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Typology of Thracian horses according to osteological analysis of skeletal remains and depictions from the antiquity

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Abstract: Skeletal remains of about 15 horses from the antique Thracian mounds were compared in terms of habitus and height at the shoulders. Additional data about the habitus of the Thracian horse were received from the analysis of more than 1000 depictions of horseman and horses from the same epoch. The breeds of the Thracian horse from the recent Bulgarian territories during the antiquity (after skeletons from IV-III century B.C.) were mostly semi-thin legged to thin-legged (following the classification of Brauner, 1916). All these horses have similarity with the ancient and recent eastern breeds: relatively small-sized as a whole, frequently with slender legs (after metapodials and especially metatarsals), adapted to fast allures. The height at the shoulder varied significantly – from 125 to 150 cm. According the classification of Vit (1952), the bred horses were usually small- to medium-sized. Based on the osteological material and the studied depictions we could conclude that in general the horses from the Thracian time (including the Roman epoch) were relatively robust, with strong skeletal system and compact, embossed muscles, large head, strong neck and short, upright mane. All of these are primitive features inherited from the wild ancestors. The studied material had similarities with the Arabian horse, but in general it was a little bit more robust and its height at the shoulder was smaller than the recent Arabian horse. The most frequent images of Thracian horses from the antiquity of Bulgaria and the Balkans represent exactly this kind of horse. Such horses would be suitable for hunting, especially in the varied relief, typical for the Bulgarian/Balkan lands. Most of the Thracian horses from the studied age (judging from the sample) probably could not reach the height, the slenderness and the running ability of the recent Arabian horses, which have been selected over a long period of time. At the same time, it is important to note that the elite Thracian horses had attained the parameters of the Arabian horse, especially its height and slenderness.

Key words: Thracian horses, osteological analysis, horse height

Introduction

The horse is a subject of a particular interest since ancient times. There is no doubt that his domestication has gradually opened up new strategic options in terms of military actions, transportation and communications. The horse has also played an exceptional role in the life of the ancient Thracians. It was used in various activities: as a saddle horse in hunting or war, as a carthorse in chariots and freight cars. His role in the everyday life and culture was so important that he had become a symbol of prosperity and power and hence a symbol of cultural traditions and beliefs (Marazov, 1968, 2010; Fol, 1993; Gocheva, 2003; Izdimirski, 2006; Sakellariou, 2015). He used to be so venerated, that he even used to be buried with his owner.

The present study aimed to characterise Thracian horses based on the osteometric analysis of horse skeletons found in Thracian necropolises. It was complemented by data from analyses of ancient depictions from the same period.

Materials and Methods

Horse skeletons from the following archaeological sites have been studied:

A. Site No 9 (LOT 2), sq. G5, E-2 and E-3 along the layout of Thracia Motorway near Benkovski

Village - 2009 (antiquity). Archaeological excavations of Dr. Iliana Borissova (University of Sofia).

The material provided for examination included three horse skeletons from the pits. According to the archaeological context, their age referred to the second half of the IV century BC.

1. Horse skeleton from sq. G5 (hereafter, horse BN-1). Material: unfortunately, the skull was heavily damaged and fragmented. This did not permit its more detailed comparison with current and former races and breeds. The rest of the skeleton allowed for bone, metric analysis. The pictures of the skeleton finding during the excavations showed the particular position of the hind limbs and the unnaturally curved backwards head.

2. Horse skeleton from sq. E-2 (hereafter, horse BN-2). Material: The skeleton supplied for processing was missing the skull. The pictures of the excavations showed clearly that the skull had not been available in the dug structure in which the skeleton was revealed.

3. Horse skeleton from sq. E-3 (hereafter, horse BN-3). The pictures of the excavations revealed that the skeleton was entirely preserved. However, the material provided included only a portion of the bones.

No traces of skinning or dismemberment of the corpse were found, with the exception of the skull of horse BN-2.

Taphonomic notes: in horse BN-2 (sq. E-2) a deliberate stroke had cut the head of the skull and decapitated the animal. It appears that the head had been taken from the skeleton. In the horse from G-5 (BN-1), a blow at a similar place might have killed the animal, while the head might had been cut off at the neck and placed in a reverse position, which explains its unnatural position in the preserved remains of the skeleton. At least two of the three horses had been decapitated. It could be assumed that this deliberate beheading had a symbolic-ritual character.

B. Eastern Hellenistic necropolis of the Sboryanovo Reserve (IV-III century B.C.) near Sveshtare Village (excavations of prof. Diana Gergova, Inst. of Archaeology with museum - BAS).

The bones of five horse skeletons from the archaeological excavations of Prof. Diana Gergova were provided for studying. They were found in mounds No 30, 29, 21 and 27 from the Eastern necropolis of the Sboryanovo Reserve, IV-III century B.C.

The two skeletons of horses from sites No 30 and 29 were in a very bad condition with only a few, mostly long bones being preserved. At the same time, the horse skeleton from site (mound) No 21 and the two skeletons from site No 27 were in a relatively good condition and the bone material was almost entirely preserved. At site No 30, the skeleton of the horse was found without a skull, at site No 29 the skull was crushed, at site No 21 the skull was preserved in a very bad condition and no measurements could be made, except for the teeth and the two mandibles. At site No 27 the skulls of the two horses were also fragmented.

C. The height at the shoulder of four horses from the Thracian necropolis from Kazanlak Region (Iskra Museum collection, Kazanlak, excavations of assoc. prof. G. Kitov, Inst. of Archaeology and Kazanlak museum) were studied based on their metatarsal bones: KZ-1 - Slavchova Mound (beginning of IV century B.C.), expedition Temp 95; KZ-2 - Sarafova Mound (IV-III century B.C.), Temp 95; KZ-3 - Belchinova Mound, 2006; KH-4 – Golyama kosmatka Mound, (IV century B.C.), 2004, first chamber.

The morphological analysis were based on the comparative craniological and osteological indices of Ewart (1907) and Brauner (1916) (see also Osborn 1912) and the height classification indicators of Vit (1952), as well as on the comparative metric data for the Arabian horse and other Thracian and local horses (according to Petrov 1925; Stanchev & Ivanov 1958; 1972; Vassilev & Georgiev 1985; Iliev 2000), for the wild horses (Gromova 1949), and on other of our unpublished data. Determination of age was done following the comparative schemes of Klimov (1950) and that of sex according to Gromova's analyses (1949).

While analysing the height at the shoulder and habitus of horses, additional comparisons with more than 1000 images of Thracian horses dating B.C. and A.C. were made (based on published depictions in Opperman, 2006; Yurukova, 1992; Rabadzhiev, 2012; etc.)

Gender and Age of the Horses

A. Site Benkovski:

The gender of horse BN-1 was determined using the very small, almost rudimentary, canine teeth. The condition of the canine teeth, whose development is a manifestation of sexual dimorphism (Gromova, 1949), was an indication for female sex. The analysis of the wearing of the mandibular incisors (according to the schemes of Klimov, 1950, vol. I, p. 418) lead to the conclusion that the mare was about 8-10 years, i.e. in full mature age.

The gender of horse BN-2 (sq. E-2) could not be reliably determined based on the available skeletal

material. The comparison with the other two horses, as well as with other Thracian horses, showed a high (for its breed, see below) growth and relatively bigger mass and it could be assumed that it was probably a stallion. According to the established pelvic exostoses and the separate phalanges, we could assume it was not young: probably at least at the age of ten or perhaps more years.

The lower jaw of horse BN-3 (sq. E-3) was gracile, devoid of canine teeth. This determined the individual as a mare. The teeth were very worn out. The animal was old, at least at the age of 15. Here, it should be noted that, according to Vit (1952), the Eastern Scythians had taken special care of their elite saddle horses and some of them continued to be used for combat horses up to 18 years and even longer. The tear surface of the second premolar (the first tooth of the cheek teeth row) was heavily carved, which was likely owing to the prolonged use of a bridle with a metal mouthpiece).

B. Site Sboryanovo: Only the gender of horse SB-3 could be determined. The developed canine teeth and heavily worn-out incisors indicated that it was also an adult stallion, about 12-18 years old.

Osteometric analysis

A. Comparison of relative lengths of long bones.

1. Benkovski horses:

The relative lengths of the bones of stallion BN-2 and mare BN-1 (expressed as a percentage of the total sum of the bone lengths of the fore and hind limbs) were compared with the stallion from Kralevo, Targovishte, which was of the same epoch (IV- III century B.C.; Vasilev & Georgiev, 1985). The results for forelimb, shoulder bone, humerus (H) + radius (R) + metacarpus (Mc) and, respectively hind limb: femur (F) + large tibia (T) + metatarsal bone (Mt), are shown in Table 1.

The difference between the percentages of the individual bones of the three horses was too small. The studied horses were practically the same in terms of proportions. This implied not only close kinship (in terms of breed), similar breeding conditions and similar terrain in which they had been used, but probably the use of these horses for the same purposes.

2. Sboryanovo horses:

The results of comparing the relative lengths of the bones of horses from Sboryanovo expressed in % of the total sum of the lengths of the most indicative bones of the fore (shoulder bone, humerus + radius + metacarpus) and, respectively, the hind limb (femur + large tibia + metatarsal bone) are presented in Table 2.

The difference between the percentages of the individual bones of the four horses, three of the necropolis from Sboryanovo: mounds 21 and 27 (horses SB 3 and SB 4-5) and the studies of the stallion from Kralevo varied within very small limits, leading practically to the same conclusions as the ones made above for the horses from Benkovski.

B. Metacarpal index. According the classification of Brauner (1916), based on the indices for the width of the diaphysis to the largest length of the metacarpal bones, the horses could be divided into the categories given in Table 3.

The comparison of the three horses from Benkovski, with data on the stallion from the Thracian

Table 1. Comparison of the relative length of the long bones of horses BN-1 and BN-2 with the long bones of the stallion from Kralevo, Targovishte area. H – humerus; R – radius; Mc – metacarpus; F – femur; T – tibia; Mt – metatarsus.

	H	R	Mc	F	T	Mt
Horse BN-1	34.70	39.50	25.71	38.50	35.46	25.97
Horse BN-2	33.71	38.38	27.90	37.82	35.56	26.90
Mean	34.21	38.97	26.80	38.19	36.01	26.41
Kralevo (BG)	35.18	38.31	26.50	39.66	34.45	25.87

Table 2. Comparison of the relative length of the long bones of horses SB-3, SB-4 and SB-5 with the long bones of the stallion from Kralevo, Targovishte area. H – humerus; R – radius; Mc – metacarpus; F – femur; T – tibia; Mt – metatarsus.

Individuals	H	R	Mc	F	T	Mt
Mound 21 – horse SB-3	34.93	39.10	25.97	39.30	34.80	25.90
Mound 27 – horse SB-4	33.36	40.03	26.60	38.14	35.69	26.73
Mound 27 – horse SB-5	34.79	39.42	25.78	39.12	34.64	26.23
Mean	34.36	39.52	26.12	38.85	35.04	26.29
Kralevo	35.18	38.31	26.50	39.66	34.45	25.87

Table 3. Distribution of the studied horses among the different categories according to Brauner's classification (Brauner, 1916)

Category	Limits of variation
Very slender	below 13.5
Slender legged	13.5 -14.5
Semi-slender legged	14.5 -15.5
Slender	15.5 -16.5
Semi-robust	16.5 -17.5
Robust	above 17.5

Table 4. Brouner's horse classification on the basis of metatarsal bones' index.

Category	Limits of variations
Slender legged	up to 12
Semi-slender legged	12 - 12.7
Semi-robust	12.8 - 13.6
Robust	above 13.7

tombstone near Kralevo Village (III century B.C., eastern type, Thracian horse) showed the following:

The mare of G5 (BN-1) with metacarpal index 15.20 and the male horse of E-2, (BN-2) with index 14.70 belonged to the semi-thin legged horses, together with the stallion of Kralevo with index 14.67. This seems to be a typical proportion for the Thracian horses, which show similarity with the eastern type of horses, but appear to have had relatively more massive metacarpi as compared to the Arab horses.

Generally, the horses from Sboryanovo have had even more massive metacarpal bones: Horse SB-3 - with index 16.92 - semi-robust; Horse CB-4 - with index 15.24 - semi-thin legged and Horse ST-5 - with index 16.48 - slender.

C. Metatarsal Index. This is one of the most pertinent indices of the horse's slenderness and running capability and, hence, of its use and purpose. This is why the metatarsal index is one of the most commonly used. The classification of Brauner based on the same proportion of metatarsal bones is presented in Table 4.

The comparison of the metatarsal index of the horses from Benkovski (mare BN-1 and stallion BN-2) is shown in Table 5 (based on Stanchev & Ivanov, 1958, Ivanov, 1972, Vassilev & Georgiev, 1985; Iliev, 2000, our unpublished data for excavations of Dr. Koleva and based on Gromova, 1949 for wild horses).

According to this index, horse BN-1 and horse BN-2 were identified as slender-legged, and together with the other Thracian horses known to date (see Table 5), they resembled the Arabian horse, i.e. referred to the eastern saddle horses with fast allures.

The horses from Sboryanovo showed a greater

Fig. 1. Metatarsal bones from the area of Sboryanovo: 1. Metatarsal bone of horse SB-1 – slender legged; 2. Metatarsal bone of horse SB-3 – semi-slender legged; 3. Metatarsal bone of SB-5 – semi robust. Scale bar = 40 mm.

variety: they ranged from semi-robust to slender-legged (Table 5).

The horses from the Kazanlak tombs varied in slenderness, but the slender-legged dominated as based on the metatarsal index (Table 5)

In general, the horses surveyed, although in many cases having the slenderness of the slender-legged and the long-selected Arabian horses, did not show such a precise selection and their characteristics varied within a wider range, thus resembling the more primitive eastern horses.

D. Determination of horse height.

The height at the withers was determined following the classification of O. Vit (1952) according to the horse height at the shoulder (Table 6). The latter was calculated using individual bones.

1. Benkovski horses:

Relationships of their heights are presented in Table 7.

The relationships of their heights confirmed the morphological data and indicated that horses No 1 and 3 were mares, while horse No 2 was a male individual.

The mares BN-1 (G5) and BN-3 belonged to the group of the medium-sized horses, to which belonged also the stallion from Kralevo and horse №1 from site 9 from the excavations of Dr. B. Koleva

Table 5. Comparison of the metatarsal index of horses from Benkovski (BN-1 and BN-2), Sboryanovo (SB-1, SB-2, SB-3, SB-4, SB-5) and Kazanluk (KZ-1, KZ-2, KZ-3, KZ-4) with wild horses.

Domestic horses	Horse BN-1	11.92
	Horse BN-2	11.54
	Horse SB-1	11.34
	Horse SB-2	12.27
	Horse SB-3	12.61
	Horse SB-4	10.92
	Horse SB-5	12.84
	Horse KZ-1	12.14
	Horse KZ-2	10.68
	Horse KZ-3	11.47
	Horse KZ-4	12.52
	Horse from Thracia motorway, site 9, antiquity (excavations of Dr. R. Koleva, 2008)	11.87
	Novi Pazar (8th century)	11.50
	Durankulak (9-10 century)	11.52
	Kralevo (4-3 century B.C., Bulgaria)	11.68
	Yankovo (4th century B.C.)	11.00
	Veliki Preslav (9-10 century)	10.58 – 12. 73
	Arabian horse breed	11.00
	Avarian horse breed	10.40
	draught horse	14. 30
Wild horses	*E. przewalskii*	11.60
	E. *ferus* (= *E. gmelini*)	11.90

Table 6. Horse height at the shoulder after the classification of O. Vit (1952)

Dwarf	under 112 см
Very small sized	112 – 120
Small sized	120 – 128
below medium size	128 – 136
Medium sized	136 – 144
Above the medium size	144-152
Large sized	152 – 160
Very large sized	160 - 168
Giants	over 168

(Thracia Motorway - 2008), also studied by us.

Noteworthy is the fact that the expectedly higher stallion from sq. E-2 (horse BN-2) seemed to have reached a height at the shoulder above the average according the classification of Vit. This specimen must have been an elite saddle horse for its time.

2. Sboryanovo horses:

Relationships of their heights are presented in Table 8.

It is noteworthy (though we did not test statistically this conclusion in order to accept it as a rule), that the horse from the 30 SB1 mound, which had been buried separately (probably a saddle horse), had height at the shoulder and slenderness typical of a modern Arabian horse, while the two carthorses SB-4 - 5 (Fig. 5) were below the average height (Table 9).

3. Kazanlak tombs horses:

The height at shoulder of the horses from the Kazanlak tombs varied greatly. Some of them reached 150 cm, a height similar to those of the present Arabian horses.

Discussion

The relatively well-preserved skull of SB-3 identified this horse as belonging to the eastern oriental horses, to which belonged also the Thracian horses. That was suggested by the feature defined by the line drawn through the back edge of the hard palate (according to the signs defined by Franck, 1875). In Horse SB-3, it went towards the rear edge of M2, which was typical of the Eastern horses. The robust, western type of horses probably has originated in Rome during a later era, and has later spread in Byzantium. One such a horse with scars of carrying heavy weight was identified by us among the horse remains from the First Bulgarian Kingdom in Preslav (N.I., N.S.).

Table 7. Height at the shoulder of the horses from Benkovski, calculated after different bones: . H – humerus; R – radius; Mc – metacarpus; F – femur; T – tibia; Mt – metatarsus.

	H	R	Mc	F	T	Mt	Mean height
Horse BN-1	137.2	137.6	134.7	134. 4	141.3	136	137.86
Horse BN-2	138.40	146.80	149	140.80	148	149.83	145.47
Horse BN-3				134.80	138.80		136.80

Table 8. Height at the shoulder of the horses from Sboryanovo calculated after different bones: H – humerus; R – radius; Mc – metacarpus; F – femur; T – tibia; Mt – metatarsus.

Individuals	H	R	Mc	F	T	Mt	Mean height
Mound 30 – horse SB-1					147	150	148.50
Mound 30 – horse SB-2	135	136			133	132	134
Mound 30 – horse SB-3	138	136	135	141	146	139	138.16
Mound 30 – horse SB-4	130	136	135	128	134	121	132.39
Mound 30 – horse SB-5	131	130	129	128	128	129	129.16

Fig. 2. Marble relief from Ginina mound tomb – Sveshtari (second quarter of 3th century B.C.) (source: http://uspiavamevbulgaria.com/)

For comparison, data on Thracian horses bred on our land from IV B.C. until I A.C. and the beginning of II century (including Roman times) were provided. Horses from an adjacent area, the village of Akandjievo, Pazardzhik (IV-II B.C.) (Kovachev & Gigov, 1987), were with small and medium growth. Studies of a number of Thracian tombs indicated that the height at shoulder and habitus of Thracian horses varied (see Ninov, 1997).

Based on the studied material of bone marrow horses with small to medium size prevailed. In our country, the most frequent depictions of Thracian horses from the antiquity represented such a horse. The numerous depictions of horses varied in their proportions and depended on the style and skill of the craftsman, on the material and method of making (drawing, embossed image), the area provided for the depiction, etc. Regardless, certain generalisation about the habitus of the horses could be made based on these numerous depictions. Generally, it is noticeable that they were usually small-sized, as compared to the present saddle horses, usually with a

Fig. 3. Thracian horseman (end of 1-2 century). Marble relief from Thessaloniki. İstanbul Arkeoloji Müzeleri; Inv. No. 31 T. Cat. Mendel 492.

Fig. 4. Coin of the Thracian ruler Mozes, (475 – 465 B.C.) (after Yurukova, 1922)

Table 9. Horse height at the shoulder of the horses from Kazanluk, calculated by the metatarsal bones measurements.

Individuals	height at the dhoulder
Horse KZ-1	131
Horse KZ-2	142
Horse KZ-3	147
Horse KZ-4	150

height at the withers of about 125-130 (135) cm (according to a number of comparisons with the people beside them), with a strong body, powerful necks and croup, short and protruding mane - characteristics typical of primitive and wild horses (Figs. 2-4).

Judging by the size of individual horses (BN-2 and SB-1, two of the four horses from the Kazanlak tombs), it could be concluded that some elite horses had a height above average, between 145-150 cm, which is the height of the present Arabian horses. The usual height of the modern selected, saddle Arabian horse is within the range of 146-150 cm (Vit, 1952). The Arabian horse is more elegant (with slightly more slender metapods) than the primitive ancient (so-called eastern) horse and belongs to the group of the horses with height above the average.

The slab of Shapladere (Fig. 5) presents carthorses harnessed in a massive, heavy wagon and a high saddle horse. According to our comparisons, the saddle horse probably had a height of about 150 cm, while the carthorse was slightly shorter but also a bit more massive. Probably these heights and proportions were not accidental in this very realistic image and reflected selection of horses for heavy carts and riding (elite horse). Height up to 148-150 cm could have been reached by the largest horses from the Scythian Pazyryskiy mound (Altai). Two height categories of horses were defined there by O. Vit, 1952 using a mass material: more robust, up to 130 cm tall and more slender with a height of 148-150 cm. For instance, it could be estimated based on the frieze of the tomb in Xanthos, Antalya (6 - 5th century B.C.), that the elite Assyrian saddle horse depicted there likely had a height of about 150 cm.

Conclusions regarding the growth, physical type and breed of the Thracian horses according to osteological data and depictions

The analysis showed that the Thracians of the surveyed epoch predominantly cultivated semi-slender and slender-legged horses used for cart and sad-

Fig. 5. Slab from Shapladere, Maritsa River outfall (V-III century B.C.), the earliest depiction of a chariot in Thracia (after RABADJIEV, 2012).

Fig. 6. Horses from the chariot of mound 27, Sboryanovo, near Sveshtari (excavations of prof. Diana Gergova; see Gergova, 2014)

dle animals. All of these horses had similarities with past and modern eastern breeds: in general, they were relatively small, most often with slender limbs (metatarsi) that were adapted for fast allures. More individuals need to be compared in order to determine whether horses with specific skeletal parameters, such as the horses studied here, have been used primarily for riding or for a cart (Fig. 6), or could have been used simultaneously for both. Larger and slender horses might have been used for riding from a higher-standing social stratum. The qualities of the horses likely depended on the skills of their keepers and the horses that had parameters above the average were highly appreciated. The height varied greatly: from 125 until 150 cm. (Table 10). These conclusions, based on osteological data, were confirmed by image analyses (comparisons of proportions of horse/ rider). In terms of height, the horses usually were small-

Fig. 7. Image of a hobbled horse. Detail on a vase from the mound of Chertomlykskiy (fourth century B.C.), Dnepropetrovsk, Ukraine (source: http://www.pslava.info/)

Table 10. Height at the shoulders of the horses from Benkovski, Sboryanovo and Kazanluk and their constitutional type after the metatarsal index.

Horse	Size Category	Constitutional types after metatarsals (classification of Brauner, 1916)
BN-1	medium sized	slender legged
BN-2	above the medium size	slender legged
SB-1	above the medium size	slender legged
SB-2	below the me dium size	semi slender legged
SB-3	medium sized	semi slender legged
SB-4	below the medium size	slender legged
SB-5	below the medium size	semi robust
KZ-1	below the medium size	semi robust
KZ-2	medium sized	slender legged
KZ-3	above the medium size	slender legged
KZ-4	above the medium size	semi slender legged

to medium-sized. The mass-bred horse was rather thickset, with a sturdy skeletal system and a dense, embossed musculature. The neck was stout, the head - large, with powerful jaws, short mane (often like bristles, rarely with longer straight forelocks), as seen from hundreds of detailed depictions. These are all primitive characteristics that practically did not differentiate them from the wild horses. The horse was usually more massive and shorter than the modern Arabian horse. According to osteological data, it was similar in height (and in its variability) to Scythian horses, but perhaps it used to be a bit more massive if judged by the depictions (Fig. 7). It differed from the ancient Akhal-Teke horse from Turkmenistan by its shorter body, its massive head and neck, the shorter and powerful body. The most frequent depictions of Thracian horses from the antiquity in Bulgaria were represented by such a horse (Figs. 2-4). Such horses would have been suitable for hunting, especially in the varied relief that characterises our lands. Most Thracian horses of the surveyed epoch (according to the study of the bone sample) were unlikely to have reached the height, slenderness and running abilities of the long-selected modern Arabian horse. At the same time, we have to pay attention to the fact that the elite Thracian horses (judging by osteological data, as well as some depictions) had already reached the parameters of the purebred Arabian saddle horses - their height and slenderness.

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