THE ROLE OF HORSE BURIALS IN THE BOGACZEWO CULTURE. KEY STUDIES OF PAPROTKI KOLONIA SITE 1 CEMETERY, NORTHEAST POLAND

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Abstract

The paper presents the problem of archaeological, archaeozoological and anthropological interpretations of horse burials from the Roman Period cemeteries from the Bogaczewo Culture (Masurian Lakeland) territory. It is presented on the basis of the multidisciplinary research of the cemetery in Paprotki Kolonia located in the heart of Bogaczewo Culture territory.

Key words: Horse, ritual, Roman Period, archaeology, archaeozoology.

Archaeological observations[1]

The cemetery of Bogaczewo Culture in Paprotki Kolonia site 1 is one of the best preserved cemeteries from the Roman Period in the Masurian Lakeland. Archaeological research of the cemetery began in 1991. So far, 534 human graves and 11 horse graves have been discovered there.[2]

Horse graves occupied three clearly distinct zones. The largest one was situated in the middle part of the cemetery. On both sides of this zone there were clusters of human graves containing the earliest burials. This confirms the allotment of this zone already at the time that the first burials took place in the cemetery. The second zone was located on the south-eastern edge of the cemetery, and the third – on the south-western edge (Fig. 1).

Eleven horses in the cemetery in Paprotki Kolonia were buried in rectangular or oval burial pits. In roofs of two of them – graves 290 and 398 a layer of stones was found. Stones were from 10 to 30 centimetres in diameter. Stone structures are also found in roofs of horse graves at other sites of the Bogaczewo Culture, in the cemeteries in Mojtyny (Hollack, Peiser 1904, p.57) and in Wyszembork at sites II and IVa (Szymański 2001, p.104, Rogalska 2002, p.21). Horse graves in the burial site in Paprotki Kolonia were usually oriented along the NE – SW axis, and rarely along the NW – SE axis (grave 356), with horse's head in the south part of their burial pit. Such arrangement of a horse body is typical for horse burials in the West Baltic Cultural Circle (Piątkowska-Małecka 2000, p.190; Gręzak 2007, p.366ff). Only grave 320 is an exception to this rule, as the horse body was oriented along the E–W axis, with it's head at west direction.

Animals were reposed in their burial pits in two positions. In the first one, called abdominal – dorsal position, an animal lay on it's stomach, a bit tilted to the right. Horses in this position were found in at least two graves (215 and 251). These animals had their legs under their bodies. Horses in the second position lay on their right (rarely left) side, with their forelimbs bent and their hind limbs straightened. Their legs were placed side by side in both leg pairs which may suggest that they had been bound before they were put into the

[1] All archaeological and archaeozoological analysis of horse graves from the cemetery in Paprotki Kolonia presented in this paper were conducted within the grant No. 1 H01H 003 29 "Sacrum et nature. The results of investigations of the Bogaczewo Culture cemetery in Paprotki Kolonia in the Great Masurian Lakes District" financed by Polish Ministry of Science and Higher Education, implemented at the University of Bialystok.

[2] So far the information on results of excavations at the cemetery in Paprotki Kolonia were published in: Bitner-Wróblewska 1999, pp.109-114; Bitner-Wróblewska, Karczewska 2007, p.349ff; Bitner-Wróblewska *et al.* 2001, pp.65-85; Gręzak 2007, p.356ff, 359ff and 367; Gręzak *et al*. 2003(2006), p.243ff; Informator Archeologiczny 1997a, p.73ff; 1997b, p.58ff; 1998a, p.61ff; 1998b, p.58ff; 2005, p.182; 2006, p.153ff; Karczewska 1996, p.105ff; Karczewska, Karczewski 2003, p.75ff; 2006, p.35ff; 2007a, pp.627-642; 2007b, pp.195-217; Karczewska *et al*. 2007, p.65; Karczewski 1997a, p.23ff fig.2; 1997b, pp.312 and 315; 1997c, pp.130 and 134-137, p.162 fig.III.3-16, IV.1-15, map 2; 1999; 2001, pp.28, 41 and 103 with map 5; 2002; 2006, p. 55, 56; 2008, p. 42-45; Karczewski *et al.* 2007, p.78ff; Karczewski *et al.* 2007a, p.75ff; Karczewski *et al.* 2007b, p.182ff; Mitkowska-Szubert 1996; Nowakowski 1995, pp.39, 40 and 43; Nowakowski 2001, p.85ff; Piasecki 2001, p.86; 2007, p.350ff; Szymański 2000, pp.115-129, 131, 133-135, 144, 161-164 and 173-183 fig.I.

Fig. 1. The map of the cemetery in Paprotki Kolonia site 1 (excavated in 1991–2007) with the location and C-14 dating of horse graves (after Karczewska, Karczewski 2007).

grave or that their bodies were deliberately arranged in a carefully planned, well-ordered position.

The arrangement of a horse body in it's grave may indicate the way in which it was buried, as well as the preceding ritual activities. The zoologists who investigate horse burials associate the first of the position with burying animals alive (Krysiak, Serwatka 1970, p.219). The arrangement of skeletons in horse graves in the burial grounds of the Bogaczewo Culture does not imply that the animals tried to get out of their grave cavities. Because of there is not any evidence for that, it is possible that the horse was completely weakened, intoxicated or tied up before placing into the grave pit. Even if such practices occurred, they must coexisted with burying dead animals, and sometimes only parts of their bodies.

In case of horse graves in Paprotki Kolonia there were some evidences pointing to the possibility that the horses had been killed and quartered. Killing of a horse, probably already inside the grave pit, has been affirmed in the case of grave 215 (Fig. 1; 2; table 3).The horse skeleton from the grave 215 had unnatural arrangement of the cervical vertebrae. Vertebra C5 was turned 90 degrees right of its standard anatomical position and vertebra C6 was broken. These abnormalities can suggest that the animal was killed by breaking it's neck. It is less possible, that the horse's neck was broken when the dead animal was placed into the grave pit.

The horse skeleton from grave 290 diverges from the norm even more (Fig. 1; 3; table 11). The horse was placed on its right side. Unfortunately, the grave was destroyed when the trenches were being dug during World War I and only the east part of the burial pit survived. Only the cranium and the right side of the post-cranial skeleton (cervical and thoracic vertebrae, ribs and bones belonging to the right forelimb) were found in the grave pit (Table 11). It means that the animal was halved in sagittal plane. The horse lay on its right side. Moreover, the cranium was about forty centimetres away west of vertically placed vertebra C1, and with it's teeth facing the vertebra. The horse's head had been cut off and placed with teeth in the direction of its back. Everything was covered with a layer of several stones. The remaining untouched graves included complete or almost complete skeletons (Tables 3; 7; 13; 17; 19 and 21; Figs. 2–5 Plate I.2–5).

Partial horse burials occurred in the grave 30A in Netta, dating from the late Roman Period (Bitner-Wróblewska 2007, p.18) and from barrow 76 in Osowa, from the early Migration Period (Jaskanis, Jaskanis 1961, p.172). They were also common in cemeteries on the territory of Lithuania. Three types of horse burials from between the eight and the 11th centuries AD were found near Kaunas: complete, partial (only a head or a head with forelimbs was buried), and the burials of fragmented scattered bones (Bertašius, Daugnora

Fig. 2. The location of a horse skeleton in grave 215 (photograph by Karczewski).

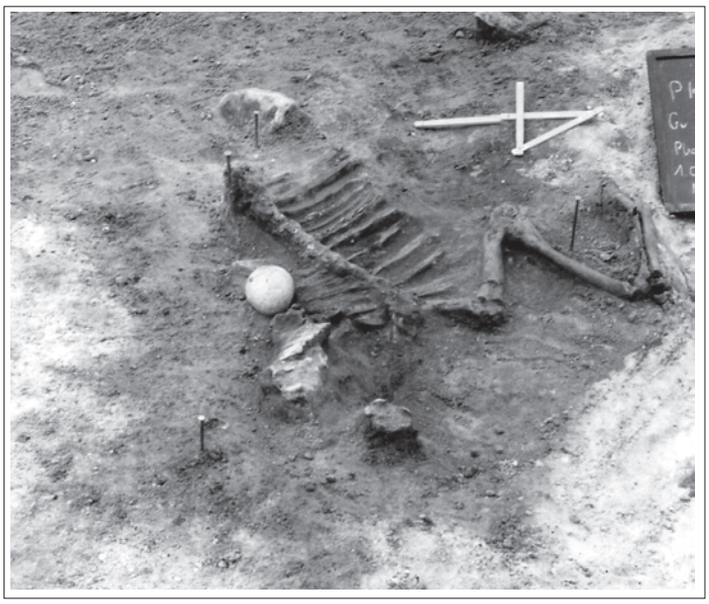


Fig. 3. The location of a horse skeleton in grave 290 (photograph by Karczewski).

2001, p.390). But there is no any horse burial similar to grave 290 from the cemetery in Paprotki Kolonia.

One of the most important feature of horse graves from the cemetery in Paprotki Kolonia is the completely lack of equipment. Establishing the chronology of burials was possible on the basis of C14 dating (Fig. 1).[3] The oldest horse graves are dated to 2185±30 BP (grave 175) and 2010 ±30 BP (grave 254), while the youngest grave is dated to 1760 ±30 BP (grave 398). This means that horses were buried in the cemetery throughout a period of 300-400 years, with the oldest burials laid already at the time of the establishment of the cemetery, in the turn of the eras.

For the first time in the history of research on cemeteries of the Bogaczewo Culture searches for macroscopic plant remains in grave pits were undertaken at the cemetery in Paprotki Kolonia. In the case of graves containing skeletal burials of horse these searches led to the discoveries of:

• in grave 290, at the level of the front part of the horse's skeleton, harred fragments of tall oat grass (*Arrhenatherum elatius*), a grass whose grains are of high nutritional value,

• in grave 320, charcoals from: birch (*Betula sp.*), European ash (*Fraxinus excelsior*) and bark.[4]

What's more two clusters of charcoal located by the horse's pelvic limbs and at the point of crossing of the thoracic limbs and pelvic limbs were discovered in grave 442. Charcoals found next to the horse's pelvic limbs came from birch (*Betula sp.*) and oak (*Quercus sp.*), while those found at the place of crossing of the thoracic and pelvic limbs came from pine (*Pinus sylvestris*) and oak (*Quercus sp.*). The lack of traces of fire on the bones of the horse's limbs indicates that either these charcoals came from fires lit inside the grave pit before the horse was laid there or that they were poured into it during the ritual connected with sacrificing the animal.

Archaeozoological observations

The archaeozoological analysis concerned 11 horse skeleton graves found in the burial ground in Paprotki Kolonia.[5] Three of the analysed objects had already undergone archaeozoological research at the Environmental Archaeology Unit, Institute of Archaeology, Warsaw University (Zajkowska 1999).

The osteological material was identified anatomically and zoologically (Driesch, Boessneck 1974). The age was estimated according to the criteria established by Kolda (1936) and Lutnicki (1972). The bones were

[3] The C14 dating of eleven horse graves from the cemetery in Paprotki Kolonia was financed by Foundation for Polish Science within the program „NOVUM".

[4] All palaeobotanical analysis were made by Dr Aldona Bieniek, MA Katarzyna Cywa and MA Zofia Tomczyńska from the Wladyslaw Szafer Institute of Botany Polish Academy of Sciences in Cracow.

[5] Authors realize that 11 horse skeletons dated from 3-4 centuries are not a representative for statistic test. So all remarks made on this base must be regarded as an assumption.

Fig. 4. The location of a horse skeleton in grave 320 (photograph by Karczewski).

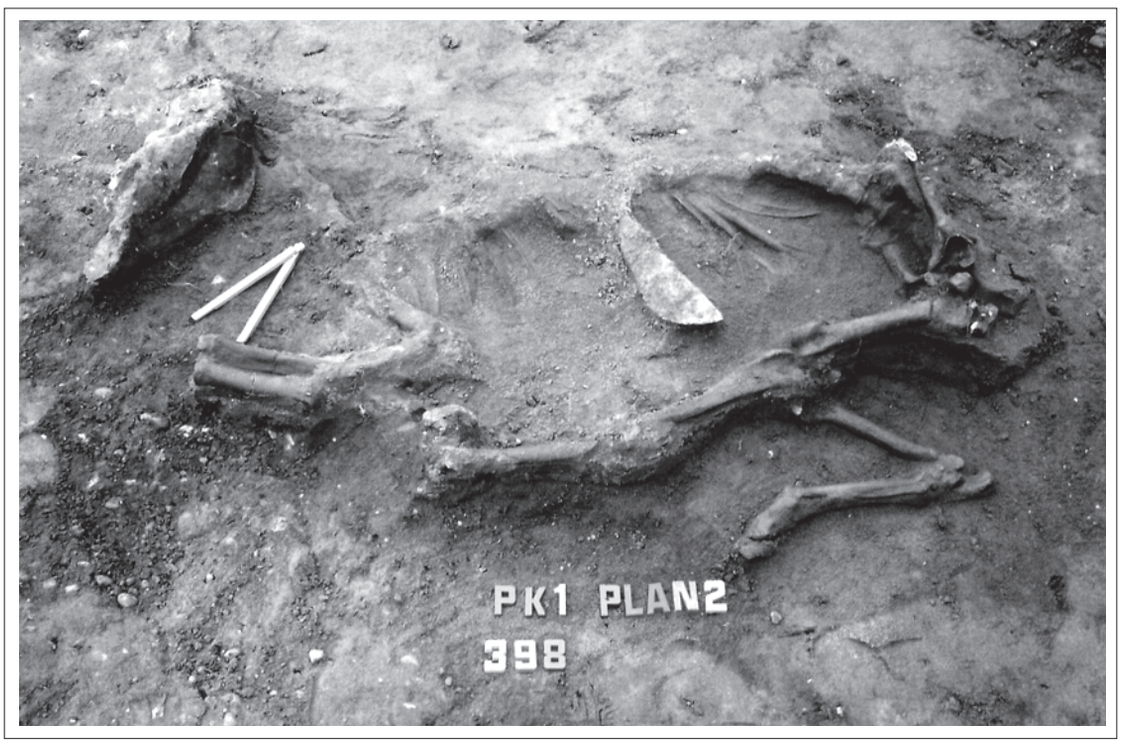


Fig. 5. The location of a horse skeleton in grave 398 (photograph by Karczewski).

measured according to the unified Driesch's method (1976). The measurements helped to calculate the withers height according to Kiesewalter's coefficient (quoted after Lasota-Moskalewska 1997, p.156). Metacarpal slenderness was calculated by means of the metacarpal slenderness indices (Całkin 1972, quoted after Kobryń 1984, p.29). Horse morphology was reconstructed by using the point-scale method devised by Kobryń (1989). The method also served to estimate the morphological resemblance of the animals. The withers height of a particular individual was converted into points of the point scale method and compared with the separate measurements of the long bones (radial bone, tibial bone and metapodial bone) of the animal. The similarity scale consisted of the values determined by the withers height ± 10 points. The measurements within this range were marked with '~' in the animal morphology tables, higher measurements – with '+' and lower – with '-'. The marks connected with animal illnesses were also described.

The research concerned 11 horse skeletons (Catalogue, Tables 1-22). The sex of 10 animals was reconstructed – all of them were males. The age range was wide as there were relatively young individuals, killed at the age of 5, as well as some very old horses (17–21 years old). Adult animals (between 5 and 9 years old) prevailed and only foals were missing. Similar age distribution concerns horses from other burial sites of the West Baltic Cultural Circle (Piątkowska-Małecka 2000, p.192). The age distribution of horses buried at the Bogaczewo Culture cemeteries almost precisely concur with the age distribution in the case of present herds.

The withers height of horses buried in Paprotki Kolonia site 1, varied and ranged from about 115-127 centimetres (the horse from grave 442, Table 22) to 139–143 centimetres (the horse from grave 320, Table 14). According to the division devised by Kobryń (1984) the horses were small (below 131 cm), small medium (132–135 cm), and large medium (136–142 cm) and they were similar in size to tarpan and konik / Polish pony (a small Polish horse, a kind of semi-wild pony). According to Kownacki (1963, quoted after Kobryń 1984, p.61) this kind of a horse reach the withers height of 128–135 centimetres, and according to Vetulani (1928) – about 138 centimetres, whereas tarpans described by Gromowa (quoted after Lasota-Moskalewska, Perlikowska-Puszkarska 1994, p.195) were 133–136 centimetres high. The measurements for the horses from the burial ground in Paprotki Kolonia calculated into points of the point-scale method fall within the same height ranges. Single animals were smaller or higher but it must be pointed out that tarpan withers height is only an estimate, as it was calculated on the basis of limited osteological material. Polish pony withers height does not seem to be well established (Kobryń 1984, p.61). Therefore, when the measurements of horses from archaeological sites are compared with those of Polish ponies, one has to bear in mind that they vary greatly depending on different breeding condition (Herman 1930, quoted after Kobyń 1984, p.62). It must also be stressed that the withers heights reconstructed on the basis of the excavated osteological material are approximate, and sometimes a particular individual is given a wide withers height estimate. This situation concerns the horse from grave 442. It's withers height estimate, based on the combined humerus, radius, femur, tibia, metacarpus and metatarsus lengths, ranges between about 115 and 127 centimetres (Table 22). The withers height of the horses from the cemetery in Paprotki Kolonia was calculated according to Kiesewalter's coefficients, which had been determined on the basis of observation of primitive horse breeds living in Europe at the end of the 19th century. Therefore, the wide range of withers height of the horse from grave 442 may be attributable to the different proportions of particular bones of this individual in comparison with the average proportions of the same bones in the animal population analysed by Kieselwalter. The withers heights of the horse from grave 442 calculated on the basis of its radial and tibial bone measurements are similar (123.7 and 127.3, respectively); the measurements of the metapodial bones gave a bit lower estimations (withers height of 118.6 cm for the metacarpal bone and 121 cm for the metatarsal bone), whereas the lowest withers height (about 115 cm) was obtained after calculating the measurements of the humeral and femoral bones. It suggests that this particular horse from the burial site in Paprotki Kolonia had different proportions of the stylopodial part of the forelimb to its zeugopodial part and to the metapodial part of both the forelimb and the hind limb than the analogous proportions commonly encountered in the animals examined by the German zoologist. In order to show more clearly the differences in the length and width dimensions of the long bones of particular animals buried in the burial site, the absolute values were calculated into points (Tables 2, 4, 6, 8, 10, 12, 14, 16, 18, 20 and 22). The analysis showed that horses from graves 251 (Table 8) and 442 (Table 22) had a similar morphotype; they had relatively longer radial bones than metacarpal bones, while their tibial bones and metatarsal bones were similar in length. In case of animals from graves 215 (Table 4) and 320 (Table 14), lengths of the zeugopodial elements (that is, the radial bone and the tibial bone) were proportionally bigger than the lengths of metapodial elements. The condition of the horse bones from grave 254 (Table 10) enabled

the analysis of the forelimb only, and the condition of the horse bones from grave 398 (Table 20) – of the hind limb. In case of the former animal, the length dimensions of its radial bones were similar to the analogous dimensions of its metacarpal bones, whereas the latter had similar length dimensions of tibial bones and metatarsal bones. Similar analyses are impossible for horses from other graves, as the bones in question either had not been found or had been preserved in fragments only. The analysis shows that horses had different morphotypes. Two morphotypes were distinguished, characterised by substantial differences in the length of individual bones belonging to a particular animal. In the first morphotype length dimensions of radial bones are relatively bigger than the length dimensions of metacarpal bones, whereas parametres describing tibial bones and metatarsal bones are even (two horses from graves 251 and 442). The length dimensions of radial and tibial bones of a particular individual bigger than the length dimensions of its metacarpal and metatarsal bones are typical of the second morphotype (two horses from graves 215 and 320, and maybe also the horse from grave 398). As for the horse from grave 254, proportions of it's forelimb do not match any of the presented morphotypes. It could have been an example of a fully developed type, with similar measurements of all analysed bones.

A similar analysis was carried out on the basis of the length dimensions of horse bones from the burial site in Sątoczno, dated to the Migration Period (Lasota-Moskalewska, Perlikowska-Puszkarska 1994, p.197). It revealed that dimensions of radial and tibial bones were bigger than those of metapodial bones. Similar results were obtained on examining the variability of horse morphological features on the basis of horse osteological material from the sites on the present Polish territory (Kobryń 1984). As for the forelimb, the degree of changes with time (from the Neolithic Period to the Middle Ages) was lower for proximal parts and bigger for distal parts. This was not the case for the hind limb which may indicate different bio-mechanical function of the forelimb and hind limb, resulting in bigger susceptibility of the hind limb to environmental factors (Kobryń 1984, p.64).

Another analysis concerned metacarpal slenderness according to Brauner's coefficients (quoted after Kobryń 1984, p.29). Metacarpal slenderness indices were calculated for 8 horses from the burial ground in Paprotki Kolonia and pointed up the differences in the morphotypes of animals. Most metacarpal bones fell into Brauner's *slightly massive*- and *slender legged* categories (3 individuals in each group), while the categories of *massive*- and *medium slender legged* horses were represented by one individual each.

The third analysis concerned the extent to which the individual dimensions of long bones belonging to a particular horse deviate from the value determined by the withers height, calculated on the basis of length dimensions of long bones. Values higher than expected regarded the majority of breadth dimensions: six times the shaft breadth, four times the proximal part breadth, and four times the distal part breadth. The metacarpal bone length dimension of the horse from grave 356 was the only exception as it's value was bigger than the approximate relative withers height range of the animal. Values lower than the established withers height range also concerned mostly breadth dimensions: distal part breadth – four times, shaft breadth – three times, proximal part breadth – twice, and only once they concerned the length dimension of a bone. These data suggest that the morphological type of horses buried in Paprotki Kolonia was not homogenic. Animals differed in the metacarpal slenderness. The observed variety of morphotypes indicates unstable population dynamics. It may have been caused by the possible control (usage) of animals which can have been selected by their users. The increase in dimension variability is believed to be an indicator of the early domestication (Benecke 1998). Wild populations exhibit lower variability of bone dimensions.

Pathological changes which made an animal unique sometimes marked it to become a sacrificial animal (Węgrzynowicz 1982, p.110). One ill animal was buried at the cemetery in Paprotki Kolonia. Bone hyperplasia following a chronic inflammatory condition was found on the cervical and thoracic vertebrae and the tarsal joint of the horse from grave 221. Bone hyperplasia leads to *ankylosis* (deformation and stiffening of the spine), which greatly affects an animal's physical fitness. In case of this particular individual, the vertebrae did not fuse and only tarsal joint fusion was observed, which did not influence much the animal's physical fitness. Signs of inflammatory condition found on bones may be the consequence of using these animals for riding, since this particular pathology is more likely to occur in riding horses than in non-exploited individuals. The appearance of ill animals in graves is not necessarily connected with deliberate selection of crippled and ill horses for sacrificial animals; it can be the result of burying riding horses and in this particular case it may be attributable to the horse's advanced age.

Horse graves from the burial site in Paprotki Kolonia reveal certain similarities to other burials of the Bogaczewo Culture but some differences are also found (Rogalska 2002; Zajkowska 1999; Gręzak 2007). As for the similarities, all burial pits are of the same shape and are similarly oriented. They show no relations to human graves. Male individuals are preferred as sac-

rificial animals and there is no age selection. As far as the differences are concerned, the analysed burials lack equipment. The research which has been carried out so far point to the wide range of withers height of the sacrificial horses. It is also worth mentioning that the buried horses vary in morphotype which may be the result of length of their control by man.

The role of horse burials in Bogaczewo Culture

The fundamental questions connected with graves containing horse burials are those concerning the reasons for burying them and the criteria for the selection of specimens. Hitherto literature indicated sex as the only criterion for selection (Gręzak 2007, p.359). It appears that the maturity of the male could have constituted another criterion. The skeletons found in the graves in cemeteries of the Bogaczewo Culture were exclusively those belonging to horses, adult, of different ages.[6] On the cemetery in Paprotki Kolonia the youngest horse was 5 years old when died, and the oldest was very old. The horse from the grave 221 was handicapped in respect of movement because of the illness, which lead to the hyperplasia of neck and chest vertebra and tarsus.

The morphological features do not provide the grounds for determining if these were wild or livestock animals (Lasota-Moskalewska 1997, p.94; Piątkowska-Małecka 2000, p.191ff). It is possible both: that horses from the cemetery in Paprotki Kolonia were stallions captured from wild herds or they were domestic or tame animals. As it was mentioned above some results of archaeozoological analysis suggests that discussed animals might be domesticated. We can also surmise that these horses were specially destined for the sacral purpose.

The reasons for burying horses in the cemeteries of the Bogaczewo Culture, despite the attempts made, have not been explained yet (Jaskanis 1974, p.248ff; Piątkowska-Małecka 2000, p.190ff). In contrast to the cemeteries of the Sudovian Culture (Jaskanis 1966, p.49), it is impossible to indicate a direct connection between a horse burial and a specific human grave. Therefore, it is not likely that these horses were simply burial offerings accompanying male burials, including the graves of warriors. The role of horse burials in the sphere of magical beliefs, and the votive sphere, emphasising the role of the horse as a symbol of vital force and fertility was stressed (Jaskanis 1966, pp.50 and 55; 1974, pp.148-250).

In the case of the cemetery in Paprotki Kolonia the horizontal and vertical stratigraphy indicates that horse burials were used for delimitation and dividing of the sacrum space (Fig. 1). They were located in three clearly distinct zones probably defined in the moment of establishing the cemetery.

However, there is no visible regularity in the chronology of the graves which would point to the burial of subsequent horses in a specific order. Two oldest burials (graves 175 and 254) were located in the southern part of the central cluster of horse graves. Successive burials (graves 215 and 221) in this cluster, which are in one row with graves 175 and 154, became progressively younger to the north. The grave located in the most extreme northern part of this cluster (grave 442) was, however, older than graves 215, 251 and 254, which constituted the central part of the cluster. The interpretation of the spatial development of the central cluster of horse graves is also greatly hampered by the fact that a considerable part of it has probably been destroyed by a dug-out made in the 1940s.

Three graves located on the south-eastern and eastern edge of the cemetery (graves 320, 356 and 398) were created in the space of about 200 years with the oldest one situated in the south-western part of the cluster and the younger one in the north-western part.

Rather interesting is the chronology of two graves located in the south-western part of the cemetery (graves 290 and 369). They were created within a very short time interval or were simply created simultaneously.

The dating and distribution of horse graves in the cemetery in Paprotki Kolonia indicate that there might have been some connection between these graves and the clusters of human graves in the vicinity of which they have been located. In such a case horse sacrifices were probably made by those members of the community, which buried its dead in the cemetery in Paprotki Kolonia, who had the closest ties to the deceased buried in a given cluster or several neighboring clusters of graves.

Conclusions

The horse graves from the cemetery in Paprotki Kolonia shows certain similarities to other burials of the Bogaczewo Culture but some differences are also found. As for the similarities, all burial pits were of the same shape and similarly oriented. They show no simple relations to human graves. All the horse burials from the cemetery in Paprotki Kolonia, contained skel-

[6] The only one exception is the horse from the object 120 discovered in Wyszembork site II. A skeleton of an animal in the age of less than 3.5 years was found there. But it must be noted that this object was situated outside of the cemetery.

etons of adult males, from relatively young individuals to very old. Horses laid in graves in other cemeteries of the West Baltic Cultural Circle were also male. In morphological terms they are analogous to horses resembling the contemporary Polish ponies or to the extinct tarpan type.

A feature which distinguishes the horse graves in Paprotki Kolonia from burials of this type known from other cemeteries is the complete absence of equipment. Another feature, which has not been recorded in other cemeteries of the Bogaczewo Culture, was the use of plants and lighting fires or pouring charcoals into grave pits in the ritual connected with burying horses.

It is very likely that burying live horses and horses killed earlier in the cemetery in Paprotki Kolonia took place at times of particularly great significance for the community which buried its dead in that cemetery. The chronology of horse graves shows that these were not cyclical sacrifices made at regular intervals. Whereas the places of horse burials were precisely defined in the space of the cemetery.

Catalog of horse burials from the cemetery in Paprotki Kolonia site 1

Grave 175 (Tables 1 and 2; Fig. 6)

The horse skeleton was found at the bottom of a pit oriented along a NE–SW axis. The upper part of the pit was damaged. The animal lay on its left side, hind limbs straight. The arrangement of the forelimbs is unknown. No equipment has was found accompanying the horse skeleton. The northernmost part of the grave pit had been damaged by the digging of grave 242 dated to phase B_2/C_1–C_{1a}. Results of radiocarbon dating of the horse skeleton: 2185±30 BP.

The preserved skeleton was nearly complete. Three incisors were missing. The cranium, mandible as well as elements of the axial skeleton were preserved fragmentarily. Only fragments of the scapulas, the pelvis and the right femur were found. Most of the limb bones were represented in pairs. The recorded absence of some fragments is probably due to the bad state of preservation of the bones. Part of the osteological material was highly fragmented, which made anatomical identification impossible. On the basis of the degree of attrition of the incisor cups it was determined that the horse was about 7 years old. The presence of well-developed canines indicates that the buried animal was a male. Withers height: 136.7–145.1 cm (Table 2). The metacarpal index was 15.22, which according to Brauner's criteria classifies the described animal as medium slender-legged.

Grave 215 (Tables 3 and 4; Fig. 2)

The horse skeleton was found at the bottom of a big pit which had a ceiling outline similar to a rectangle, nearly vertical walls and a flat base. The skeleton was oriented along a NE–SW axis, the head to the SW. It lay in an abdominal-dorsal position (on the abdomen, slightly tilted to the left side, resting against the grave pit wall) with flexed limbs. The right forelimb was slightly stretched out to the side in a northern direction, the left one was positioned under the horse's neck. The horse's head lay in a vertical position with the muzzle directed downwards. The arrangement of the cervical vertebrae differed from the anatomical arrangement. The fifth cervical vertebra had been twisted 90° to the right from its natural position, the sixth was broken. There was no equipment accompanying the horse skeleton. Results of radiocarbon dating of the horse skeleton: 1825±30 BP.

The preserved horse skeleton was complete. The horse was a male, aged about 7. Withers height estimated on the basis of the dimensions of five long bones fell within the range of 133–135 cm (Table 4). The metacarpal index was 16.74, which according to Brauner's criteria classifies the described animal as massive-legged.

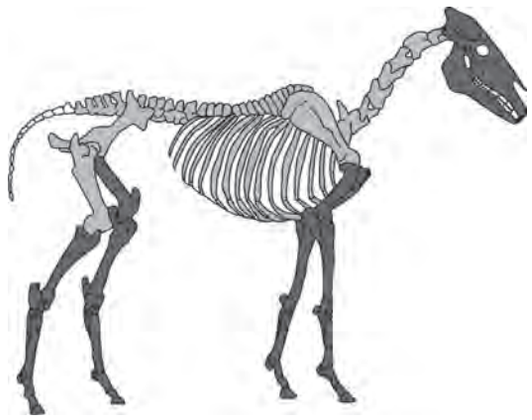
Fig. 6. The location of a horse skeleton in grave 175 (photograph by Karczewski).

Grave 221 (Tables 5 and 6; Plate I.4)

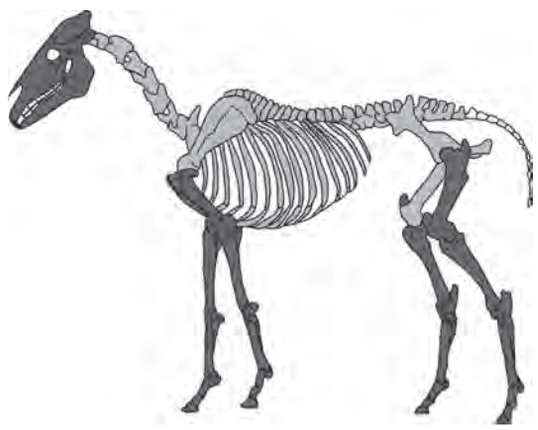
The horse skeleton was found at the bottom of a pit which closely fit the size of the animal, with an oval ceiling outline. The extent of the grave pit with the oval outline of the ceiling closely corresponded to the shape and size of the skeleton. The skeleton was oriented along a NE–SW axis. The animal lay on its left side with the head directed SE, muzzle directed E. Its forelimbs were bent, the right limb next to the mandible,

Table 1. Horse bone remains from grave 175

Element of skeleton	Right	Left
Cranium	5 pieces	
Hyoid bone	-	
Mandible	11 pieces	
Teeth	I – 9, C – 4, P + M 24	
Vertebrae	7 pieces of v. c. and v. th	
Sternum	-	
Ribs	A lot of pieces	
Scapula	5 pieces of right and left bones	
Humerus	5 pieces of right and left bones	
Radius	4 pieces of right and left bones	
Ulna	2 pieces	
Carpals	6 left and right bones	
Metacarpus III	1 bone	1 bone
Phalanx I, forelimb	1 bone	1 bone
Phalanx II, forelimb	1 bone + 1 piece	
Phalanx III, forelimb	1 bone + 1piece	
Pelvis	1 piece	
Femur	2 piece	
Patella	1 bone	1 bone
Tibia	1 piece	1 piece
Fibula	-	-
Calcaneus	1 bone	1 bone
Talus	1 bone	1 bone
Tarsals	4 bones	4 bones
Metatarsus III	1 bone	2 pieces
Metacarpus II, IV; Metatarsus II, IV	8 pieces of 4 bones	
Sesamoideal bones	7 bones	
Phalanx I, hind limb	1 bone	1 bone
Phalanx II, hind limb	1 bone	1 bone
Phalanx III, hind limb	1 piece	1 piece
Unidentified bones	A lot of small pieces	



Grave 175 – horse skeleton, a view from the right side.



Grave 175 – horse skeleton, a view from the left side.

the left limb away from the right one, closer to the hind limbs. The hind limbs were straight and arranged in a south-east direction. The eastern part of the pit had been damaged by a modern object. The posterior part of the skeleton was damaged (Tables 5; 6). The burial was deposited directly under the arable layer, which led to the damage of the cerebral part of the cranium as well as the atlas and axis. No equipment has been found accompanying the horse skeleton. Results of radiocarbon dating of the horse skeleton: 1920±30 BP.

As a result of the disturbance of the grave pit by a modern pit, the skeleton was only partially preserved (Table 5). Nearly all bone elements from the undamaged part of the skeleton have been described. The only missing elements were phalanges II and III of the right hind limb and small elements, e.g. sesamoideal bones, which might have been destroyed in the ground or overlooked during exploration. The horse's bones were characterized by a bad state of preservation, relatively few fragments of vertebrae and ribs were found. Many bone chips have not been anatomically identified.

The horse was a male aged 17–21. Withers height estimated on the basis of the dimensions of three long bones fell within the range of 127.6–133 cm. The metacarpal index was 15.87, which according to Brauner's criteria classifies the described animal as slightly massive-legged.

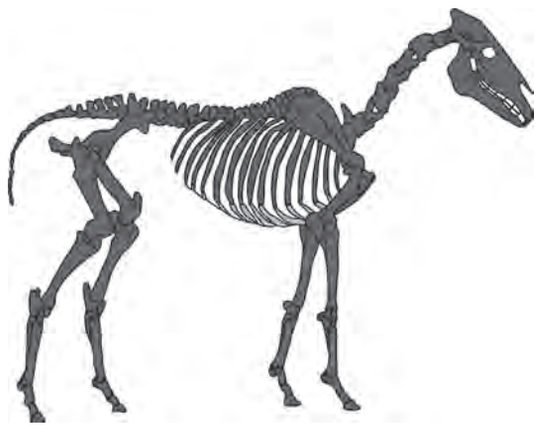
On the preserved cervical and thoracic vertebrae on the abdominal side there was an osteophyte, probably caused by a stiffening inflammation of the vertebrae - spondylitis (*spondylitis*) (Zajkowska 1999, p.24). Lesions were also recorded on tarsal and metatarsal bones. As a result of deforming proliferative stiffening inflammation of the tarsal joint known as bone spavin (*arthropathia deformans et ankylopoetica tarsi*) there was a symphysis between two tarsal bones.

Table 2. Morphological data concerning the horse from grave 175

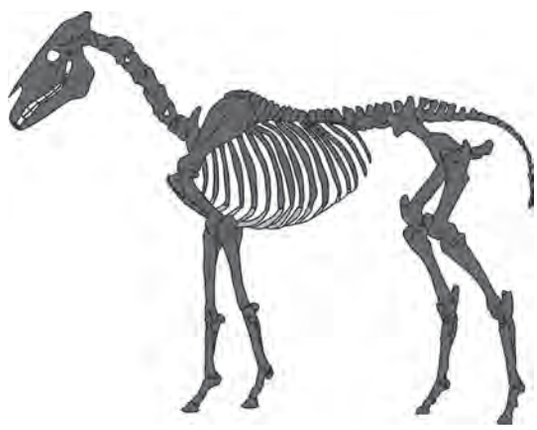
Bone	Measurement	/mm/		Withers height /cm/	Points
		Right	Left		
Scapula	Length of the glenoid cavity – LG	-	-	-	-
	Breadth of the glenoid cavity – BG				
	Smallest length of collum – SLC				
Humerus	Greatest length – GL	289	-		-
	Greatest length of the lateral part – GLI	298		145,1	
	Breadth of the proximal end – Bp	-			
	Breadth of the distal end – Bd	87			
	Smallest breadth of diaphysis – SD	-			
Radius	Greatest length – GL	335	-		70 ~
	Length of the lateral part – LI	315		136,7	
	Breadth of the proximal end – Bp	85			70 ~
	Breadth of the distal end – Bd	-			
	Smallest breadth of diaphysis – SD	-			
Metacarpus III	Greatest length – GL	230	230		53,3 ~
	Length of the lateral part – LI	215	215	137,8	
	Breadth of the proximal end – Bp	50	50		56,6 ~
	Breadth of the distal end – Bd	50	50		50 ~
	Smallest breadth of diaphysis – SD	35	35		
Phalanx I	Greatest length – GL	85	-	-	
	Breadth of the proximal end – Bp	55			
	Breadth of the distal end – Bd	45			
	Smallest breadth of diaphysis – SD	36			
Phalanx II	Greatest length – GL	45		-	35 ~
	Breadth of the proximal end – Bp	52			40 ~
	Breadth of the distal end – Bd	50			45 ~
	Smallest breadth of diaphysis – SD	-			
Phalanx III	Greatest length – GL	-	-	-	-
	Greatest breadth – GB				
	Length of the dorsal surface –Ld				
	Diagonal length of the sole – DLS				
	Height in the region of the extensor process – HP				
Pelvis	Length of acetabulum – LA	-	-	-	-
Femur	Greatest length – GL	-	-	-	-
	Greatest length from caput – GLC				
	Breadth of the distal end – Bd				
	Smallest breadth of diaphysis – SD				
Patella	Greatest length – GL	73	-	-	-
	Greatest breadth – GB	73			
Tibia	Greatest length – GL	-	-	-	-
	Length of the lateral part – LI				
	Breadth of the proximal end – Bp				
	Breadth of the distal end – Bd				
	Smallest breadth of diaphysis – SD				
Calcaneus	Greatest length – GL	110	110	-	-
Talus	Greatest height – GH	67	65	-	-
	Greatest breadth – GB	60	60		
Metatatarus III	Greatest length – GL	269	269		57,7 ~
	Length of the lateral part – LI	263	263	140,2	
	Breadth of the proximal end – Bp	49	49		60 ~
	Breadth of the distal end – Bd	51	51		65 ~
	Smallest breadth of diaphysis – SD	32	32		70 ~
Phalanx I	Greatest length – GL	81	82	-	-
	Breadth of the proximal end – Bp	57	55		
	Breadth of the distal end – Bd	53	43		
	Smallest breadth of diaphysis – SD	33	32		
Phalanx II	Greatest length – GL	47	46	-	40 ~
	Breadth of the proximal end – Bp	51	50		40 ~
	Breadth of the distal end – Bd	47	46		40 ~
	Smallest breadth of diaphysis – SD	40	40		40 ~
Phalanx III	Greatest length – GL	-	65	-	-
	Greatest breadth – GB		-		
	Length of the dorsal surface –Ld		59		
	Diagonal length of the sole – DLS		/60/		
	Height in the region of the extensor process – HP		40		

Table 3. Horse bone remains from grave 215

Element of skeleton	Right	Left
Cranium	Almost whole cranium + 108 small pieces	
Hyoid bone	-	
Mandible	23 pieces	
Teeth	I – 12, C – 4, P+M – 24	
Vertebrae	196 pieces of 38 vertebrae + 19 pieces of sacrum	
Sternum	10 pieces	
Ribs	232 pieces of 36 ribs	
Scapula	1 bone	8 pieces
Humerus	1 bone	1 bone
Radius	1 bone	1 bone
Ulna	1 bone	1 bone
Carpals	11 bones	
Metacarpus III	1 bone	1 bone
Phalanx I, forelimb	1 bone	1 bone
Phalanx II, forelimb	1 bone	1 bone
Phalanx III, forelimb	1 bone	1 bone
Pelvis	30 pieces	
Femur	1 bone	1 bone
Patella	1 bone	1 bone
Tibia	1 bone	1 bone
Fibula	1 bone	1 bone
Calcaneus	1 bone	1 bone
Talus	1 bone	1 bone
Tarsals	7 bones	
Metatarsus III	1 bone	1 bone
Metacarpus II, IV; Metatarsus II, IV	11 pieces of 8 bones	
Sesamoideal bones	-	
Phalanx I, hind Limb	1 bone	1 bone
Phalanx II, hind limb	1 bone	1 bone
Phalanx III, hind limb	1 bone	1 bone
Unidentified bones	About 200 pieces	



Grave 215 – horse skeleton, a view from the right side.



Grave 215 – horse skeleton, a view from the left side.

Grave 251 (Tables 7 and 8; Plate I.2)

The horse skeleton was found at the bottom of a pit which had a ceiling outline similar to a rectangle. It was oriented along a NE–SW axis. The skeleton lay on its right side, the head to the SW and muzzle to the S. The forelimbs were bent at the elbow joint while the hind limbs were straight, arranged alongside the trunk and directed SW. No equipment was found accompanying the horse skeleton. The easternmost edge of the grave pit had been disturbed during the digging of the pits of graves 236 and 237. The chronology of the complex has been determined, on the basis of the equipment found in the grave, to phase B_{2a}. Results of radiocarbon dating of the horse skeleton: 1885±30 BP.

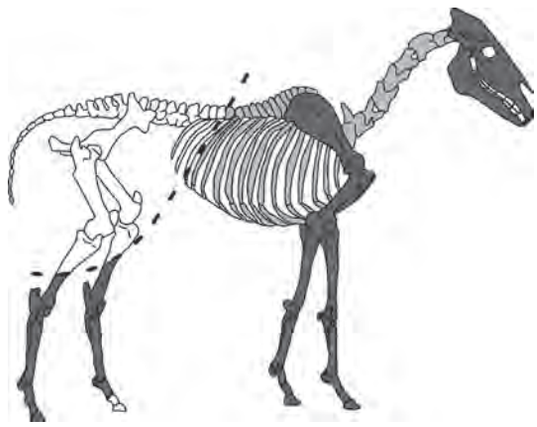
The animal's complete skeleton was preserved, including phalanges (Table 7). The horse was a male. On the basis of the degree of attrition of the incisor cups it has been estimated that the horse was about 8–9 years old. Withers height estimated on the basis of the dimensions of five long bones fell within the range of 126.9–133.8 cm. The metacarpal index was 16.09, which according to Brauner's criteria classifies the described animal as slightly massive-legged.

Table 4. Morphological data concerning the horse from grave 215

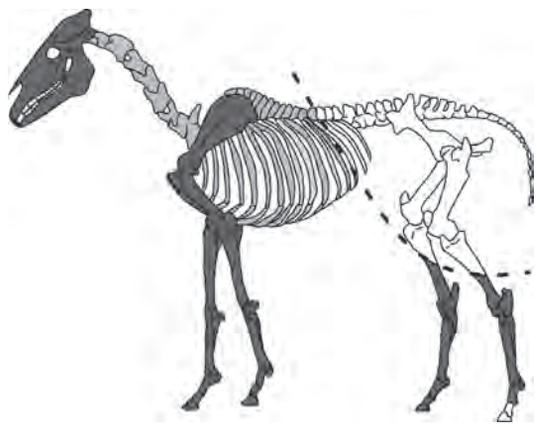
Bone	Measurement	/mm/		Withers height /cm/	Points
		Right	Left		
Scapula	Length of the glenoid cavity – LG Breadth of the glenoid cavity – BG Smallest length of collum – SLC	-	-	-	-
Humerus	Greatest length – GL Greatest length of the lateral part – GLI Breadth of the proximal end – Bp Breadth of the distal end – Bd	286 276 - 72	287 277 - 71	134,9	-
Radius	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	328 309 81 72 40	327 309 81 71 39	134,1	62 ~ 53,5 ~ 40 + 100 ~
Metacarpus III	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	215 207 50 49 36	214 208 50 49 36	about 133	about 36 ~ 50 ~ 50 ~ 55 ~
Phalanx I	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	84 55 46 35	86 55 48 36	-	-
Phalanx II	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	44 53 50 44	44 53 50 45	-	30 55 45 80
Phalanx III	Greatest length – GL Greatest breadth – GB Length of the dorsal surface –Ld Diagonal length of the sole – DLS Height in the region of the extensor process – HP	-	-	-	-
Pelvis	Length of acetabulum – LA	-	-	-	-
Femur	Greatest length – GL Greatest length from caput – GLC Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	381 - 92 43	381 - 91 43	-	-
Patella	Greatest length – GL Greatest breadth – GB	-	-	-	-
Tibia	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	351 309 92 70 41	350 310 93 - 42	about 135	about 64 ~ 70-73 + 55 ~ 90 -
Calcaneus	Greatest length – GL	108	107	-	
Talus	Greatest height – GH Greatest breadth – GB	-	-	-	
Metatarsus III	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diathesis – SD	258 251 49 49 34	257 250 50 49 34	about 134	about 45 ~ about 70 ~ 55 ~ >0 -
Phalanx I	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	84 55 46 35	87 54 49 3	-	-
Phalanx II	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	47 53 48 42	47 53 48 43	-	45 55 50 50-55
Phalanx III	Greatest length – GL Greatest breadth – GB Length of the dorsal surface –Ld Diagonal length of the sole – DLS Height in the region of the extensor process – HP	-	-	-	-

Table 5. Horse bone remains from grave 221

Element of skeleton	Right	Left
Cranium	77 pieces of neuro- and viscerocranium	
Hyoid bone	-	
Mandible	32 pieces	
Teeth	I – 12, C – 4, P+M – 24	
Vertebrae	107 pieces of 12 vertebrae	
Sternum	11 pieces	
Ribs	125 pieces	
Scapula	32 pieces of right and left bones	
Humerus	41 pieces of right and left bones	
Radius	10 pieces of right and left bones	
Ulna	7 pieces of right and left bones	
Carpals	11 right and left bones + 2 pieces	
Metacarpus III	1 bone	1 bone
Phalanx I, forelimb	1 bone	1 bone
Phalanx II, forelimb	1 piece	1 piece
Phalanx III, forelimb	1 piece	1 piece
Pelvis	-	-
Femur	-	-
Patella	-	-
Tibia	5 pieces of right and left bones	
Fibula	-	-
Calcaneus	3 pieces of right and left bones	
Talus	1 bone	1 piece
Tarsals	3 bones + 4 pieces	
Metatarsus III	14 pieces of right and left bone	
Metacarpus II, IV; Metatarsus II, IV	11 pieces of 5 bones	
Sesamoideal bones	-	-
Phalanx I, hind limb	1 bone	-
Phalanx II, hind limb	1 bone	-
Phalanx III, hind limb	1 piece	-
Unidentified bones	1350 pieces	



Grave 221 – horse skeleton, a view from the right side.



Grave 221 – horse skeleton, a view from the left side.

Grave 254 (Tables 9 and 10; Fig. 7)

The horse skeleton was found at the bottom of a pit which had been largely destroyed by ploughing and a military trench from World War I. This fact made it difficult to determine the shape and size of the pit. The pit was oriented along a NE–SW axis. The skeleton lay in the pit on its abdomen (or in an abdominal-dorsal position) with the head directed SW. No equipment was found accompanying the horse skeleton. Results of radiocarbon dating of the horse skeleton: 2010±30 BP.

The only surviving parts of the skeleton were fragmented elements of the spine, ribs and sternum as well as fragments of bones of: the proximal part of the forelimbs – both scapulas and humeral bones, as well as the proximal segment of the hind limbs – the pelvis, two femurs, the right kneecap and small fragments of the tibia shaft (Table 9). The absence of teeth made the determination of the animal's gender or its age at the time of death impossible. A certain hint as to the horse's age is given by the degree of development of the proximal part of the femur. The proximal bone end of the femur joined with its shaft which only indicates that the animal had lived for at least 3–3.5 years and, therefore, rules out the possibility of a burial of a morphologically immature individual. There is no available data for determining the animal's morphology.

Grave 290 (Tables 11 and 12; Fig. 3)

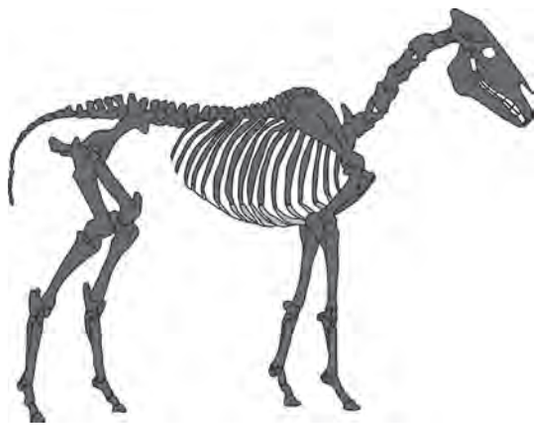
The horse skeleton was found at the bottom of a pit with an oval outline. The western part of the pit had been damaged by a military trench from World War I, which resulted in the fact that the hind part of the skeleton was no preserved. The skeleton was oriented along a NE–SW axis. A layer of large granite boulders was deposited in the ceiling of the pit. There was no equipment accompanying the horse skeleton. Results

Table 6. Morphological data concerning the horse from grave 221

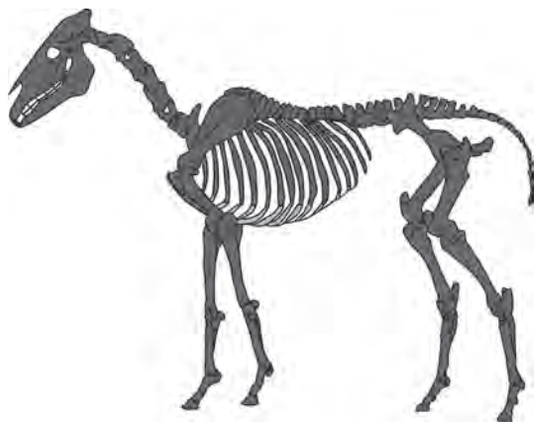
Bone	Measurement	/mm/		Withers height /cm/	Points
		Right	Left		
Scapula - Scapula	Length of the glenoid cavity – LG Breadth of the glenoid cavity – BG Smallest length of collum – SLC	-	-	-	
Humerus	Greatest length – GL Greatest length of the lateral part – GLI Breadth of the proximal end – Bp Breadth of the distal end – Bd	-	- - 70 -	-	
Radius	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	326 308 79 74 37	326 307 79 73 37	about 133	60 + 50 ~ 46,6 ~ 80 +
Metacarpus III	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	208 199 48 48 33	207 199 48 47 33	127,6	about 29 ~ 40 ~ 40 ~ 40 ~
Phalanx I	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	78 53 43 33	78 52 44 33	-	-
Phalanx II	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	- 48 - -	-	-	-
Phalanx III	Greatest length – GL Greatest breadth – GB Length of the dorsal surface –Ld Diagonal length of the sole – DLS Height in the region of the extensor process – HP	-	-	-	-
Pelvis	Length of acetabulum – LA	-	-	-	-
Femur	Greatest length – GL Greatest length from caput – GLC Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Patella	Greatest length – GL Greatest breadth – GB	-	-	-	-
Tibia	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Calcaneus	Greatest length – GL	-	-	-	-
Talus	Greatest height – GH Greatest breadth – GB	56 52		-	-
Metatarsus III	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	249 241 50 46 30	248 - 49 - 29	128,5	about 35 ~ 60 ~ - 40 ~
Phalanx I	Greatest length - GL Breadth of the proximal end - Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	75 53 42 33	-	-	-
Phalanx II	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	43 49 - 43	43 49 46 43	-	25 35 40 55
Phalanx III	Greatest length – GL Greatest breadth – GB Length of the dorsal surface – Ld Diagonal length of the sole – DLS Height in the region of the extensor process – HP	-	-	-	-

Table 7. Horse bone remains from grave 251

Element of skeleton	Right	Left
Cranium	122 pieces of neuro- and viscerocranium	
Hyoid bone	5 pieces of right and left bones	
Mandible	12 pieces of right left bones	
Teeth	I – 12, C – 2, P+M – 24	
Vertebrae	v. c – 8 pieces, v. th. + v. l – 6 pieces, os sacrum – 9 pieces, v. co. –12 bones	
Sternum	-	
Ribs	26 pieces of right ribs, 25 pieces of left ribs, 200 pieces of ribs	
Scapula	18 pieces	3 pieces
Humerus	9 pieces	6 pieces
Radius	1 bone	1 bone
Ulna	1 bone	1 bone
Carpals	6 bones	6 bones
Metacarpus III	1 bone	1 bone
Phalanx I, forelimb	1 bone	1 bone
Phalanx II, forelimb	1 bone	1 bone
Phalanx III, forelimb	1 bone	1 pieces
Pelvis	12 pieces	
Femur	11 pieces	5 pieces
Patella	1 bone	1 bone
Tibia	2 pieces	2 pieces
Fibula	1 bone	1 bone
Calcaneus	1 bone	1 bone
Talus	1 bone	1 bone
Tarsals	4 bones	4 bones
Metatarsus III	1 bone	1 bone
Metacarpus II, IV; Metatarsus II, IV	15 pieces of 8 bones	
Sesamoideal bones	12 bones	
Phalanx I, hind limb	1 bone	1 bone
Phalanx II, hind limb	1 bone	1 bone
Phalanx III, hind limb	1 piece	1 piece
Unidentified bones	950 pieces	



Grave 251 – horse skeleton, a view from the right side.



Grave 251 – horse skeleton, a view from the left side.

of radiocarbon dating of the horse skeleton: 1835±30 BP.

The horse skeleton found inside the pit was incomplete (Table 11). The preserved parts included the cranium with full dentition, cervical and thoracic vertebrae, ribs and all the elements of the right forelimb. The bones of the left limb were not found, which suggests that the animal had been halved in the sagittal plane (Table 11) prior to burial. Part of the horse had been laid into the pit on its right side with a bent forelimb. The cranium, disarticulated from the rest of the skeleton, without the mandible, was oriented in the same direction as the rest of the skeleton, close to the spine, turned towards its croup. Discovered to the east of it, about 40 cm from the thoracic vertebrae, was an atlas positioned vertically on end. Fragments of the horse's bones including the mandible, which might have come from the damaged part of the pit, were found in the fill of the military trench. A fact which supports the possibility of these mandible fragments belonging to the skeleton of the horse found in grave 290 is the same age of the cranial and mandible teeth. Speaking against this possibility is the stratigraphy of the surviving part of the pit where no signs of secondary disturbances of the layers have been found.

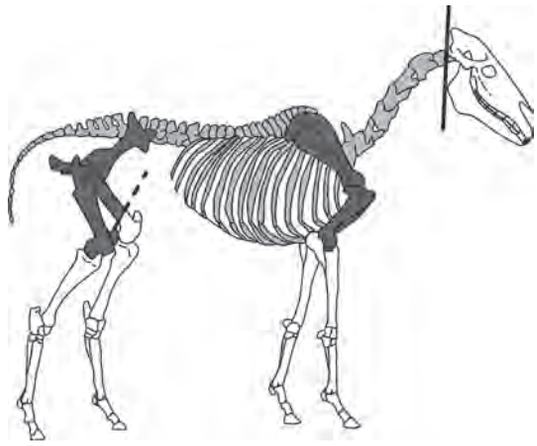
On the basis of the horse's dentition it has been determined that the buried individual was a male aged about 6–7. The animal's withers height was about 128 cm (Table 12) while the metacarpal index was 14.35,

Table 8. Morphological data concerning the horse from grave 251

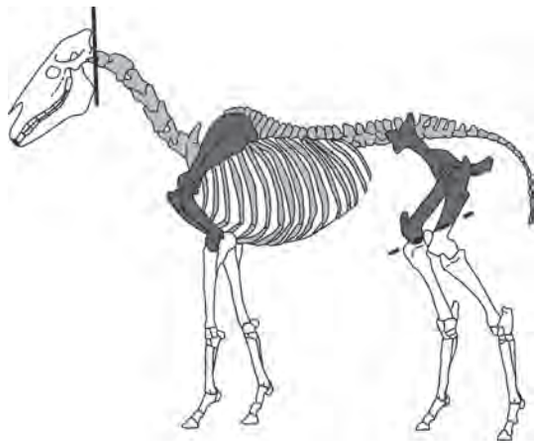
Bone	Measurement	/mm/		Withers height /cm/	Points
		Right	Left		
Scapula	Length of the glenoid cavity – LG	52	-	-	-
	Breadth of the glenoid cavity – BG	42	42		
	Smallest length of collum – SLC	67	68		
Humerus	Greatest length – GL	-	-	-	-
	Greatest length of the lateral part – GLI				
	Breadth of the proximal end – Bp				
	Breadth of the distal end – Bd				
Radius	Greatest length – GL	315	314		about 48 ~
	Length of the lateral part – LI	303	/303/	131,5	
	Breadth of the proximal end – Bp	77	-		43,3 ~
	Breadth of the distal end – Bd	71	70		40 ~
	Smallest breadth of diaphysis – SD	35	36		60-70 +
Metacarpus III	Greatest length – GL	205	205		24,4 ~
	Length of the lateral part – LI	198	198	126,9	
	Breadth of the proximal end – Bp	44	46		20-30 ~
	Breadth of the distal end – Bd	50	50		55 ~
	Smallest breadth of diaphysis – SD	33	32		35 ~
Phalanx I	Greatest length – GL	77	77	-	
	Breadth of the proximal end – Bp	54	54		
	Breadth of the distal end – Bd	45	44		
	Smallest breadth of diaphysis – SD	34	35		
Phalanx II	Greatest length – GL	42	42	-	20
	Breadth of the proximal end – Bp	50	50		40
	Breadth of the distal end – Bd	46	46		25
	Smallest breadth of diaphysis – SD	41	41		40
Phalanx III	Greatest length – GL	/65/	-	-	-
	Greatest breadth – GB	-			
	Length of the dorsal surface –Ld	/52/			
	Diagonal length of the sole – DLS	-			
	Height in the region of the extensor process – HP	37			
Pelvis	Length of acetabulum – LA	-	-	-	-
Femur	Greatest length – GL	-	-	-	-
	Greatest length from caput – GLC				
	Breadth of the distal end – Bd				
	Smallest breadth of diaphysis – SD				
Patella	Greatest length – GL	63	62	-	-
	Greatest breadth – GB	62	61		
Tibia	Greatest length – GL	-	330		about 45 ~
	Length of the lateral part – LI	-	307	133,8	
	Breadth of the proximal end – Bp	/92/	93		73,3 +
	Breadth of the distal end – Bd	67	66		30 ~
	Smallest breadth of diaphysis – SD	38	38		35 ~
Calcaneus	Greatest length – GL	-	-	-	-
Talus	Greatest height – GH	58	-	-	-
	Greatest breadth – GB	61			
Metatarsus III	Greatest length – GL	243	243		29 ~
	Length of the lateral part - LI	251	250	about 133	
	Breadth of the proximal end – Bp	49	47		50-60 +
	Breadth of the distal end – Bd	51	510		60 +
	Smallest breadth of diaphysis – SD	31	30		50-60 +
Phalanx I	Greatest length – GL	76	76	-	-
	Breadth of the proximal end – Bp	54	54		
	Breadth of the distal end – Bd	43	43		
	Smallest breadth of diaphysis – SD	35	34		
Phalanx II	Greatest length – GL	45	45	-	35
	Breadth of the proximal end – Bp	50	49		about 40
	Breadth of the distal end – Bd	44	43		25-30
	Smallest breadth of diaphysis – SD	39	39		35
Phalanx III	Greatest length – GL	-	-	-	-
	Greatest breadth – GB				
	Length of the dorsal surface –Ld				
	Diagonal length of the sole – DLS				
	Height in the region of the extensor process – HP				

Table 9. Horse bone remains from grave 254

Element of skeleton	Right	Left
Cranium	-	
Hyoid bone	-	
Mandible	-	
Teeth	-	
Vertebrae	v. c – 11 pieces, v. th. 2 pieces, v. l. 6 pieces, os sacrum – 5 pieces, v. co – 2 pieces, 59 pieces of vertebrae	
Sternum	2 pieces	
Ribs	20 pieces of right ribs , 18 pieces of left ribs, 225 pieces of ribs	
Scapula	12 pieces	2 pieces
Humerus	2 pieces	4 pieces
Radius	-	-
Ulna	-	-
Carpals	-	-
Metacarpus III	-	-
Phalanx I, forelimb	-	-
Phalanx II, forelimb	-	-
Phalanx III, forelimb	-	-
Pelvis	2 pieces	7 pieces
Femur	3 pieces	2 pieces
Patella	1 bone	-
Tibia	1 piece	
Fibula	-	-
Calcaneus	-	-
Talus	-	-
Tarsals	-	-
Metatarsus III	-	-
Metacarpus II, IV; Metatarsus II, IV	-	-
Sesamoideal bones	-	-
Phalanx I, hind limb	-	-
Phalanx II, hind limb	-	-
Phalanx III, hind limb	-	-
Unidentified bones	235 pieces	



Grave 254 – horse skeleton, a view from the right side.



Grave 254 – horse skeleton, a view from the left side.

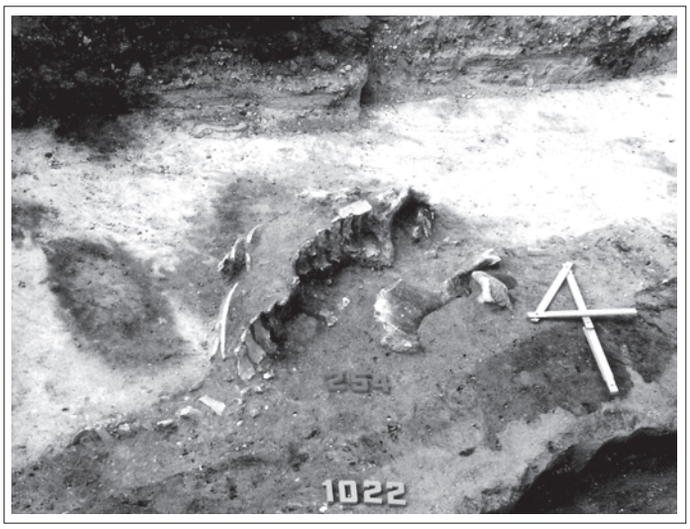


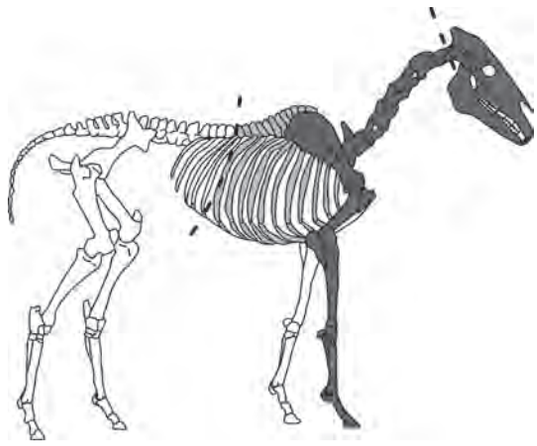
Fig. 7. The location of a horse skeleton in grave 254 (photograph by Karczewski).

Table 10. Morphological data concerning the horse from grave 254

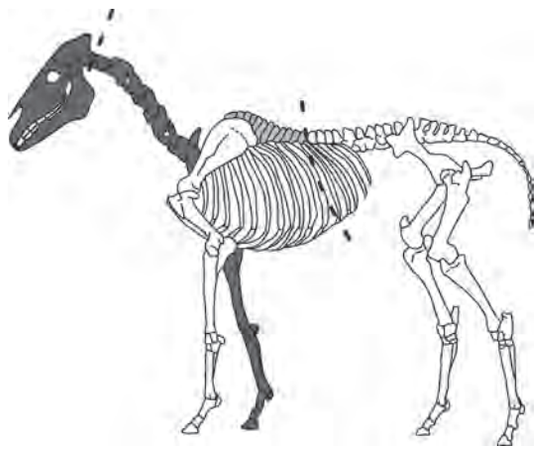
Bone	Measurement	/mm/		Withers Height /cm/	Points
		Right	Left		
Scapula	Length of the glenoid cavity – LG Breadth of the glenoid cavity – BG Smallest length of collum – SLC	-	- 47 -	-	-
Humerus	Greatest length – GL Greatest length of the lateral part – GLI Breadth of the proximal end – Bp Breadth of the distal end – Bd	-	-	-	-
Radius	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Metacarpus III	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Phalanx I	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Phalanx II	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Phalanx III	Greatest length – GL Greatest breadth – GB Length of the dorsal surface –Ld Diagonal length of the sole – DLS Height in the region of the extensor process – HP	-	-	-	-
Pelvis	Greatest length of acetabulum – LA	60	60	-	-
Femur	Greatest length – GL Greatest length from caput – GLC Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	- - 87 40	- - - -	-	-
Patella	Greatest length – GL Greatest breadth – GB	58 58	-	-	-
Tibia	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Calcaneus	Greatest length – GL	-	-	-	-
Talus	Greatest height – GH Greatest breadth – GB	-	-	-	-
Metatarsus III	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Phalanx I	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Phalanx II	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Phalanx III	Greatest length – GL Greatest breadth – GB Length of the dorsal surface –Ld Diagonal length of the sole – DLS Height in the region of the extensor process – HP	-	-	-	-

Table 11. Horse bone remains from grave 290

Element of skeleton	Right	Left
Cranium	176 pieces of neuro- and viscerocranium	
Hyoid bone	-	
Mandible	16 pieces	
Teeth	I – 8, C – 4, P+ M – 18	
Vertebrae	v. c. – 2 , v. th. pieces, v. 3 pieces, 330 pieces of vertebrae	
Sternum	-	
Ribs	350 pieces	
Scapula	72 pieces	-
Humerus	24 pieces	-
Radius	8 pieces	-
Ulna	3 pieces	-
Carpals	6 bones	
Metacarpus III	1 bone	-
Phalanx I, forelimb	1 bone	-
Phalanx II, forelimb	1 bone	-
Phalanx III, forelimb	1 piece	-
Pelvis	2 pieces	7 pieces
Femur	3 pieces	2 pieces
Patella	1 bone	-
Tibia	1 piece	
Fibula	-	-
Calcaneus	-	-
Talus	-	-
Tarsals	-	-
Metatarsus III	-	-
Metacarpus II, IV; Metatarsus II, IV	5 pieces of 2 bones	
Sesamoideal bones	4 bones	
Phalanx I, hind limb	-	-
Phalanx II, hind limb	-	-
Phalanx III, hind limb	-	-
Unidentified bones	80 pieces	



Grave 290 – horse skeleton, a view from the right side.



Grave 290 – horse skeleton, a view from the left side.

which according to Brauner's criteria classifies the described animal as slender-legged.

Grave 320 (Tables 13 and 14; Fig. 4)

The horse skeleton was found at the bottom of a pit with an oval outline. The skeleton was positioned on its right side, oriented along an E–W axis with the head directed W. Its forelimbs were folded and the hind limbs straight with the phalanges directed SW. Both pairs of limbs were parallel to each other. The horse skeleton was not accompanied by any equipment. Results of radiocarbon dating of the horse skeleton: 1980±30 BP.

The animal's skeleton was preserved in nearly complete form, only phalanges II and III of the hind limbs were found (Table 13). The horse was a male aged about 5. Withers height estimated on the basis of the dimensions of four long bones fell within the range of 139.1–142.8 cm (Table 14). The metacarpal index was 14.10, which according to Brauner's criteria classifies the described animal as slender-legged.

Grave 356 (Tables 15 and 16, Fig. 8)

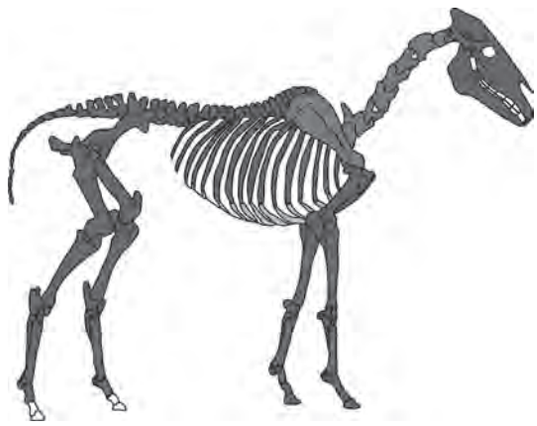
The horse skeleton was found at the bottom of a pit with an unclear, most probably oval outline. The pit's ceiling and its central part (at the level of the animal's trunk) were damaged by a military trench from World War I. The skeleton lay on its left side along a NW–SE axis with the head directed SW. Several bone fragments found in the fills of modern objects situated directly

Table 12. Morphological data concerning the horse from grave 290

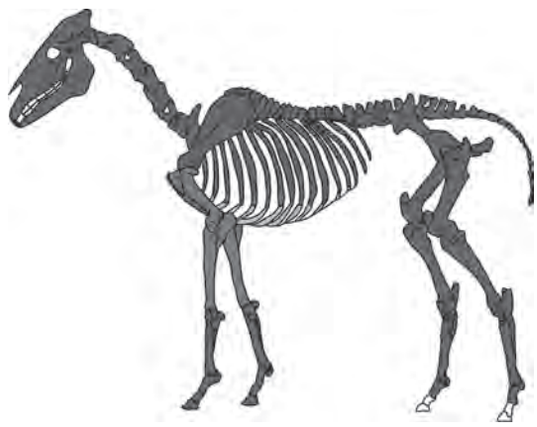
Bone	Measurement	/mm/		Withers height /cm/	Points
		Right	Left		
Scapula	Length of the glenoid cavity – LG Breadth of the glenoid cavity – BG Smallest length of collum – SLC	-	-	-	-
Humerus	Greatest length – GL Greatest length of the lateral part – GLI Breadth of the proximal end – Bp Breadth of the distal end – Bd	-	-	-	-
Radius	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	/320/ 295 71 79 35	-	 128	53 ≈ 23,3 ≈ 66,6 + 60 +
Metacarpus III	Greatest length – GL Length of the lateral part - LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	223 206 50 46 32	-	-	44,4 ≈ 50 ≈ 35 ≈ ≈ 35 ≈
Phalanx I	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	85 53 46 33	-	-	-
Phalanx II	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	45 51 46 -	-	-	35 45 25 -
Phalanx III	Greatest length – GL Greatest breadth – GB Length of the dorsal surface – Ld Diagonal length of the sole – DLS Height in the region of the extensor process – HP	-	-	-	-
Pelvis	Greatest length of acetabulum – LA	-	-	-	-
Femur	Greatest length – GL Greatest length from caput – GLC Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Patella	Greatest length – GL Greatest breadth – GB	-	-	-	-
Tibia	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Calcaneus	Greatest length – GL	-	-	-	-
Talus	Greatest height – GH Greatest breadth – GB	-	-	-	-
Metatarsus III	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Phalanx I	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Phalanx II	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Phalanx III	Greatest length – GL Greatest breadth – GB Length of the dorsal surface – Ld Diagonal length of the sole – DLS Height in the region of the extensor process – HP	-	-	-	-

Table 13. Horse bone remains from grave 320

Element of skeleton	Right	Left
Cranium	161 pieces of neuro- and viscerocranium	
Hyoid bone	5 pieces of right and left bones	
Mandible	43 pieces of right and left bones	
Teeth	I – 12, C – 4, P=M – 24, 1 piece of root	
Vertebrae	v. c – 7 pieces, v. th. 39 pieces, v. l. 17 pieces, v. th. or v. l – 41pieces, os sacrum – 5 pieces, v. co – 2 pieces, 38 pieces	
Sternum	2 pieces	
Ribs	499 pieces	
Scapula	9 pieces	15 pieces
Humerus	6 pieces	14 pieces
Radius	2 pieces	2 pieces
Ulna	1 piece	1 piece
Carpals	7 bones	7 bones
Metacarpus III	1 bone	2 pieces
Phalanx I, forelimb	2 pieces	
Phalanx II, forelimb	-	-
Phalanx III, forelimb	-	-
Pelvis	13 pieces	
Femur	5 pieces	18 pieces
Patella	1 bone	1 piece
Tibia	1 bone	14 pieces
Fibula	-	-
Calcaneus	-	-
Talus	2 bones	
Tarsals	3 bones	3 bones
Metatarsus III	1 bone	4 pieces
Metacarpus II, IV; Metatarsus II, IV	9 pieces	
Sesamoideal bones	4 bones	
Phalanx I, hind limb	1 bone	1 bone
Phalanx II, hind limb	1 bone	1 bone
Phalanx III, hind limb	1 piece	
Unidentified bones	630 pieces	



Grave 320 – horse skeleton, a view from the right side.



Grave 320 – horse skeleton, a view from the left side.

over or in the vicinity of the pit were recognized as elements belonging to the described individual. These were bones from different parts of the skeleton (inter alia fragments of the mandible, vertebrae, scapula and metapodium). There was no equipment accompanying the horse skeleton. Results of radiocarbon dating of the horse skeleton: 1910±30 BP.

The only preserved parts were fragmented elements of the head skeleton, the neck skeleton, the thoracic section of the spine, as well as fragments of the bones of both forelimbs without the extreme elements and the proximal part of the left hind limb up to the level of the tarsus (Table 15). The horse was a male aged about 8. According to estimates made on the basis of the length of the metacarpal bones the animal's withers height was about 141 cm (Table 16). The metacarpal index was 14.15, which according to Brauner's criteria classifies the described animal as slender-legged.

Grave 369 (Tables 17 and 18; Plate I.5)

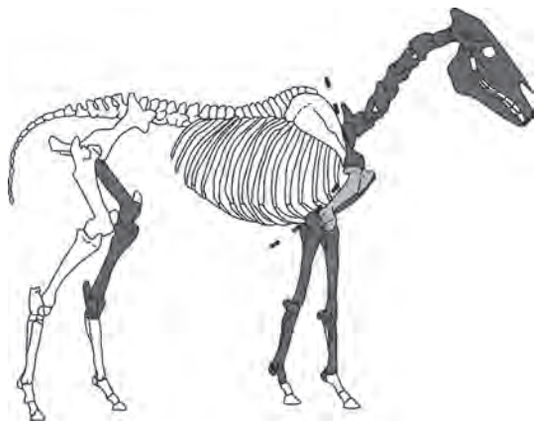
The horse's skeleton was found at the bottom of a pit with an outline similar to an oval one. It was oriented along a NE–SW axis with the head directed SW. The skeleton was positioned on its right side. Its forelimbs were folded, hind limbs straight with phalanges directed to the SW. Both pairs of limbs were parallel to each other. There was no equipment accompanying the horse skeleton. Results of radiocarbon dating of the horse skeleton: 1840±30 BP.

Table 14. Morphological data concerning the horse from grave 320

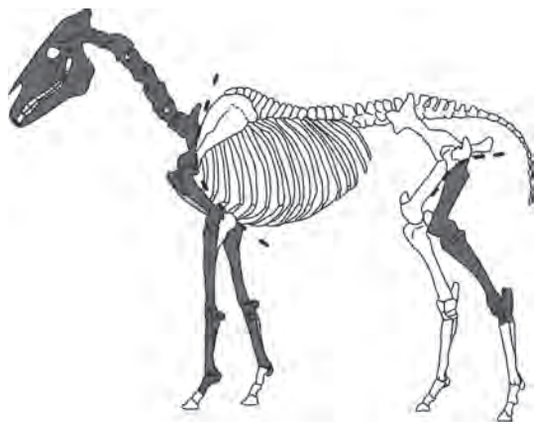
Bone	Measurement	/mm/		Withers height / cm/	Points
		Right	Left		
Scapula	Length of the glenoid cavity – LG	55	55	-	-
	Breadth of the glenoid cavity – BG	45	45		
	Smallest length of collum – SLC	6	-		
Humerus	Greatest length – GL	-	-	-	-
	Greatest length of the lateral part – GLI	-			
	Breadth of the proximal end – Bp	-			
	Breadth of the distal end – Bd	75			
Radius	Greatest length – GL	/317/	/317/		50 ~
	Length of the lateral part – LI	329	329	142,8	
	Breadth of the proximal end – Bp	80	79		50-53,3 ~
	Breadth of the distal end – Bd	72	72		43,3 ~
	Smallest breadth of diaphysis – SD	38	38		90 +
Metacarpus III	Greatest length – GL	227	/227/		50 ~
	Length of the lateral part – LI	219	/220/	140,4	
	Breadth of the proximal end – Bp	47	47		35 -
	Breadth of the distal end – Bd	47	4		40 -
	Smallest breadth of diaphysis – SD	32	31		30 -
Phalanx I	Greatest length – GL	-	-	-	-
	Breadth of the proximal end – Bp				
	Breadth of the distal end – Bd				
	Smallest breadth of diaphysis – SD				
Phalanx II	Greatest length – GL	-	-	-	-
	Breadth of the proximal end – Bp				
	Breadth of the distal end – Bd				
	Smallest breadth of diaphysis – SD				
Phalanx III	Greatest length – GL	-	-	-	-
	Greatest breadth – GB				
	Length of the dorsal surface – Ld				
	Diagonal length of the sole – DLS				
	Height in the region of the extensor process – HP				
Pelvis	Greatest length of acetabulum – LA	-	-	-	-
Femur	Greatest length – GL	-	-	-	-
	Greatest length from caput – GLC				
	Breadth of the distal end – Bd				
	Smallest breadth of diaphysis – SD				
Patella	Greatest length – GL	62	-	-	-
	Greatest breadth – GB	62			
Tibia	Greatest length – GL	348	-		62,2 ~
	Length of the lateral part – LI	322		104,4	
	Breadth of the proximal end – Bp	/92/			/70/ ~
	Breadth of the distal end – Bd	71			55 ~
	Smallest breadth of diaphysis – SD	41			50 ~
Calcaneus	Greatest length – GL	-	/110/	-	-
Talus	Greatest height – GH	57	57	-	-
	Greatest breadth – GB	57	58		
Metatarsus III	Greatest length – GL	264	-		52,2 ~
	Length of the lateral part – LI	261		139,1	
	Breadth of the proximal end – Bp	47			50 ~
	Breadth of the distal end – Bd	48			50 ~
	Smallest breadth of diaphysis – SD	29			40 -
Phalanx I	Greatest length – GL	83	83	-	-
	Breadth of the proximal end – Bp	52	52		
	Breadth of the distal end – Bd	43	43		
	Smallest breadth of diaphysis – SD	34	34		
Phalanx II	Greatest length – GL	44	44	-	30
	Breadth of the proximal end – Bp	49	48		30-35
	Breadth of the distal end – Bd	45	45		35
	Smallest breadth of diaphysis – SD	43	43		55
Phalanx III	Greatest length – GL	-	-	-	-
	Greatest breadth – GB	-			
	Length of the dorsal surface – Ld	-			
	Diagonal length of the sole – DLS	-			
	Height in the region of the extensor process – HP	34			

Table 15. Horse bone remains from grave 356

Element of skeleton	Right	Left
Cranium	250 pieces	
Hyoid bone	-	
Mandible	200 pieces	
Teeth	I – 12, C – 4, P+M – 4	
Vertebrae	v. c – 150 pieces, v. th. – 1 piece	
Sternum	-	
Ribs	-	
Scapula	5 pieces of right and left bones	
Humerus	34 pieces of right and left bones	
Radius	84 pieces of right and left bones	
Ulna	1 bone	1 bone
Carpals	11 right and left bones	
Metacarpus III	1 bone	1 bone
Phalanx I, forelimb	-	1 bone
Phalanx II, forelimb	-	-
Phalanx III, forelimb	-	-
Pelvis	-	-
Femur	-	3 pieces
Patella	-	-
Tibia	1 piece	
Fibula	-	-
Calcaneus	-	1 bone
Talus	-	3 pieces
Tarsals	-	3 pieces
Metatarsus III	-	
Metacarpus II, IV; Metatarsus II, IV	4 bones	
Sesamoideal bones	3 bones	
Phalanx I, hind limb	-	-
Phalanx II, hind limb	-	-
Phalanx III, hind limb	-	-
Unidentified bones	-	



Grave 356 – horse skeleton, a view from the right side.



Grave 356 – horse skeleton, a view from the left side.

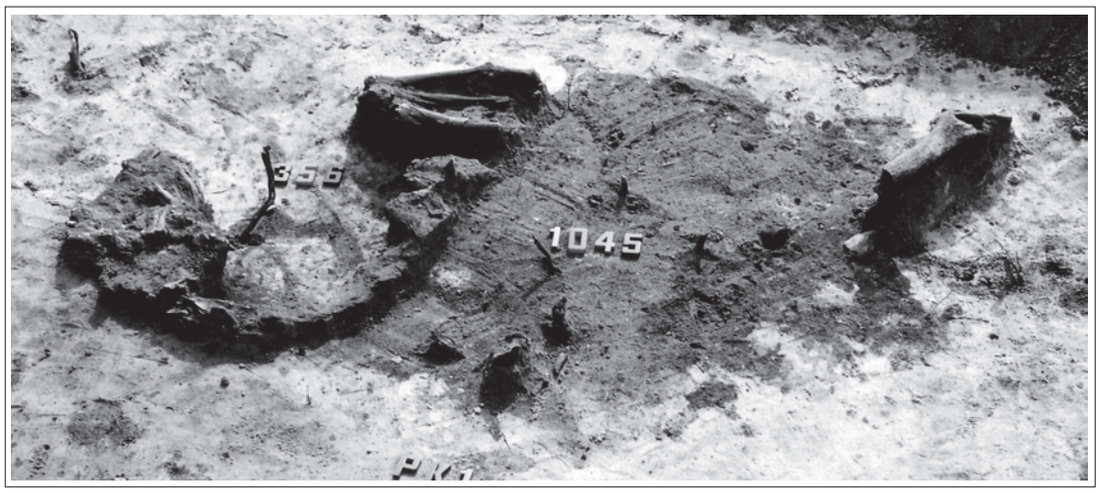


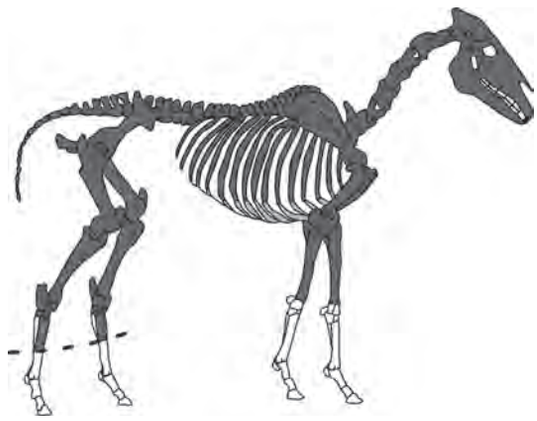
Fig. 8. The location of a horse skeleton in grave 356 (photograph by Karczewski).

Table 16. Morphological data concerning the horse from grave 356

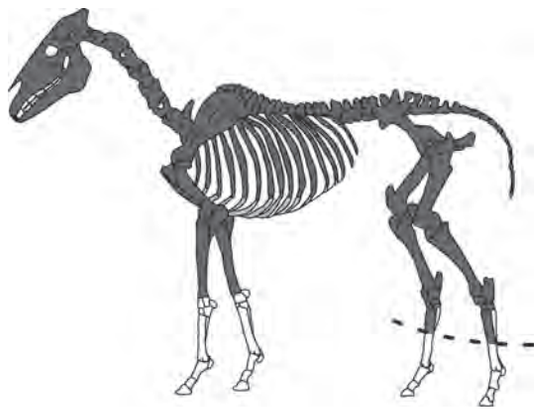
Bones	Measurement	/mm/		Withers height /cm/	Points
		Right	Left		
Scapula	Length of the glenoid cavity – LG Breadth of the glenoid cavity – BG Smallest length of collum – SLC	-	-	-	-
Humerus	Greatest length – GL Greatest length of the lateral part – GLI Breadth of the proximal end – Bp Breadth of the distal end – Bd	-	-	-	-
Radius	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Metacarpus III	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	225 220 49 /50/ 32	226 220 49 51 32	141	about 48 - 45 - 56,6-60 ~ 35 -
Phalanx I	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	87 56 46 33	-	-
Phalanx II	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Phalanx III	Greatest length – GL Greatest breadth – GB Length of the dorsal surface –Ld Diagonal length of the sole – DLS Height in the region of the extensor process – HP	-	-	-	-
Pelvis	Greatest length of acetablum – LA	60	60	-	-
Femur	Greatest length – GL Greatest length from caput – GLC Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	- - 87 40	-	-
Patella	Greatest length – GL Greatest breadth – GB	58 58	-	-	-
Tibia	Greatest length – GL Length of the lateral part - LI Breadth of the proximal end - Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Calcaneus	Greatest length – GL	-	-	-	-
Talus	Greatest height – GH Greatest breadth – GB	-	61 59	-	-
Metatarsus III	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Phalanx I	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Phalanx II	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Phalanx III	Greatest length – GL Greatest breadth – GB Length of the dorsal surface – Ld Diagonal length of the sole – DLS Height in the region of the extensor process – HP	-	-	-	-

Table 17. Horse bone remains from grave 369

Element of skeleton	Right	Left
Cranium	53 pieces of neuro- and viscerocranium	
Hyoid bone	-	
Mandible	733 small pieces of cranium and mandible	
Teeth	I – 12, C – 4, P+M – 24	
Vertebrae	v. c. – 123 pieces of 7 bones, v. th. – 56 pieces, v. l. – 30 pieces of 2 bones, os sacrum – 2 pieces, 100 pieces of vertebrae	
Sternum	-	
Ribs	117 pieces	
Scapula	29 pieces of right bone, 13 pieces of left f bones, 53 pieces of both bones	
Humerus	9 pieces	15 pieces
Radius	1 piece	2 pieces
Ulna	4 pieces	2 pieces
Carpals	-	-
Metacarpus III	-	-
Phalanx I, forelimb	-	-
Phalanx II, forelimb	-	-
Phalanx III, forelimb	-	-
Pelvis	13 pieces	
Femur	16 pieces	10 pieces
Patella	1 bone	1 bone
Tibia	7 pieces	14 pieces
Fibula	-	-
Calcaneus	1 piece	-
Talus	3 pieces	-
Tarsals	2 bones	1 bone
Metatarsus III	4 pieces of metapodium	
Metacarpus II, IV; Metatarsus II, IV	-	-
Sesamoideal bones	-	-
Phalanx I, hind limb	-	-
Phalanx II, hind limb	-	-
Phalanx III, hind limb	-	-
Unidentified bones	about 190 pieces of ribs, scapula, humerus, radius, pelvis, femur, 230 of scapula and vertebrae, 276 small pieces	



Grave 369 – horse skeleton, a view from the right side.



Grave 369 – horse skeleton, a view from the left side.

The discovered skeleton was incomplete (Table 17). The distal parts of the forelimbs (below the bones of the forearm) were missing as well as the distal parts of the hind limbs (partially preserved metatarsal bones, no phalanges). The horse was a male aged about 5–6. The very bad state of preservation of the horse's bones made it impossible to take measurements necessary for the reconstruction of the specimen's morphology.

Grave 398 (Tables 19 and 20; Fig. 5)

The horse skeleton was found at the bottom of a pit with an outline similar to oval. It was oriented along a NE–SW axis with the head directed SW, the muzzle to the S. The skeleton lay on its left side. Its forelimbs were folded and parallel to each other. The left hind limb was straight and directed SW while the right one was bent at the knee joint, as a result of which only the distal part was parallel to the left limb. No equipment accompanied the horse skeleton. Results of radiocarbon dating of the horse skeleton: 1760±30 BP.

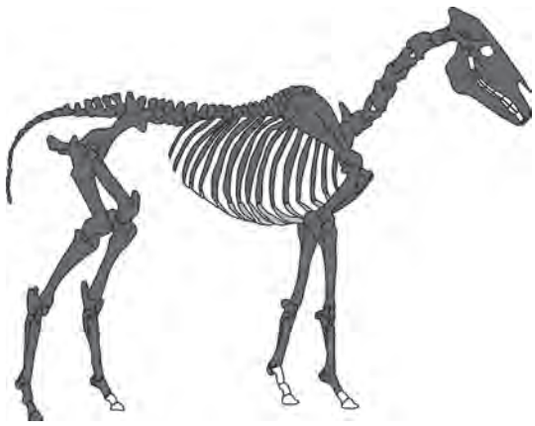
The animal's skeleton was preserved in nearly complete form, only phalanges II and III of the hind limbs were found (Table 19). The horse was a male aged about 6. Withers height estimated on the basis of the

Table 18. Morphological data concerning the horse from grave 369

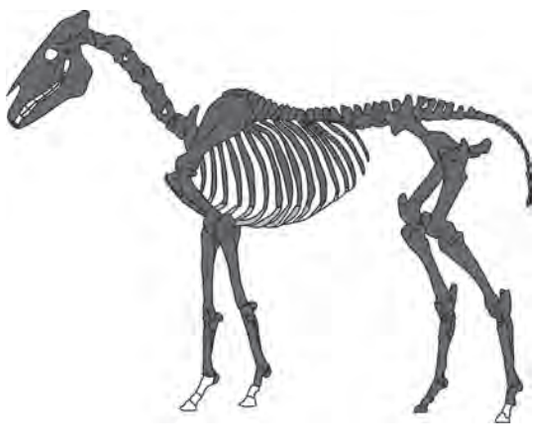
Bone	Measurement	/mm/		Withers height /cm/	Points
		Right	Left		
Scapula	Greatest length of the glenoid cavity – LG Breadth of the glenoid cavity – BG Smallest length of collum – SLC	-	-	-	-
Humerus	Greatest length – GL Greatest length of the lateral part – GLl Breadth of the proximal end – Bp Breadth of the distal end – Bd	-	-	-	-
Radius	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Metacarpus III	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bd Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Phalanx I	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-		-
Phalanx II	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Phalanx III	Greatest length – GL Greatest breadth – GB Length of the dorsal surface – Ld Diagonal length of the sole – DLS Height in the region of the extensor process – HP	-	-	-	-
Pelvis	Greatest length of acetabulum – LA	-	-	-	-
Femur	Greatest length – GL Greatest length from caput – GLC Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Patella	Greatest length – GL Greatest breadth – GB	69 /63/	68 63	-	-
Tibia	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Calcaneus	Greatest length – GL	-	-	-	-
Talus	Greatest height – GH Greatest breadth – GB	-	-	-	-
Metatarsus III	Greatest length – GL Length of the lateral part – LI Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Phalanx I	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Phalanx II	Greatest length – GL Breadth of the proximal end – Bp Breadth of the distal end – Bd Smallest breadth of diaphysis – SD	-	-	-	-
Phalanx III	Greatest length – GL Greatest breadth – GB Length of the dorsal surface – Ld Diagonal length of the sole – DLS Height in the region of the extensor process – HP	-	-	-	-

Table 19. Horse bone remains from grave 398

Element of skeleton	Right	Left
Cranium	60 of neuro- and viscerocranium	
Hyoid bone	1 piece	
Mandible	28 pieces + 200 small pieces of cranium and mandible	
Teeth	I – 10, C – 3, P+M – 13	
Vertebrae	v. c. – 9 pieces, v. th. – 3 pieces, v. l. 1, os sacrum – 11 pieces, v. co. 7, 8 pieces of vertebrae	
Sternum	-	
Ribs	297 small pieces	
Scapula	1 piece	-
Humerus	6 pieces	6 pieces
Radius	6 pieces	2 pieces
Ulna	-	1 bone
Carpals	-	-
Metacarpus III	2 pieces of 1 bone	1 piece
Phalanx I, forelimb	-	1 bone
Phalanx II, forelimb	-	-
Phalanx III, forelimb	-	-
Pelvis	4 pieces	6 pieces
Femur	8 pieces	3 pieces
Patella	1 bone	1 bone
Tibia	1 bone	3 pieces
Fibula	-	-
Calcaneus	1 bone	1 piece
Talus	1 bone	1 bone
Tarsals	6 right and left bones	
Metatarsus III	1 piece + 2 pieces of metapodium	1 bone
Metacarpus II, IV; Metatarsus II, IV	4 pieces	
Sesamoideal bones	2 bones	
Phalanx I, hind limb	1 piece	1 bone
Phalanx II, hind limb	-	1 bone
Phalanx III, hind limb		3 pieces
Unidentified bones	-	



Grave 398 – horse skeleton, a view from the right side.



Grave 398 – horse skeleton, a view from the left side.

dimensions of four long bones fell within the range of 121.8–126.3 cm (Table 20).

Grave 442 (Tables 21 and 22; Plate I.3)

The horse's skeleton was found at the bottom of a pit with an outline close to oval. It was oriented along a NE–SW axis with the head directed SW. It lay on its right side. Its forelimbs were folded while its hind limbs were straight with the phalanges directed to the south-west. Both pairs of limbs were parallel to each other. Clusters of charcoal were found in the fill of the pit at the point of crossing of the limbs and at the level of the horse's croup. There was no equipment accompanying the horse skeleton. Results of radiocarbon dating of the horse skeleton: 1955±30 BP.

An almost complete skeleton of the animal was preserved, only phalanges II and III of the forelimbs were found (Table 21). The horse was a male aged about 11–12. Withers height estimated on the basis of the dimensions of six long bones fell within the range of 114.7–127.3 cm (Table 22). The metacarpal index was 15.63, which according to Brauner's criteria classifies the described animal as slightly massive-legged.

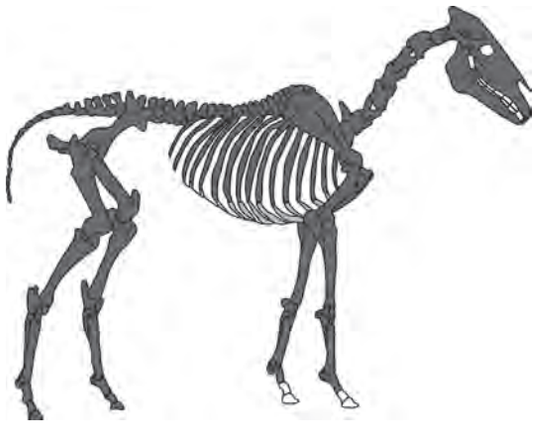
Translated by authors

Table 20. Morphological data concerning the horse from grave 398

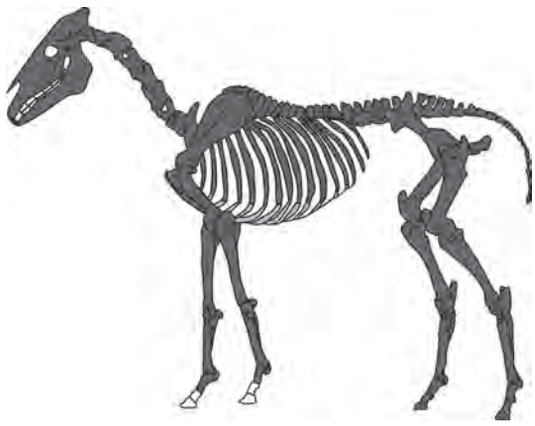
Bone	Measurement	/mm/		Withers height /cm/	Points
		Right	Left		
Scapula	Greatest length of the glenoid cavity – LG	-	-	-	-
	Breadth of the glenoid cavity – BG				
	Smallest length of collum- SLC				
Humerus	Greatest length – GL	-	-	-	-
	Greatest length of the lateral part – GLl	-			
	Breadth of the proximal end – Bp	-			
	Breadth of the distal end – Bd	73			
Radius	Greatest length – GL	-	-	-	
	Length of the lateral part – LI	-	-		
	Breadth of the proximal end – Bp	72	72		26,6 ~
	Breadth of the distal end – Bd	63	-		13,3 ~
	Smallest breadth of diaphysis – SD	37	-		80 +
Metacarpus III	Greatest length – GL	-	-		-
	Length of the lateral part – LI	190		121,8	15 ~
	Breadth of the proximal end – Bp	43			-
	Breadth of the distal end – Bd	-			30 ~
	Smallest breadth of diaphysis – SD	31			
Phalanx I	Greatest length – GL	-	-	-	-
	Breadth of the proximal end – Bp				
	Breadth of the distal end – Bd				
	Smallest breadth of diaphysis – SD				
Phalanx II	Greatest length – GL	-	-	-	-
	Breadth of the proximal end – Bp				
	Breadth of the distal end – Bd				
	Smallest breadth of diaphysis – SD				
Phalanx III	Greatest length – GL	-	-	-	-
	Greatest breadth – GB				
	Length of the dorsal surface –Ld				
	Diagonal length of the sole – DLS				
	Height in the region of the extensor process – HP				
Pelvis	Greatest length of acetabulum – LA	-	-	-	-
Femur	Greatest length – GL	-	-	-	-
	Greatest length from caput – GLC	-			
	Breadth of the distal end – Bd	83			
	Smallest breadth of diaphysis – SD	-			
Patella	Greatest length – GL	56	56	-	-
	Greatest breadth – GB	56	55		
Tibia	Greatest length – GL	311	-		about 28 ~
	Length of the lateral part – LI	284	-	123,8	
	Breadth of the proximal end – Bp	82	82		33,3 ~
	Breadth of the distal end – Bd	62	-		10 -
	Smallest breadth of diaphysis – SD	34	34		15 ~
Calcaneus	Greatest length – GL	93	-	-	-
Talus	Greatest height – GH	54	-	-	-
	Greatest breadth – GB	53			
Metatarsus III	Greatest length – GL	-	237		22 ~
	Length of the lateral part – LI	229	229	126,3	
	Breadth of the proximal end – Bp	-	45		40 +
	Breadth of the distal end – Bd	45	45		35 ~
	Smallest breadth of diaphysis – SD	28	28		30 ~
Phalanx I	Greatest length – GL	-	73	-	-
	Breadth of the proximal end – Bp		50		
	Breadth of the distal end – Bd		41		
	Smallest breadth of diaphysis – SD		-		
Phalanx II	Greatest length – GL	-	47	-	45
	Breadth of the proximal end – Bp		41		>0
	Breadth of the distal end – Bd		39		5
	Smallest breadth of diaphysis – SD		-		
Phalanx III	Greatest length – GL	-	-	-	-
	Greatest breadth – GB				
	Length of the dorsal surface – Ld				
	Diagonal length of the sole – DLS				
	Height in the region of the extensor process – HP				

Table 21. Horse bone remains from grave 442

Element of skeleton	Right	Left
Cranium	89 pieces of neuro- and viscerocranium	
Hyoid bone	6 pieces	
Mandible	12 pieces	
Teeth	I – 12, C – 4, P+M – 24	
Vertebrae	v. c. – 17 pieces of 7 bones, v. th. – 15 pieces. v. l. – 10 pieces, os sacrum – 2 pieces, 32 pieces of vertebrae	
Sternum	-	
Ribs	104 pieces	
Scapula	6 pieces	5 pieces
Humerus	1 bone	2 pieces
Radius	1 bone	1 bone
Ulna	1 bone	1 bone
Carpals	2 bones	
Metacarpus III	2 pieces	1 bone
Phalanx I, forelimb	1 bone	1 bone
Phalanx II, forelimb	-	
Phalanx III, forelimb	-	
Pelvis	12 pieces	2 pieces
Femur	2 pieces	7 pieces
Patella	1 bone	1 bone
Tibia	2 pieces	6 pieces
Fibula	1 pieces	
Calcaneus	-	1 bone
Talus	1 bone	1 bone
Tarsals	3 bones	2 bones
Metatarsus III	1 bone	3 pieces
Metacarpus II, IV; Metatarsus II, IV	9 pieces	
Sesamoideal bones	6 bones	
Phalanx I, hind limb	1 bone	1 piece
Phalanx II, hind limb	1 piece	1 piece
Phalanx III, hind limb	1 bone	1 bone
Unidentified bones	1250 pieces	



Grave 442 – horse skeleton, a view from the right side.



Grave 442 – horse skeleton, a view from the left side.

Table 22. Morphological data concerning the horse from grave 442

Bone	Measurement	/mm/		Withers height /cm/	Points	
		Right	Left			
Scapula	Greatest length of the glenoid cavity – LG	53	-	-	-	
	Breadth of the glenoid cavity – BG	43				
	Smallest length of collum – SLC	60				
Humerus	Greatest length – GL	257	256		-	
	Greatest length of the lateral part – GLl	236	236	114,9		
	Breadth of the proximal end – Bp	-	-			
	Breadth of the distal end – Bd	67	67			
Radius	Greatest length – GL	310	310		42	~
	Length of the lateral part – LI	285	-	123,7		
	Breadth of the proximal end – Bp	74	74		35	~
	Breadth of the distal end – Bd	69	-		-	
	Smallest breadth of diaphysis – SD	34	34		50	+
Metacarpus III	Greatest length – GL	192	-		11	~
	Length of the lateral part – LI	185	-	118,6		
	Breadth of the proximal end – Bp	45	-		25	~
	Breadth of the distal end – Bd	44	44		25	~
	Smallest breadth of diaphysis – SD	30	30		25	~
Phalanx I	Greatest length – GL	76	76	-	-	
	Breadth of the proximal end – Bp	49	49			
	Breadth of the distal end – Bd	43	44			
	Smallest breadth of diaphysis – SD	-	-			
Phalanx II	Greatest length – GL	-	-	-	-	
	Breadth of the proximal end – Bp					
	Breadth of the distal end – Bd					
	Smallest breadth of diaphysis – SD					
Phalanx III	Greatest length – GL	-	-	-	-	
	Greatest breadth – GB					
	Length of the dorsal surface –Ld					
	Diagonal length of the sole – DLS					
	Height in the region of the extensor process – HP					
Pelvis	Greatest length of aceabulum – LA	-	-	-	-	
Femur	Greatest length – GL	343	-		-	
	Greatest length from caput – GLC	327	-	114,7		
	Breadth of the distal end – Bd	81	/81/			
	Smallest breadth of diaphysis – SD	-	-			
Patella	Greatest length – GL	59	59	-	-	
	Greatest breadth – GB	58	/58/			
Tibia	Greatest length – GL	303	-		21	~
	Length of the lateral part – LI	292		127,3		
	Breadth of the proximal end – Bp	-			15	~
	Breadth of the distal end – Bd	63				
	Smallest breadth of diaphysis – SD	-				
Calcaneus	Greatest length – GL	-	-	-	-	
Talus	Greatest height – GH	53	53	-	-	
	Greatest breadth – GB	50	50			
Metatarsus III	Greatest length – GL	231	230		15	~
	Length of the lateral part – LI	227	-	121		
	Breadth of the proximal end – Bp	42	42		25	~
	Breadth of the distal end – Bd	40	40		10	~
	Smallest breadth of diaphysis – SD	28	28		30	~
Phalanx I	Greatest length – GL	69	-	-	-	
	Breadth of the proximal end – Bp	-				
	Breadth of the distal end – Bd	-				
	Smallest breadth of diaphysis – SD	-				
Phalanx II	Greatest length – GL	-	-	-	-	
	Breadth of the proximal end – Bp					
	Breadth of the distal end – Bd					
	Smallest breadth of diaphysis – SD					
Phalanx III	Greatest length – GL	/65/	62	-	-	
	Greatest breadth – GB	-	/67/			
	Length of the dorsal surface – Ld	/52/	48			
	Diagonal length of the sole – DLS	-	-			
	Height in the region of the extensor process – HP	34	-			

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ŽIRGŲ KAPŲ VAIDMUO BOGAČEVO KULTŪROJE. PAPROTKI KOLONIA 1 KAPINYNO (ŠIAURĖS RYTŲ LENKIJA) ANALIZĖ

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Santrauka

Bogačevo kultūros Paprotki Kolonia 1-asis kapinynas yra vienas geriausiai išlikusių romėniškojo laikotarpio kapinynų Mozūrijos ežeryno regione. Iki dabar čia ištirta 534 žmonių kapai ir 11 žirgų kapų (1 pav.).

Žirgų kapai buvo išsidėstę trijose aiškiai išsiskiriančiose zonose. Pirmoji jų buvo kapinyno centrinėje dalyje, antroji – pietrytiniame pakraštyje, trečioji – pietvakariniame pakraštyje (1 pav.). Žirgai buvo palaidoti dviem pozomis stačiakampio ar ovalo formos duobėse: jie buvo paguldyti ant pilvo, šiek tiek pasukti į kairę arba ant dešiniojo (retais atvejais ant kairiojo) šono, sulenktomis priekinėmis ir ištiestomis užpakalinėmis galūnėmis. Kojų padėtis rodo, kad gyvūnai galėjo būti surišti arba kad jų kūnai buvo tikslingai suguldyti tokiomis pozomis. Ant pilvo paguldyti žirgai galėjo būti palaidoti gyvi. Kai kurie požymiai rodo, kad gyvūnai galėjo būti nužudyti ir ketvirčiuoti (2–8 pav; I: 2–5 iliustr.).

Radioaktyviosios anglies datavimas (1 pav.) atskleidė, kad ankstyviausi kapai datuojami 2185±30 BP (kapas 175) ir 2010 ±30 BP (kapas 254), o vėlyviausias – 1760 ±30 BP (kapas 398). Taigi žirgai kapinyne buvo laidojami maždaug 300–400 metų, o ankstyviausi kapai sutampa su kapinyno įrengimo laikotarpiu.

Archeozoologinės analizės metu nustatyta dešimties (iš vienuolikos) žirgų lytis – visi vyriškos lyties (žr. katalogą, 1–22 lent.). Amžiaus įvairovė buvo didelė, nuo santykinai jaunų, 5 metų, iki labai senų, 17–21 metų amžiaus, žirgų. Dominavo suaugę, 5–9 metų amžiaus, gyvūnai. Kumeliukų kapų neaptikta. Panašus amžiaus pasiskirstymas būdingas Vakarų baltų kultūrinio arealo žirgų kapams.

Žirgų ūgis svyravo nuo 115–127 cm iki 139–143 cm ties ketera. Ūgiu jie primena tarpaną ar *konik* / lenkišką ponį. Morfotipų variavimą galėjo lemti gyvūnų atranka. Matmenų įvairovės didėjimas laikomas ankstyvosios domestikacijos požymiu.

Vieno žirgo palaikuose nustatyta ligos požymių: kape 221 kaklo ir krūtinės slanksteliai bei čiurnikaulio sąnarys buvo pažeisti kaulų hiperplazijos ir uždegimo. Uždegimo požymiai gali būti gyvūno naudojimo jodinėjimui pasekmė, kadangi ši patologija būdingesnė jojamiesiems žirgams. Ligotų gyvūnų laidojimas yra nebūtinai susijęs su luošų ar sergančių žirgų atrinkimu aukojimui: tai gali būti jojamųjų žirgų laidosena, šiuo atveju aiškintina senyvu žirgo amžiumi.

Nepaisant pastangų, Bogačevo kultūros kapinynuose aptinkamų žirgų laidojimo priežastys nėra ištirtos. Kitaip nei sūduvių kultūros kapinynuose, tiesioginio ryšio tarp žirgų ir žmonių kapų nėra. Taigi nepanašu, kad šie žirgai atliko vyrų (karių) kapų įkapių funkciją. Paprotki Kolonia 1-ojo kapinyno atveju horizontalioji ir vertikalioji stratigrafija rodo, kad žirgų kapai ribojo ir dalijo sakralinę erdvę. Aiškiai išsiskiriančios trys zonos galėjo būti parinktos įrengiant kapinyną.

Vienas svarbiausių Paprotki Kolonia 1 kapinyno žirgų bruožų, išskiriančių jį iš kitų panašaus tipo kapinynų – visiškas žirgo aprangos nebuvimas. Kitas Bogačevo kultūros kapinynams nebūdingas, bet rastas Paprotki Kolonia 1-ajame kapinyne bruožas – augalų naudojimas ir ritualinis laužų deginimas bei angliukų bėrimas į kapo duobę. Labai tikėtina, kad gyvų ir nužudytų žirgų laidojimo ritualas užėmė ypač svarbią vietą šį kapinyną palikusioje bendruomenėje. Žirgų kapų chronologija rodo, kad tai buvo reguliariais intervalais atliekami aukojimai.

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