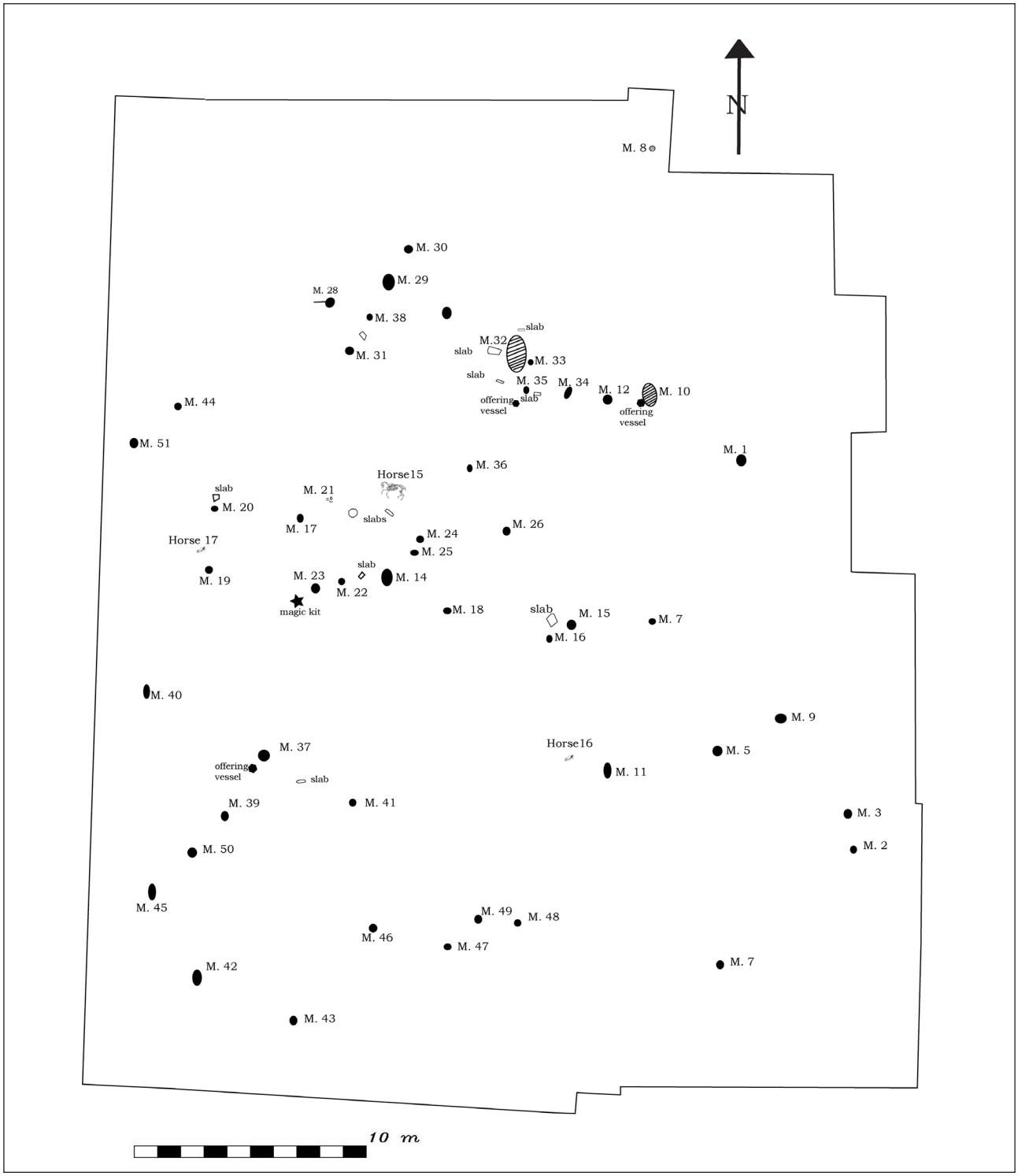

Fig. 2 – Distribution of the findings 2007-2008. ⬬ cremation with bones deposed in urn; ▨ cremation with bones deposed in pit; ●— inhumation graves.

tus. Orientation: S-N. Complete skeleton.

Horse 5/Z69C10, -1.00 m, partial deposition. Orientation: E-W. Skull surrounded by metatarsals.

Horse 6/Z69C10, -0.90 m, right lateral decubitus. Orientation: S-N. Complete skeleton. ***Inventory:*** chain consisting in five bronze rings.

Horse 7/Z69C10, -1.20-1.30 m, left lateral decubitus. Orientation: S-N. Disturbed skeleton. Some of the elements are missing or disturbed.

Horse 8/Z69C10, -1.15 m, right lateral decubitus. Orientation: S-N. Complete skeleton.

Horse 9/Z69C10, -1.15 m, left lateral decubitus. Orientation: W-E. Partial skeleton, disturbed.

Horse 10/Z69C10, Orientation: N-S, partial deposition. Skull and metatarsals.

Horse 11/Z70C15, -1.15 m, right lateral decubi-

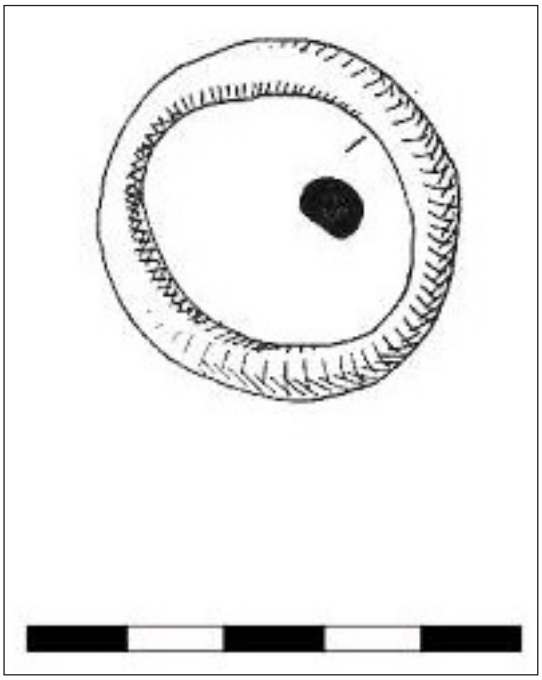

Fig. 3 – Horse 15, bronze ring.

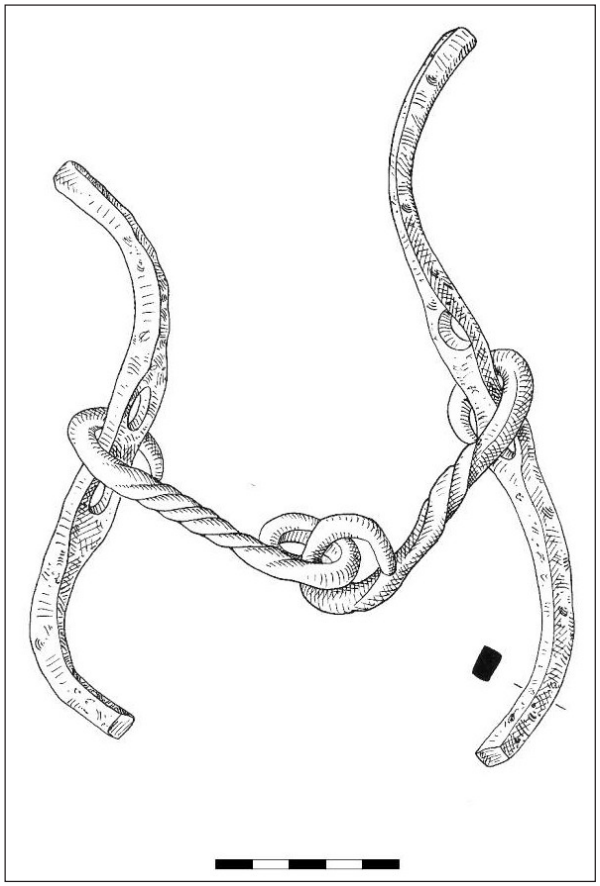

Fig 4 – Horse 15, iron bit.

tus. Orientation: S-N. Complete skeleton.

Horse 12/Z70C17, Orientation: S-N, Complete skeleton, disturbed. ***Inventory:*** fragmentary iron bit, iron spear point.

Horse 13/Z71C10, -1.00 m, right lateral decubitus. Orientation: S-N. Complete skeleton, possibly disturbed. The limbs show burning traces. ***Inventory:*** iron bit, iron harness buckle, bronze bar, and bronze crescent piece.

Horse 14/Z72C17, -1.15 m, left lateral decubitus. Orientation: S-N. Complete skeleton, possibly disturbed? ***Inventory:*** three winged bronze arrow heads.

Horse 15/2008, -1.11-1.37 m, Orientation: E-W. Left lateral decubitus, complete skeleton. ***Inventory***: iron bit, bronze ring (Fig. 3, 4, 5).

Horse 16/2008, -0.66-0.81 m. Orientation: NNW-SSE. Partial deposition. East of the skull, metatarsals and phalanges were identified (Fig. 6). West of the skull a metatarsal fragment was described. Above the bones, -0.60 m deep, hand worked pottery fragments were recovered. The fragments had the inner surface facing up.

Horse 17/2009, -0.65 m. Orientation: E-W. Partial deposition. A horse skull was identified, with the ventral part facing up. (Fig. 7).

Horse 18/2009, S. 24, c. 1. Two features were identified, one -0.35 m deep and the other -0.70 m deep, with a distance of 1.20 m between them. The two features contain distal limb elements from the same individual. The first one contains parts of the front right limb and the rear left limb. The second one contains elements of the left front limb and the rear right limb (Fig. 8, 9, 12).

Reviewing all the contexts of deposed horses, two categories are emerging: complete animals (12) and parts of individuals (6). The complete horse burials prevails, and seven of them contain inventory. The horse 13 shows a unique case, having the limbs intensely burned. The cremations appears to have happened elsewhere and not on the deposition place.

The inventory that accompanied the horse burials consists in harness elements (iron bits, harness rings, buckles and bronze chains), armament (fighting knife, arrow head, and spear point), clothing accessories (fibula) and adornments (*Gesichtsperle*).

The partial horse depositions consists in the head (skull and mandible) accompanied by distal limbs (tarsal/carpal bones, metapodials and phalanges), with two exceptions: horse 17 (only the skull) and horse 18 (only the distal limbs).

An attribute of all the partial horse depositions is the absence of any inventory.

Unlike other discoveries, were horse remains are associated with human graves, at Zimnicea although the horse burials are located

Fig. 5 – Horse 15.

among the human graves, there is no clear evidence of any connection with the human graves. The association horse and human burials was found mainly in tumular tombs, eventually with funeral chamber/chambers, with one till three horses. We are reffering to discoveries such as those from Agighiol[11], Peretu[12], Jankovo[13], Ivanski[14], Sveštari – *Ginina Mogila*[15] and so on.

The zooarchaelogical description of the newly discovered horses

The age has been determined by measuring the tooth wear[16] and observing the epiphyses fusion state[17]. Sex determination was based on the presence and morphology of canines.

The withers height has been estimated by using the methods of Kiesewalter[18] and Vitt[19]. The biometrical standards created by von den Driesch[20] were used in the present study (tables 1-35).

Horse 15

The age estimated from the lower and upper teeth crown heights[21] is seven to nine years old.

The sex is male, according to canines' morphology and development.

The withers height was calculated using Kiesewalter's system. The minimum value, based on the lateral length of the tibia is 1,258.51 mm, and the maximum value is 1,322.69 mm, obtained from the greatest length of the lateral part of the humerus.

The average withers height obtained from all the measurable elements is 1,284.97 mm. The average between the minimum and maximum values is 1,290.6 mm. By the classifications of Vitt, both values correspond to a horse smaller than average, closer to the small category than the average category.

Pathology

An arthropathic condition was identified on the rear legs of the horse, diagnosed by us as bone spavin (Fig. 10).

Bone spavin is osteoarthritis, or the final phase of degenerative joint disease, in the lower three hock joints. It usually affects the two lowest joints of the

[11] Berciu 1969, 33-76, fig. 7-54; Berciu 1971; Berciu 1974, 40-84, 219-221, fig. 5-39; Măndescu 2010, 12, cat. no. 8.

[12] Moscalu 1986; Moscalu 1989.

[13] Dremsizova 1955, 61-83; Dremsizova 1963, 7-8, pl. 7/4; Hatłas 1997, 311, cat. no. 5-6; Măndescu 2010, 89-90, cat. no. 305.

[14] G. Atanasov, Y. Yorgov 2007, 37-44; Măndescu 2010, 94, cat. no. 320.

[15] Ivanov 1992; Čičikova 1992; Gergova 1996; Măndescu 2010, 155, cat. no. 616.

[16] Levine 1982.

[17] Schmidt 1972.

[18] Kiesewalter 1888.

[19] Vitt 1952.

[20] Driesch 1976.

[21] Levine 1982.

Fig. 6 – Horse 16.

Fig. 7 – Horse 17.

hock (the tarsometatarsal and the distal intertarsal joints) and the metatarsal fuses with one or more of the tarsals. It is more often seen in older horses and ponies and is a common cause of hind limb lameness[22].

Horse 16

The skull and mandible were found in anatomical connection, accompanied by the right metacarpus with its phalanges, the right metatarsus with its phalanges, but also the first and second phalanges of the left front limb. The skull and mandible were very badly preserved, thus only the teeth could be observed and measured.

The metatarsus exhibits bone damage of the proximal epiphysis, very likely provoked with a heavy metal cutting tool in order to segment the metatarsus from the distal tibia.

The age of the horse was estimated measuring the lower and upper teeth crown heights and falls in the interval of five to seven years.

The sex is male, as indicated by the canines.

Withers height, calculated using the metatarsus and the metacarpus has the average value of 1,390.97 mm. According to Vitt, this is an average height horse.

Horse 17

This is the single case when only the skull was deposited, placed with the ventral face up. In the occipital region, bone damage is evident, destroying the margin of foramen magnum. Most probably it indicates the beheading of the horse with a heavy cutting blade.

The canines erupt at four to five years of age in male horses. This individual has well developed canines, so it is older than five years. According to incisors wear stage we estimate that the age is comprised between five and six years.

The sex is indicated by the presence of canines and it is a male.

Withers height, estimated from the length of the skull is 1,377 mm, thus an average height horse.

Horse 18

The situation is also unique. Only distal limbs from the same animal were found, divided in two features. The age according to metatarsal distal epiphysis[23] is more than 16-20 months.

Cut marks were identified on the posterior side of the os carpale 3 and on the lateral side of the os tarsi centrale, indicating that distal limbs were severed from the horse's carcass and deposed separately. We can therefore eliminate the possibility of post-depositional disarrangement of the body parts (Fig. 11).

The average height estimated on metapodial measurements is 1,417.95. This value corresponds to average size horses.

Discussion and conclusions

From the zooarchaeological perspective we can observe the fact that the complete horse skeletons show no traces of flesh removal or any kind of butchering. In the case of partial deposits, usually consisting in the head and distal limbs placed

[22] Baker & Brothwell 1980.

[23] Silver 1969.

together, or separately the skull or distal limbs, in three situation butchery marks were recognized (horses 16, 17 and 18). The butchery marks identified on the lower limb elements of horses 16 and 18 and the skull of horse 17 is a result of horse's body parts segmentation.

From the practical view, unlike the main body of the horse, the head and distal limbs are of no important alimentary use. These body parts are often discarded when one butchers an animal with the conformation comparable to a horse's (cattle, sheep, goat or deer). Usually the skull is cracked open to access the brain and the metapodials are also broken for the marrow. The masseter muscles and the tongue are removed, leaving typical cut marks.

Unlike an alimentary butchery process, horse elements from the partial deposits found in Zimnicea are intact, so they showed no alimentary interest for the people that butchered and buried them. In what concerns the rest of the body, rich in meat, there is no indication if it was the subject of human consumption. We assume therefore that the elements we found were separated from the body and deposited in a ritual, symbolic circumstance.

The 18 horse burials and depositions discovered within the Zimnicea necropolis can be divided in two main categories:

1. complete horse burials (12).
2. partial depositions (6) with three subcategories:

2.1. the head and the distal limbs placed together (4);

2.2. the skull (1);

2.3. the distal limbs (1).

In 17 cases the age of the animals could be estimated and ranges between five to ten years old, except one individual, aged about 3.5 years. For 11 horses the sex could be established and all of them appear to be males.

Lacking any evidence, we cannot know for sure if these animals were sacrificed or if they died by natural causes. However, the further treatment of the carcasses stands out.

In the case of the complete horse burials, the animals are placed in lateral decubitus, right and left in similar amount. Most of them are accompanied by inventory, consisting in harness parts, adornments and weapons. No butchery traces were recorded on the skeletons.

The partial horse depositions consist invariably of head and distal limb elements, with no inventory associated. In half of the cases we have identified butchery marks produced while severing the skull or limbs from the main body.

Fig. 8 – Horse 18 – feature 1.

Fig. 9 – Horse 18 – feature 2.

Fig. 10 – Osteoarthritis of the left tarsometatarsal joint of horse 15. Left – anterior view. Right – lateral view.

Although the horse remains are dispersed on the entire surface of the necropolis, they are not associated with human burials, unlike other contemporary sites. The situation raises some problems

Fig. 11 – Disjointing cut marks on the os magnum of horse 18. The cuts were intended to separate the distal limb from the tibia.

considered as contemporary with the complete horse burials, due to the fact that all of them were discovered at similar depths all over the necropolis.

As we observed, the new discovered horse burials from Zimnicea, are scarce in inventory. The only creditable object with chronological value is the iron bit discovered with ***Horse 15***. Even if such discoveries are numerous in the Zimnicea necropolis as well as in other sites (Getic settlements and cemeteries), this horse bit possesses some problems regarding its chronology and typology. Allthough the other horse bits from Zimnicea have quite clear analogies, this is not the case for the piece in discussion. This is an iron bit with cheek

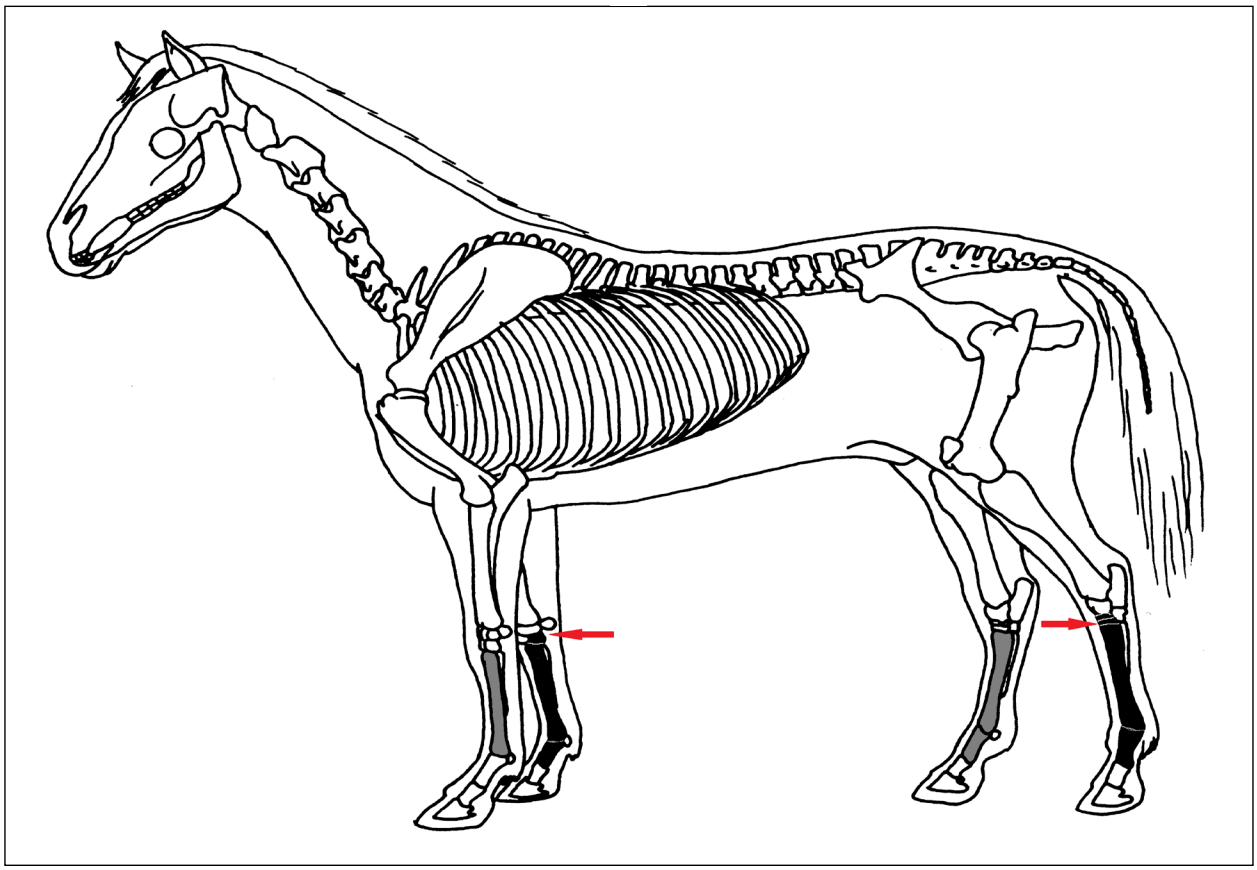

Fig. 12 – Horse 18. Black – the elements from feature 1. Gray – the elements from feature 2. The arrows indicate disjointing cut marks.

regarding the motivation of this behaviour. The horse remnants are located in the proximity of human burials, at variable distances, but no connection can be made between them in the absence of visible archaeological traits on the excavation ground.

The complete horse burials, associated with harness parts and other objects, respect the chronology of the necropolis and join the classical horse burials. Although the partial horse depositions do not contain any datable inventory, they may be

pieces *S*-shaped, with rectangular section, and two orifices on each of them. The mouth piece is made of two stranded iron bars, jointed together by two ringlets. The two stranded iron bars are also attached to the cheek pieces by one ringlet each. According to Werner[24], the cheek pieces can be included in type V, variant A, S-shaped iron bit with two orifices located very close two each other. Unlike this variant, our cheek piece lacks the terminal

[24] Werner 1988, taf. 18/120.

button and the two lateral ringlets. The stranded mouth piece has analogies at Dobrosloveni[25], included by Werner in type V, variant B[26].

According to Werner, type V, variant A 1, with button or angular endings, also includes other tow horse bites from Zimnicea[27], as well as the discovery from Şopot. One of the objects from Zimnicea has the orifice placed in right angle to the bending plane of the cheek piece. The harness was attached by ringlet on one side and on the other side by a double ringlet whose parts are connected by a bar resembling the number 8. The second horse bit from Zimnicea has the mouth piece made of three ringlets of each side with analogies at Şopot.

In Werner's typology[28], type V, variant B is characterised by different shapes of the mouth piece. The one from Dobrosloveni[29] is stranded, another one from Zimnicea[30] has fine nervures, and the one from Şopot[31] is made from a two ringlets sequence, repeated three times. Even though the horse bit we are discussing has no precise analogy in type V, variant A, B, we incline to believe that it can be included in this typology. We may deal with an unfinished object that can be a subvariant of A or B.

Following the distribution of type V, variants A and B horse bits North of the Lower Danube, after Werner[32], we can observe that South of the Danube we found type VI, having the same shape, but the mouth piece is formed by a chain. In type V horse bits at South of Danube only the Jankovo discovery can be included. The most western point of variant B, is the *oppidum* from Manching, Bavaria. Another piece was found in the *oppidum* from Stradonice. On the other hand horse bits from variant B, are more abundant in south-western Ukraine, in kurgans. Similar horse bits are rarely found in south-east Europe. Except the simple *S*-shaped horse bits, a great amount of S-shaped ornated cheek pieces was discovered. Variants A and B, are found in the kurgans of south Ukraine, often in the same complex.

Concerning the chronology of type V, a starting point for Werner, is ***M. 7,*** from Bugeac II cemetery. According to P. Alexandrescu[33], the horse bit was found with a attic kantharos with black lacquer, dated in the second quarter of the 4th century BC. Another kantharos with two handles was found at Zimnicea associated with a type A horse bit, and dated by P. Alexandrescu in the third quarter of the 4th century BC[34]. The Jankovo I tumulus[35] was dated at the end of the 4th century BC[36].

Considering all these facts as well as the chronology of the Zimnicea cemetery, that starts in at the half of 4th century BC and ends in the 1st century BC, we can assume that the new discovered horse bit can be dated eventualy in the early period of the necropolis, with analogies with the Ukrainian kurgans.

In the same feature a bronze link was also found, but it does not have a chronological value. This type of link is common in the Getic necropolis from Zimnicea and also in other necropolises or isolated tombs.

[25] Nicolăescu-Plopşor 1945-1947, 23, pl. V/9.
[26] Werner 1988, taf. 19/131.
[27] Werner 1988, 37, cat. no. 123, 124, taf. 18/123, 19/124.
[28] For type V, variant B see Werner 1986, 40-41.
[29] Nicolăescu-Plopşor 1947, 23, taf. V/12.
[30] Werner 1988, 40, cat. no. 137, taf. 20/137.
[31] Werner 1988, 40, cat. no. 135, taf. 20/135.
[32] Werner 1988, 41, taf. 69A.
[33] P. Alexandrescu 1976, 118, 123.
[34] P. Alexandrescu 1976, 123.
[35] Werner 1988, 38, cat. no. 125, 126.
[36] Dremsizova 1955, 81.

Biometry

Table 1. Horse 15.		
Maxillary teeth	**Dex.**	**Sin.**
Length of P^2	38.23	38.05
Breadth of P^2	23.93	24.52
Length of P^3	29.10	29.08
Breadth of P^3	26.72	26.40
Length of P^4	29.35	29.58
Breadth of P^4	26.70	26.32
Length of M^1	25.56	25.78
Breadth of M^1	25.20	25.65
Length of M^2	27.00	26.60
Breadth of M^2	24.98	24.96
Length of M^3	27.27	27.42
Breadth of M^3	22.25	22.96

Table 2. Horse 15 – Mandible.		Dex.	Sin.
6. Length of the cheektooth row measured along the alveoli on the buccal side		172.70	
6a. Length of the cheektooth row measured near the biting surface		169.00	
7. Length of the molar row measured along the alveoli on the buccal side		84.06	
7a. Length of the molar row measured near the biting surface		82.90	
8. Length of the premolar row measured along the alveoli on the buccal side		89.84	
8a. Length of the premolar row measured near the biting surface		85.54	
9.	Length of P_2	31.36	30.24
	Breadth of P_2	16.19	16.30
10.	Length of P_3	27.00	27.69
	Breadth of P_3	19.45	18.08
11.	Length of P_4	26.00	26.82
	Breadth of P_4	19.34	18.88
12.	Length of M_1	26.40	25.67
	Breadth of M_1	17.60	17.12
13.	Length of M_2	25.00	25.40
	Breadth of M_2	16.92	16.20
14.	Length of M_3	32.50	33.27
	Breadth of M_3	14.90	14.02
22a. Height of the mandible behind M_3 from the most aboral point of the alveolus		106.90	

Table 3. Horse 15 – Atlas.	
GL – Greatest length	94.00
BFcr – Greatest breadth of the Facies articularis cranialis	84.80
BFcd – Greatest breadth of the Facies articularis caudalis	80.50
GLF – Greatest length from the BFcr to the BFcd	78.50
H – Height	75.00

Table 4. Horse 15 – Axis.	
LCDe – Length in the region of the corpus	131.00
BFcr – Greatest breadth of the Facies articularis cranialis	79.27
SBV – Smallest breadth of the vertebra	39.90

Table 5. Horse 15 – Sacrum.	
GL – Greatest length on the ventral side	203.75
PL – Physiological length	180.66
GB – Greatest breadth	180.80
BFcr – Greatest breadth of the Facies terminalis cranialis	44.07
HFcr – Greatest height of the Facies terminalis cranialis	19.92

Table 6. Horse 15 – Scapula.	Dex.	Sin.
SLC – Smallest length of the Collum scapulae		59.16
GLP – Greatest length of the Processus articularis	90.50	89.83
LG – Length of the glenoid cavity	54.30	53.45
BG – Breadth of the glenoid cavity		42.86

Table 7. Horse 15 – Humerus.	Dex.	Sin.
GL – Greatest length		273.60
GLl – Greatest length of the lateral part		271.60
GLC – Greatest length from caput		258.50
SD – Smallest breadth of the diaphysis	34.50	34.90
Bd – Greatest breadth of the distal end	70.60	70.30
BT – Greatest breadth of the trochlea	69.40	69.25
Withers height	**1,322.69**	

Table 8. Horse 15 – Radius and ulna.	Dex.	Sin.
GL – Greatest length	380.00	379.70
GLl – Greatest length of the lateral part	376.00	375.80
Withers height	**1,278.06**	

Table 9. Horse 15 – Radius.	Dex.	Sin.
GL – Greatest length	309.30	309.66
PL – Physiological length	300.64	301.48
Ll – Length of the lateral part	294.48	295.38
Bp – Greatest breadth of the proximal end	77.92	78.09
BFp – Breadth of the Facies articularis proximalis	71.22	70.94
SD – Smallest breadth of the diaphysis	36.63	37.45
CD – Smallest circumference of the diaphysis	114.00	114.00
Bd – Greatest breadth of the distal end	71.40	70.90
BFd – Breadth of the Facies articularis distalis	61.45	60.62
Withers height	**1,279.99**	

Table 10. Horse 15 - Pelvis.	Dex.	Sin.
LA – Length of the acetabulum including the lip	61.73	63.00
LAR – Length of the acetabulum on the rim	58.10	60.50

Table 11. Horse 15 – Femur.	Dex.	Sin.
SD – Smallest breadth of the diaphysis	38.00	38.00
CD – Smallest circumference of the diaphysis	140.00	140.00
Bd – Greatest breadth of the distal end	86.00	85.60

Table 12. Horse 15 – Patella.	Dex.
GL – Greatest length	66.03
GB – Greatest breadth	65.57

Table 13. Horse 15 – Tibia.	Dex.	Sin.
GL – Greatest length	328.31	327.92
Ll – Lateral length on the outer side	288.80	288.50
Bp – Greatest breadth of the proximal end	90.52	91.34
SD – Smallest breadth of the diaphysis	38.32	36.90
CD – Smallest circumference of the diaphysis	112.00	110.00
Bd – Greatest breadth of the distal end	70.89	68.69
Dd – Greatest depth of the distal end	44.72	44.47
Withers height	**1,258.51**	

Table 14. Horse 15 – Astragalus.	Dex.	Sin.
GH – Greatest height	58.85	58.14
GB – Greatest breadth	59.80	59.45
BFd – Breadth of the Facies articularis distalis	47.58	46.70
LmT – Length of the medial part of Trochlea tali	57.46	56.85

Table 15. Horse 15 – Calcaneus.	Dex.	Sin.
GL – Greatest length	107.08	105.90
GB – Greatest breadth	49.54	49.36

Table 16. Horse 15 – Metacarpus III.	Dex.	Sin.
GL – Greatest length	208.18	207.18
GLl – Greatest length of the lateral side	205.04	203.60
Ll – Lateral length on the outer side	198.73	197.48
Bp – Greatest breadth of the proximal end	47.71	48.30
Dp – Greatest depth of the proximal end	32.19	31.90
SD – Smallest breadth of the diaphysis	33.22	33.53
CD – Smallest circumference of the diaphysis	95.00	96.00
DD – Smallest depth of the diaphysis	21.49	21.91
Bd – Greatest breadth of the distal end	48.74	49.82
Dd – Greatest depth of the distal end	33.49	34.53
Withers height	**1,269.84**	

Table 17. Horse 15 – Metatarsus III.	Dex.	Sin.
GL – Greatest length	253.84	
GLl – Greatest length of the lateral side	250.63	
Ll – Lateral length on the outer side	244.04	
Bp – Greatest breadth of the proximal end	52.35	
Dp – Greatest depth of the proximal end	50.60	
SD – Smallest breadth of the diaphysis	29.25	29.60
CD – Smallest circumference of the diaphysis	92.00	91.00
DD – Smallest depth of the diaphysis	23.50	22.84
Bd – Greatest breadth of the distal end	49.22	48.33
Dd – Greatest depth of the distal end	35.90	35.84
Withers height	**1,300.73**	

Table 18. Horse 15 – Phalanx I.	Phalanx I ant. dex.	Phalanx I ant. sin.	Phalanx I post. dex.	Phalanx I post. sin.
GL – Greatest length	79.93	80.64	76.46	76.70
Bp – Greatest breadth of the proximal end	52.52	54.27	52.54	53.48
BFp – Breadth of the Facies articularis proximalis	48.60	49.00	48.04	48.80
Dp – Depth of the proximal end	33.80	34.06	36.70	36.13
SD – Smallest breadth of the diaphysis	34.70	35.10	33.00	32.50
Bd – Greatest breadth of the distal end	45.36	46.34	43.40	44.33
BFd – Breadth of the Facies articularis distalis	43.50	43.70	41.60	41.80

Table 19. Horse 15 – Phalanx II.	Phalanx II ant. dex.	Phalanx II ant. sin.	Phalanx II post. dex.	Phalanx II post. sin.
GL – Greatest length	45.30	46.16	48.14	48.03
Bp – Greatest breadth of the proximal end	50.15	52.81	50.20	50.37
BFp – Breadth of the Facies articularis proximalis	46.26	46.16	44.88	45.00
Dp – Depth of the proximal end	30.88	31.35	32.64	31.75
SD – Smallest breadth of the diaphysis	43.41	44.98	42.48	42.19
Bd – Greatest breadth of the distal end	48.18	49.54	47.60	45.90

Table 20. Horse 15 – Phalanx III.	Phalanx III ant. dex.	Phalanx III ant. sin.	Phalanx III post. dex.	Phalanx III post. sin.
LF – Length of the Facies articularis	22.70	22.30	23.77	22.74
BF – Breadth of the Facies articularis		52.30	46.70	51.24
HP – Height in the region of the extensor process	37.67	37.82	41.50	

Table 21. Horse 16 – Mandible.		Dex.	Sin.
6. Length of the cheektooth row measured along the alveoli on the buccal side		172.84	
6a. Length of the cheektooth row measured near the biting surface		166.52	
7. Length of the molar row measured along the alveoli on the buccal side		83.45	82.92
7a. Length of the molar row measured near the biting surface		81.00	81.45
8. Length of the premolar row measured along the alveoli on the buccal side		89.87	
8a. Length of the premolar row measured near the biting surface		86.75	
9	Length of P_2	31.88	30.49
	Breadth of P_2	16.45	16.34
10	Length of P_3	28.80	27.98
	Breadth of P_3	17.39	17.43
11	Length of P_4	28.90	26.27
	Breadth of P_4	18.25	18.67
12	Length of M_1	26.10	25.50
	Breadth of M_1	17.85	17.44
13	Length of M_2	25.50	26.50
	Breadth of M_2	16.64	16.28
14	Length of M_3	31.90	31.34
	Breadth of M_3	14.30	14.10
22a. Height of the mandible behind M_3. from the most aboral point of the alveolus		106.00	106.00
22b. Height of the mandible in front of M_1		79.00	81.40
22c. Height of the mandible in front of P_2		53.50	

Table 22. Horse 16 – Maxillary teeth.	Dex.	Sin.
Length of P^2	37.95	
Breadth of P^2	27.50	
Length of P^3	29.83	
Breadth of P^3	27.50	
Length of P^4	28.50	28.45
Breadth of P^4	26.76	26.50
Length of M^1	25.80	25.28
Breadth of M^1	25.60	25.54
Length of M^2	26.06	26.27
Breadth of M^2	24.90	24.80
Length of M^3	26.49	26.32
Breadth of M^3	22.30	22.07

Table 23. Horse 16 – Metacarpus III dex.	
GL – Greatest length	224.90
GLl – Greatest length of the lateral side	221.49
Ll – Lateral length on the outer side	214.80
Bp – Greatest breadth of the proximal end	49.63
Dp – Greatest depth of the proximal end	33.05
SD – Smallest breadth of the diaphysis	33.64
CD – Smallest circumference of the diaphysis	97.00
DD – Smallest depth of the diaphysis	22.71
Bd – Greatest breadth of the distal end	49.68
Dd – Greatest depth of the distal end	36.20
Withers height	**1,376.86**

Table 24. Horse 16 – Metatarsus III dex.	
GL – Greatest length	267.80
GLl – Greatest length of the lateral side	265.27
Ll – Lateral length on the outer side	263.62
SD – Smallest breadth of the diaphysis	31.32
CD – Smallest circumference of the diaphysis	95.00
DD – Smallest depth of the diaphysis	25.72
Bd – Greatest breadth of the distal end	50.86
Dd – Greatest depth of the distal end	35.96
Withers height	**1,405.09**

Table 25. Horse 16 – Phalanx I.	Phalanx I ant. dex.	Phalanx I ant. sin.	Phalanx I post. dex.
GL – Greatest length	83.78	83.76	80.90
Bp – Greatest breadth of the proximal end	54.43	55.15	55.96
BFp – Breadth of the Facies articularis proximalis	49.10	50.80	52.20
Dp – Depth of the proximal end	34.97	35.67	37.82
SD – Smallest breadth of the diaphysis	34.37	34.92	34.57
Bd – Greatest breadth of the distal end	46.31	46.82	44.84
BFd – Breadth of the Facies articularis distalis	46.27	44.71	43.85

Table 26. Horse 16 – Phalanx II.	Phalanx II ant. dex.	Phalanx II ant. sin.	Phalanx II post. dex.
GL – Greatest length	43.65	43.94	45.26
Bp – Greatest breadth of the proximal end	52.82	53.70	52.64
BFp – Breadth of the Facies articularis proximalis	47.68	47.38	45.87
Dp – Depth of the proximal end	30.88	31.38	32.00
SD – Smallest breadth of the diaphysis	45.20	45.62	43.30
Bd – Greatest breadth of the distal end	48.95	50.08	47.45

Table 27. Horse 16 – Phalanx III.	Phalanx III ant. dex.
GL – Greatest length	57.90
GB – Greatest breadth	76.13
LF – Length of the Facies articularis	23.00
BF – Breadth of the Facies articularis	46.93
Ld – Length of the dorsal surface	53.70
HP – Height in the region of the extensor process	37.70

Table 28. Horse 17 – Cranium.		
1. Total length: Akrokranion – Prosthion		510.00
12. Most oral point of the facial crest on one side – Prosthion		217.00
13. Short lateral facial length: Entorbitale – Prosthion		302.00
15. Lateral facial length: Ectorbitale – Prosthion		363.00
19. Dental length: Postdentale – Prosthion		286.00
20. Lateral length of the premaxilla: Nasointermaxillare – Prosthion		180.00
21. Length of the diastema (P^2 – I^3)		85.00
22. Length of the cheektooth row measured along the alveoli		164.70
22a. Length of the cheektooth row measured near the biting surface		161.30
23. Length of the molar row measured along the alveoli on the buccal side		75.90
23a. Length of the molar row measured near the biting surface		74.00
24. Length of the premolar row measured along the alveoli on the buccal side		91.80
24a. Length of the premolar row measured near the biting surface		90.60
25	Length of P^2	36.37
	Breadth of P^2	24.40
26	Length of P^3	29.00
	Breadth of P^3	27.20
27	Length of P^4	27.00
	Breadth of P^4	27.30
28	Length of M^1	24.00
	Breadth of M^1	25.00
29	Length of M^2	24.00
	Breadth of M^2	23.06
30	Length of M^3	27.50
	Breadth of M^3	21.50
31. Greatest inner length of the orbit: Ectorbitale – Entorbitale		64.10
32. Greatest inner height of the orbit		52.25
33. Greatest mastoid breadth: Otion – Otion		112.00
38. Greatest neurocranium breadth: Euryon – Euryon		103.00
40. Least breadth between the supraorbital foramina		142.60
41. Greatest breadth of skull: Ectorbitale – Ectorbitale		212.50
42. Least breadth between the orbits: Entorbitale – Entorbitale		148.50
43. Facial breadth between the outermost points of the facial crest at the point of intersection of the maxillo-jugal suture with the facial ridge		176.00
44. Facial breadth between the infraorbital foramina		80.80
45. Greatest breadth of 'snout': measured across the outer borders of the alveoli of I^3		65.70
46. Greatest breadth on the curvature of the premaxillae		63.50
47. Least breadth in the region of the diastema		57.50
48. Greatest palatal breadth: measured across the outer borders of the alveoli		116.37

Table 29. Horse 18, feature 1 – Metacarpus III dex.	
GL – Greatest length	231.01
GLl – Greatest length of the lateral side	228.13
Ll – Lateral length on the outer side	222.71
Bp – Greatest breadth of the proximal end	50.91
Dp – Greatest depth of the proximal end	34.15
SD – Smallest breadth of the diaphysis	32.53
CD – Smallest circumference of the diaphysis	95.00
DD – Smallest depth of the diaphysis	23.06
Bd – Greatest breadth of the distal end	50.09
Dd – Greatest depth of the distal end	36.23
Withers height	**1,427.57**

Table 30. Horse 18, feature 1- Phalanx I ant. dex.	
GL – Greatest length	89.00
Bp – Greatest breadth of the proximal end	56.20
BFp – Breadth of the Facies articularis proximalis	51.90
Dp – Depth of the proximal end	36.20
SD – Smallest breadth of the diaphysis	34.50
Bd – Greatest breadth of the distal end	48.55
BFd – Breadth of the Facies articularis distalis	45.20

Table 31. Horse 18, feature 1- Metatarsus III sin.	
GL – Greatest length	271.89
GLl – Greatest length of the lateral side	270.00
Ll – Lateral length on the outer side	265.44
Bp – Greatest breadth of the proximal end	52.55
Dp – Greatest depth of the proximal end	41.27
SD – Smallest breadth of the diaphysis	30.40
CD – Smallest circumference of the diaphysis	96.00
DD – Smallest depth of the diaphysis	25.80
Bd – Greatest breadth of the distal end	49.70
Dd – Greatest depth of the distal end	36.50
Withers height	**1,414.79**

Table 32. Horse 18, feature 1- Phalanx I post. sin.	
GL – Greatest length	84.84
Bp – Greatest breadth of the proximal end	55.40
BFp – Breadth of the Facies articularis proximalis	51.39
Dp – Depth of the proximal end	38.90
SD – Smallest breadth of the diaphysis	34.00
Bd – Greatest breadth of the distal end	46.70
BFd – Breadth of the Facies articularis distalis	43.50

Table 33. Horse 18, feature 2 – Metacarpus III sin.	
GL – Greatest length	230.80
GLl – Greatest length of the lateral side	227.92
Ll – Lateral length on the outer side	222.31
Bp – Greatest breadth of the proximal end	50.45
Dp – Greatest depth of the proximal end	33.80
SD – Smallest breadth of the diaphysis	33.40
CD – Smallest circumference of the diaphysis	95.00
DD – Smallest depth of the diaphysis	22.95
Bd – Greatest breadth of the distal end	50.09
Dd – Greatest depth of the distal end	36.22
Withers height	**1,425.00**

Table 34. Horse 18, feature 2 – Metatarsus III dex.	
GL – Greatest length	271.60
GLl – Greatest length of the lateral side	270.29
Ll – Lateral length on the outer side	263.50
Bp – Greatest breadth of the proximal end	51.90
Dp – Greatest depth of the proximal end	41.88
SD – Smallest breadth of the diaphysis	30.63
CD – Smallest circumference of the diaphysis	96.00
DD – Smallest depth of the diaphysis	26.52
Bd – Greatest breadth of the distal end	49.00
Dd – Greatest depth of the distal end	36.45
Withers height	**1,404.45**

Table 35. Horse 18, feature 2 – Phalanx I post. dex.	
GL – Greatest length	84.92
Bp – Greatest breadth of the proximal end	55.31
BFp – Breadth of the Facies articularis proximalis	51.33
Dp – Depth of the proximal end	38.63
SD – Smallest breadth of the diaphysis	33.38
Bd – Greatest breadth of the distal end	46.50
BFd – Breadth of the Facies articularis distalis	43.25

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