

## Animal skeletal remains of the Theodosius harbor: general overview

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**Abstract:** Archaeological excavations at the site of Yenikapı, the most important main station for Metro and Marmaray projects on the European side of İstanbul, were started in 2004 with the discovery of numerous shipwrecks, amphorae, and skeletal remains belonging to animals. The findings from the excavations conducted by the İstanbul Archaeological Museums of the General Directorate of Cultural Heritage and Museums proved that this site, known in the Ottoman period as “Langa Bostanları”, was actually the ancient harbor of Theodosius. The archeological material and animal skeletal residues, mostly of horse origin, were found side by side in excavations initiated in 2004 and covering an area over 58,000 m<sup>2</sup>. Horse (*Equus caballus* L.) skeletons were the most numerous, reaching 32.64%, and were followed by cattle, sheep, and pigs, which had been used for consumption. A brief preevaluation has been established by determining the pathologies, butchery marks, and modifications on approximately 34 animal species bones in the present study.

**Key words:** Animal skeletal remains, Theodosius harbor, Yenikapı-İstanbul, Turkey

### 1. Introduction

The excavations situated at the site of Yenikapı, the main station for Metro and Marmaray projects in Turkey, brought to light many shipwrecks, amphorae, and skeletal remains belonging to animals. The findings from the excavations proved that this site, known as Langa or Vlanga (called Langa Bostanları as its Turkish name) in the Ottoman period, was actually the ancient harbor of Theodosius (Figure 1). Originally part of the sea, this site was the place in the harbor known as Portus Theodosiacus established by Byzantine emperor Theodosius I (379–395). The harbor lost its importance as imports of grains from Egypt to Constantinople ceased in the 7th century. It became part of the land in the early period of the Ottoman reign (1). It fell out of use in the 12th century, when it was blocked with the silt carried by the Lykos (called Bayrampaşa as its Turkish name) stream and was filled with rubble thereafter (2–4). Today, the Yenikapı excavation area is located between Mustafa Kemal and Namık Kemal streets, extending from Aksaray (Figure 2).

### 2. Materials and methods

The excavations started in 2004 and have covered an area of over 58,000 m<sup>2</sup>. The archaeological material found on the

site includes animal skeletal remains, belonging mainly to horses, and then mules, donkeys, cattle, sheep, goats, pigs, ibex, wild goats, hares, foxes, dogs, cats, deer, camels, bear, birds, ostriches, dolphins, sea turtles, tortoises, and one elephant and primate (*Cercopithecidae* sp.), as well as fish. These skeletal remains of animals are currently subject to examinations at the Osteoarchaeology Laboratory of the Faculty of Veterinary Medicine of İstanbul University, with permission issued by the Ministry of Culture and with the support of the Scientific and Technological Research Council of Turkey (TÜBİTAK; Project No. 107O518). Since the excavations are still continuing, and thus new animal remains are being found, the newly arriving material will be also the subject of examinations.

The study concerning these animal remains has aimed to find the answers to numerous questions regarding the animal population of the period, observed diseases and anatomical–pathological deformations, age, sex, whether animals had been used for consumption, and the apparent morphological features of the animals. Thus, the purpose of this study was to obtain important information regarding the husbandry economy of the excavation area covering 58,000 m<sup>2</sup>, and thus of the period analyzed, as well as the veterinary practices.

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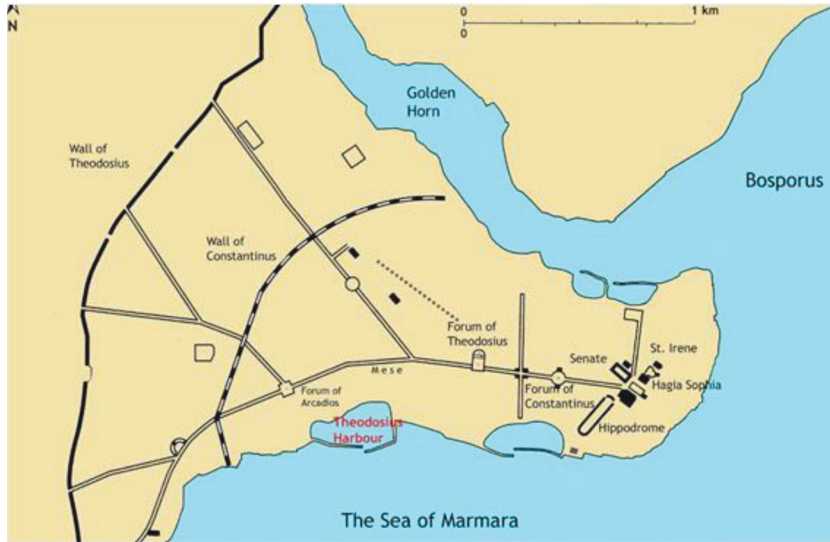


Figure 1. Theodosius harbor (4).



Figure 2. View of Yenikapı excavation area.

### 3. Results

Bones both of domestic and wild animals were found at various levels of the excavation site. Although the findings discovered were already dated by various scholars using various methods, the dating of animal bones is inevitable. Therefore, radioisotope carbon-14 dating of various specimens discovered at different levels in different grid squares was conducted in order to correlate them with the

archaeological dating of the site. For this purpose, 6 bone specimens that could represent the entire site were sent to Oxford University's Research Laboratory for Archaeology and the History of Art, Radiocarbon Accelerator Unit, with project support by TÜBİTAK (no. 107O518). The results of the analyses indicate various dates ranging from the early through the late Byzantine period (5). The results are presented in Table 1.

Looking at the species distribution of the findings, it may be seen that the amount of bones [the number of identified specimens (NISP%)] belonging to horse (*Equus caballus* L.) remains is the highest. Despite the limited number of whole horse skeletons found in situ at the Yenikapı Metro and Marmaray excavation site, the number of horse (*Equus caballus* L.) bones scattered all along the site is substantial (Figure 3). Being found at different levels and grids, these bones constitute 32.64% of the overall bone inventory. This is followed by the bones of cattle, sheep, and pig (Table 2).

The level of bone development was examined in 4 main groups, i.e. adult, young, young and adult, and infant. As a result, it was observed that the adult group is predominant, while no bones belonging to neonates or fetuses have been discovered. Of the horses, 95% were determined to be younger than 10 years, while the rest, 5%, were older than 10 years. It was noticed that most of the horses were between 5 and 10 years old and the horses between the ages of 7 and 10 constitute the majority in this group.

With regard to the bones that allow sex identification (hip bone, horn, etc.) it was seen that especially the skulls and bones, particularly of sheep and goat, belonged to males. Similarly, there were more male horses than females among the findings.

**Table 1.** Dating of animal bone specimens from Yenikapı Metro and Marmaray excavations.

Yenikapı Metro and Marmaray, 41°0'0.00"N, 28°56'59.99"E, Turkey				95% probability
OxA-18569	No. 1, bone, horse ( <i>Equus caballus</i> L.)	d13C = -20.71	1229 ± 22 BP	692–879 cal AD
OxA-18570	No. 2, bone, camel ( <i>Camelus dromedarius</i> L.)	d13C = -19.25	1456 ± 23 BP	566–646 cal AD
OxA-18571	No. 3, bone, horse ( <i>Equus caballus</i> L.)	d13C = -19.39	1235 ± 23 BP	689–874 cal AD
OxA-18572	No. 4, bone, sheep ( <i>Ovis aries</i> L.)	d13C = -19.10	1598 ± 23 Bp	415–536 cal AD
OxA-18573	No. 5, bone, cattle ( <i>Bos taurus</i> L.)	d13C = -16.06	1224 ± 23 BP	694–883 cal AD
OxA-18574	No. 6, bone, sheep ( <i>Ovis aries</i> L.)	d13C = -19.46	1061 ± 24 BP	898–1023 cal AD

BP: before present; AD 1950.



**Figure 3.** A horse skeleton in situ (archive of Yenikapı excavation).

Pathological symptoms were detected in 9.55% of all of the animal bones discovered at Yenikapı Metro and Marmaray. Most of these symptoms were observed in the horse bones. Of the horse bone inventory, 16.27% demonstrated pathological symptoms; 38.14% of these were observed on the skulls and around the oral cavity, while 61.86% were on other bones of the horse skeletons. Pathologies around the oral cavity mostly occurred on the teeth, alveoli, and *palatum durum* (around the hard palate). Other symptoms on the skulls include purulent and osteolysis inflammations, exostoses on the acrocranium and facial crest, and depression marks due to bridles. Palatal defects (inflammation on the hard palate) constitute 67.38% of the pathologies around the oral cavity. The level of this defect changes from small inflammations to extensive ones. Perforations on the *palatum durum* were even observed in some cases (Figure 4). The “acı damak gem” (Turkish name), a type of curb, was probably the cause of the inflammations on the hard palate and subsequent pathologies around the oral cavity.

On the horse skulls, palatal defect or deformations on the *palatum durum* were common and these are considered to be lesions caused by the use of bits. Furthermore, decay in the teeth (caries), alveolar recession, abscess chamber, and marks left by bridles were found. These palatal defects are believed to have been caused by use of a curb bit with

**Table 2.** Distribution of animal species found at the Marmaray–Metro excavations at Yenikapı (as of 30 September 2010).

Animal species	NISP	NISP%
Horse ( <i>Equus caballus</i> L.)	6816	32.642
Cattle ( <i>Bos taurus</i> L.)	4209	20.157
Sheep ( <i>Ovis aries</i> L.)	4018	19.242
Pig ( <i>Sus scrofa</i> L.)	925	4.430
Dog ( <i>Canis familiaris</i> L.)	859	4.114
Donkey ( <i>Equus asinus</i> L.)	794	3.802
Goat ( <i>Capra hircus</i> L.)	738	3.534
Mule ( <i>Equus mulus</i> L.)	503	2.409
Sheep/goat ( <i>Ovis</i> sp./ <i>Capra</i> sp.)	433	2.074
Deer ( <i>Cervidae</i> sp.)	297	1.422
Camel ( <i>Camelidae</i> sp.)	246	1.178
Bird ( <i>Aves</i> sp.)	241	1.154
Fish ( <i>Pisces</i> sp.)	230	1.101
Horse/mule ( <i>E. caballus</i> L./ <i>E. mulus</i> L.)	178	0.852
Dolphin ( <i>Delphinidae</i> sp.)	90	0.431
Cat ( <i>Felis catus</i> L.)	78	0.374
Sea turtle ( <i>Cheloniidae</i> sp.)	37	0.177
Wild goat ( <i>Capra aegagrus</i> L.)	33	0.158
Ostrich ( <i>Struthio</i> sp.)	32	0.153
Donkey/mule ( <i>E. asinus</i> L./ <i>E. mulus</i> L.)	26	0.125
Unidentified species	25	0.120
Water buffalo ( <i>Bos bubalis</i> L.)	13	0.062
Ibex ( <i>Capra ibex</i> L.)	10	0.048
Roe deer ( <i>Capreolus capreolus</i> L.)	9	0.043
Elephant ( <i>Elephantidae</i> sp.)	9	0.043
Bear ( <i>Ursidae</i> sp.)	9	0.043
Land tortoise ( <i>Testudinidae</i> sp.)	9	0.043
Exotic species	4	0.019
Hare ( <i>Lepus</i> sp.)	3	0.014
Carnivore	2	0.010
Primate ( <i>Cercopithecidae</i> sp., <i>Macaca</i> sp.?)	2	0.010
Gazelle ( <i>Gazella gazella</i> L.)	1	0.005
Fox ( <i>Vulpes</i> sp.)	1	0.005
Crab ( <i>Crustacea</i> sp.)	1	0.005
NISP/NISP%	20,881	100



**Figure 4.** Palatal defects observed on the *palatum durum* (hard palate) of Yenikapı horses.

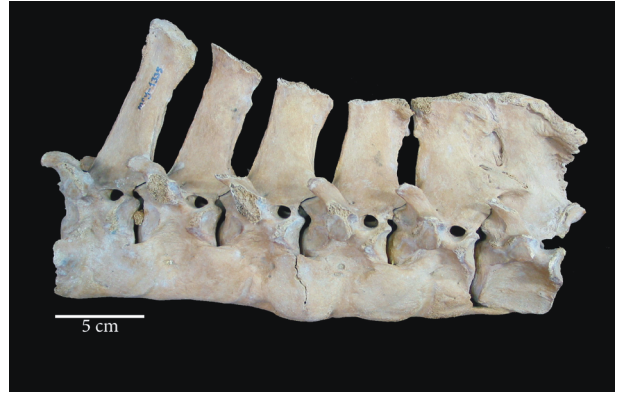
a high port, which is thought to have played a significant role in the control of horses. Some of these lesions had perforations into the nasal cavity (*cavum nasi*). Only one curb bit was discovered in the excavations, and its shape suggests the possibility of causing deformation in the palate (Figure 5).



**Figure 5.** Example of a horse bit uncovered at Yenikapı excavation area.

Pathological deformations were identified, especially on the thoracic and lumbar parts of the horse skeletons found. Signs of pressure caused by heavy load (called kissing spine syndrome) were noted on the spinous process (*processus spinosus*) of the vertebrae (Figure 6).

Twenty entire horse skeletons (*Equus caballus* L.) belonging to adult males have been discovered in situ so far. Chopping signs on single-toed animals (*Equidae* sp.) were especially found where the hind limbs join the body, i.e. on the *collum* of the *os femoris*. These bones also had



**Figure 6.** Generalized exostosis (chronic spondylitis deformans) on thoracic and lumbar vertebrae of a horse.

signs of gnawing by carnivores, which suggests that the limbs were probably chopped from the body in order to have them eaten by carnivores.

An entire camel skeleton (*Camelus dromedarius* L.) has also been discovered (Figure 7). It belongs to an 8- to 10-year-old male camel. No evidence of slaughtering has been noticed, and it is thought it had been thrown after death. All of the bones have been measured morphometrically. Other remains belonging to camels have been found scattered and with butcher marks, which suggests that they were probably consumed.

Several dolphin skulls and vertebrae have been discovered so far and their examination is still in progress. These bottlenose dolphins' skulls (*Tursiops truncatus* L.) do not have any signs of chopping; however, some of the vertebrae found have some signs of chopping with a knife.

The fish skeletal remains are one of the most common findings on the excavation area. Specifically, those belonging to the vertebrae of tuna fish (*Thunnus thynnus* L.) have signs of chopping, which suggests that they were used for consumption purposes.



**Figure 7.** A camel skeleton in situ (archive of Yenikapı excavation).

#### 4. Discussion

Taking into account the archaeological importance of the excavation site and the animal bones discovered to date, it may be concluded that especially Ruminantia such as cattle, sheep, and goat, as well as pig, bird (*Gallus* sp., *Anser* sp., *Anas* sp.), camel, deer, and fish, had been used for consumption. Signs of slaughtering and chopping observed on the bones of these species support this thesis. The single-toed animals such as horse, mule, and donkey were mainly used for horseback riding and/or draft, as concluded from the pathological deformations observed particularly on the vertebral column and legs. When the palatal defects caused by the curb bit with a high port are taken into consideration, it can be said that this bit type facilitated the control and manipulation of the animals. Signs of stress caused by the bridles on the skulls and other bones suggest that the animals were utilized for a long time. The observed signs of chronic spondylitis deformans on the vertebral column of the Yenikapı horses can be considered as an indicator of bad horseback riding and/or horse draft.

The bones studied had traces of chopping with knives as a sign of butcher's consumption. These butchering signs

were found especially in the case of Ruminantia such as cattle, sheep, and goat, which also had signs of cooking, suggesting their further destination for consumption. Furthermore, slaughter signs (cutting and chopping) were found especially on the cattle, sheep, and goat skulls, which suggests that the slaughtering intended to remove the brains. The high frequency of slaughter signs observed on the bones indicates chopping.

As the excavations at Yenikapı continue, more and more animal bones are discovered. As more materials are studied, we will be able to make more comprehensive evaluations in the future, and we will try to throw more light on the past of İstanbul.

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