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RESEARCH PAPER

Camels on the Northeastern Frontier of the Roman Empire

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Ample iconographic, written, and osteological evidence for the occurrence of both dromedary (*Camelus dromedarius*) and Bactrian camels (*Camelus bactrianus*) is known from many Roman provinces. In contrast to the western provinces, osteological material from the northeastern frontier of the Empire has not yet been discussed collectively. There is a lack of information in the literature concerning which species of camel was widely spread, for what purposes they were used, and whether the camel, as an animal introduced artificially by humans, was treated in a unique way. Camel bones have been found at Ajdovščina – Casta (Slovenia), Hrusica – Ad Pirum (Slovenia), Viminacium (Serbia), Vranj (Serbia), Novae (Bulgaria) and Tanais (Russia). The earliest (1st century AD) and the largest assemblages of bones derive from the easternmost sites of Tanais and Novae. Identification of species was possible at 4 out of the 6 sites. In all assemblages, the majority of the bones belonged to Bactrian camels. It is noteworthy that the dromedary species occurred only in the west of the study region; this indicates a gradual increase in the importance of Bactrian camels in the next eastern provinces. This is supported by the work of other researchers (Pigiére and Henrotay 2012). None of the bones in this study were isolated or intentionally buried. The incomplete dataset collected from these different sites did not confirm whether camels were bred there. It can be generally assumed that camels were used mainly as pack animals, probably in the army, and that they were rarely consumed.

Introduction

The camel was not an unfamiliar species in the Roman Empire (1st–5th centuries AD) (Toynbee 1973: 137). Both dromedaries (*Camelus dromedarius*) and Bactrian camels (*Camelus bactrianus*) as well as cross-bred hybrids were extensively used. Ample iconographic, written, and osteological evidence of their occurrence has been found in many Roman provinces (Pigiére, Henrotay 2012: 1531). Here I discuss findings from the bones discovered in the northeastern provinces, namely Illyricum, Moesia Superior, and Moesia Inferior, as well as Tanais, a city of the bordering Bosporan Kingdom. In all these provinces, camels are a non-native species artificially introduced by humans.

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State of research

The occurrence and role of camels in European provinces is not well understood. Existing documentation mostly concerns a limited number of random sites where zooarchaeologists have had the opportunity to work. The consistency with which this topic

has been addressed in the past, as well as the accuracy of dataset compilation, has been varied. The occurrence of camels on the Black Sea's shore during the domination by Roman Empire should present a special map, included in Piotr Dyczek's dissertation (2001). However, the author did not describe any assemblage of bones, but instead indicated a few archaeological sites and cited other sources. Dyczek took this information directly from an earlier source, an article written by Russian scientists Kropotkin and Kropotkin (1988: 171). The map used by these authors looks similar to one composed by Dyczek. The Kropotkins also did not describe the assemblages of bones; their information was derived from their previously written papers or from numerous Russian and Ukrainian archaeological reports from 1930s and 1940s (Kropotkin and Kropotkin 1988: 183), not available in Europe. Thus, data from the Kropotkins' and Dyczek's papers cannot be verified and will be omitted.

The literature dealing with the role of camels in Western Europe is more specific and also more easily-obtained. A report of Morales-Muñiz and his colleagues (1995) discusses the presence of camels (exclusively dromedaries) in the Iberian Peninsula in Roman and Islamic periods. At four Roman sites camel bones were found. An outstanding article by two Belgian scientists, Fabienne Pigière and Denis Henrotay, "Camels in the northern provinces of Roman Empire," was published in the *Journal of Archaeological Science* in 2012. The researchers collected, ordered, and quantified data from all publications which mention findings of camel bones from northwestern Europe, with a special consideration given to Gallia Belgica, Germania and Pannonia. Nevertheless, to my knowledge no article proposing a comprehensive view of the occurrence of camels in other provinces has been published.

Aim of this paper

The main aim of this paper is to verify – on the basis of available zooarchaeological studies – which species of camel was more common on the northeastern frontier of Roman Empire. I will try to confirm if the camel, as a species introduced by man and less common than other domesticated animals, were specially treated or had different status. I will compare my conclusions with the work of Pigière and Henrotay (2012), whose publication is the only comprehensive study of the camels' occurrence in the Empire.

Discussion of non-osteological sources

The main, undeniable evidence that camels existed in the Roman Empire are bones. Nevertheless, zooarchaeology of modern animal species is a relatively new science, spanning barely one century (Lasota-Moskalewska 1997: 12). In the more distant past, other types of archaeological sources yield knowledge about the position and role of various animals in human life. This also applies to camels: information about them is included in dozens of ancient manuscripts and also, more rarely, iconographic sources.

Pliny the Elder specified two species ("those of Bactria and those of Arabia" (trans. by J. Bostock 1893)), described their external appearance, the differences between them, and the use of their physical endurance in battles (Plin. Nat Bostock 1893 VIII. 26). This information is not original, however, as he took it from the earlier source, Aristotle's *Historia Animalium* (Arist, Hist. Anim. BII p. 1), and even mentioned Aristotle in a list of the previous writers used as authorities (Rackman 1967). Both species were also described by Diodorus Siculus in his *Bibliotheca historica.* He also mentioned the consumption of their milk and meat (Diod. 2.54.6).

Iconographical ancient sources, rare and limited to North Africa, indicate camels could be used for other purposes. A few items date from the Egyptian Dynastic Period: nevertheless, this animal was not common, as evidenced by there being no Egyptian word for it (Saber 1998: 209). Wider occurrence of camels (namely dromedaries, who originally lived in Arabia)

is reported from the Ptolemaic dynasty. Furthermore, artefactual evidence indicates that the species spread slowly to the west. The oldest such artifacts are coins (*asses*) of Cyrenaica issued by a legate of Antonius, M. Lolius Palicanus, dated to the 1st century BC (Brogen 1954: 127). Both depict a standing dromedary on the reverse, which, according to Brogen, was probably a symbol of the province (loc. cit.). However, the general appearance of camels in Cyrenaica, Tripolitania, and further Roman provinces is dated from 3rd century AD (Bartosiewicz, Dirjec 2001: 283; Morales Muñiz, Riquelme and Liesau von Lettow-Vorbeck 1995: 369). The first known presentations of working dromedaries originate from that century. Generally they are small figures of loaded-down camels (Saber 1998: 213), but a few of them are more elaborate.

In one of the mausoleums of Ghirza, the ruins of a Roman town in Tripolitania about 150 km from the coast near the river Wadi Ghirza (Brogan and Smith 1957), are preserved reliefs of agricultural scenes. A few of them depict working dromedaries, mostly in caravans. One unique relief from the mausoleum in Gebel Nefusa, a site located north of Ghirza, shows a dromedary harnessed to a plough. The monument is not yet dated and poorly preserved, but a one-humped camel and a man in a short tunic who leads the plough and holds a stick or other tool to urge the animal on are still visible (Brogan 1954: 130).

A better preserved sculpture of a dromedary used for labor was found at Henscir El-Ausaf in Western Gefara, within the territory of modern Libya, around 130 km from the coast. Two ploughs are shown on the longer side of monument: one with an ox, and the other one with a dromedary. Men in short tunics lead. On the shorter side there is a realistic relief of cereal, probably wheat (see: **Figure 1**). The age of the monument is not known, but assumed to be somewhere around the 3rd century AD (Brogan 1954: 130).

No other evidence of camels being harnessed from any other Roman provinces are known. Brogan (1954) considered that using this animal for fieldwork was a natural result of the extension of the coastal cities in Mediterranean Africa. The growth necessitated cultivation of wheat and irrigation of the desert, where cattle are useless due to their constant need for food and water. Cattle use twice as much water as camels of the same weight daily (MacFarlane et al. 1963: 270), so the camels' presence far away from coast (both described by Brogan (1954) sites lie more than 100 km from the Mediterranean Sea) is viable.

The fact that the reliefs from Tripolitania are the only known monuments showing camels performing manual labor is noteworthy. These monuments are only isolated incidents, and are not proof that camel harnessing was common throughout the Empire. Also, they only depict dromedaries, which could mean that the Bactrian camel was not introduced to North Africa. The Bactrian camel is endemic to Central Asia, where it was domesticated and then, through trade, brought westwards (Lasota-Moskalewska 2005: 154),

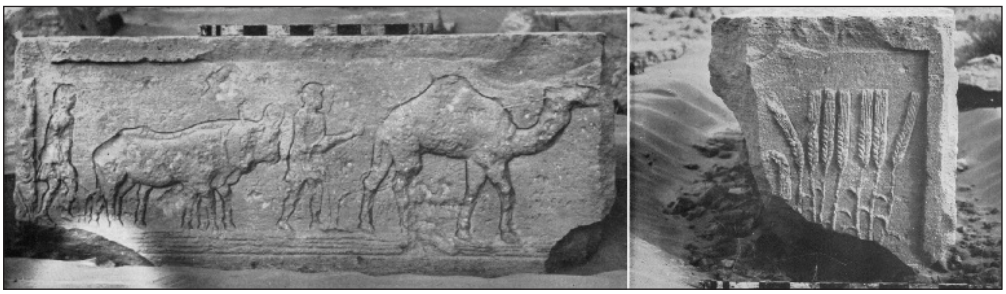

Figure 1: Monument from Henscir El-Ausaf, Western Gefara (taken from Brogan 1954: plate XVIII).

along the northern coasts of the Caspian and Black Seas. Their specific iconographic representation is unknown, but there are plenty of written sources about them. For example, Claudius Aelianus in his *De Natura Animalium* wrote about "Caspian camels" (XVII, 34): "Their Camels are past numbering, and the largest are the size of the largest horses and have beautiful hair. For their hair is so fine that it can compare with Milesian wool for softness. Accordingly their priest and the wealthiest and most powerful of the Caspii clothe themselves in garments made from Camels' hair" (trans. by A.F. Scholfield 1958).

Without any doubt, Aealianus was describing the Bactrian camel, since their identifying attribute is a long mane below the throat and thick fur (Lasota-Moskalewska 2005: 154). Even though there are gaps in iconographic sources that depict the Bactrian camel, this was a species more common in the Roman Empire, particularly near the northeastern frontier. I assume that the transport of Bactrian camels to these provinces was less troublesome than bringing dromedaries from the south.

Osteological material from chosen archaeological sites in the Eastern frontiers of the Roman Empire

For the purpose of this paper sites located in the northeastern Roman Empire were chosen. Bones of camels were found at all mentioned sites and the results of excavations were published as original work. These sites included Ajdovščina – Casta (Slovenia), Hrusica – Ad Pirum (Slovenia), Viminacium (Serbia), Vrajn (Serbia), Novae (Bulgaria), and Tanais (Russia, located near the Sea of Azov) (see **Table 1**).

Location is not the only distinguishing factor of these sites, for they have significant differences in quantity, abundance of occurrence, context, and chronological age. I will describe them in turn, starting with the westernmost and finishing with the easternmost. The additional paragraph describes bones from Novae, as these assemblages were particularly problematic.

Ajdovščina – Casta is a site near the Vipava River in western Slovenia. Founded in the 1st or 2nd century AD as a post station, it was fortified and transformed into a camp in the 3rd century AD. Soldiers abandoned this site at the beginning of the 5th century AD, after the victory of Theodosius over the usurper Eugenius. Slovenian scientists excavated the site in the 1980s and 1990s, but details about the osteological remains were not published. Four camel teeth were identified in a deposit dated c.a. 270 AD. Two of them are poorly preserved, which makes them difficult to identify. The third and fourth ones were identified as the first and second molars from the left mandible (Bartosiewicz and Dirjec 2001: 279).

Hrušica – Ad Pirum was a fort at the plateau Hrušica, in southwestern Serbia, dated to the 3rd century AD. It was an important part of the fortification of the eastern border of Italia, known as the *claustra Alpina Iuliarium.* The fort was abandoned, similarly as Ajdovščina – Casta, after Theodosius's victory. Archaeologists from the National Museum of Ljublana and the Univeristy of Munchen worked at this site in the 1970s. Unfortunately, despite extensive excavations, only 343 animal bones were documented, among them three camel bones:

- the left mandible canine
- the proximal anterior phalanx
- a fragment of the *radiocubitus*

The first two bones were found in a trench without any informative context. Information about the third one is missing (Bartosiewicz, Dirjec 2001: 280). Species identification of these bones is problematic. Bartosiewicz and Dirjec (2001) suppose that the majority of available methods used to distinguish remains of Bactrian camel from dromedary are not trustworthy. They consider only the methods of Steiger (1990) as valuable, but they cannot be used in the classification of teeth. Therefore, bones that were not teeth were identified using her method. Measurements of the *radiocubitus* show that it belonged to a dromedary,

Site	Modern country/ Roman province	Date range	Dating of remains	Type of site	No. of remains	Species	References
Ajdovščina – Casta	Slovenia/Illyricum	1st–beg. 5th AD	ca. 270 AD	Legionary camp	3	not determined	Bartosiewicz, Dirjec 2001
Hrusica – Ad Pirum	Slovenia/ Illyricum	3rd–5th AD	3rd AD	Fort	3	dromedary	Bartosiewicz, Dirjec 2001
Vrajn	Serbia/Moesia Superior	3rd–4th AD	unknown data	*Villa rustica*	3	Bactrian camel	Vuković 2010
Viminacium	Serbia/ Moesia Superior	1st–5th AD	unknown data	Legionary camp/ amphitheater/ necropolis	10 + partially preserved skeleton	Bactrian camel or hybrids	Vuković 2010; Vuković and Bogdanović 2013; Vuković and Blažić 2014
Novae	Bulgaria/Moesia Inferior	1st–5th AD	1st AD /2nd–3rd AD/4th AD	Legionary camp	53	Bactrian camel*	Chrzanowska and Molenda 1983; Schramm 1975; Schramm 1979; Gręzak and Piątkowska 2001.
Tanais	Russia/Bosporan Kingdom	3rd–6th AD	2nd AD /3rd AD/4th AD	Greek-Roman city	93	not determined	Mâgkova 2000

Table 1: The remains of camels found at discussed sites – key information.
* – result of own studies.

although one dimension is within Steiger's range for the Bactrian camel. The phalanx also belonged to a dromedary, probably a female (Bartosiewicz, Dirjec 2001: 283).

Vranj[1] is a site located near the modern village of Hrtkovci in northern Serbia. Its main architectonical assumption was *villa rustica.* Archaeological excavations were conducted twice, both in 1991 and 2004. Three elements of camel hindlimbs were found, including:

- the first phalanx of hindlimb (without epiphysis), side undetermined
- the complete left talus bone
- the fourth tarsus bone, left side, almost complete

After measurements were conducted according to the standards of Steiger (1990), the bones of Vrajn were identified as belonging to a Bactrian camel. It is unknown whether the bones come from one or more individuals.

Viminacium[1] is a site located near the Mlava River, close to its outlet into Danube, in modern eastern Serbia. At first it was a military camp of Claudius' Seventh Legion, and was later transformed into a city that became the capital of Moesia Superior. Today it is one of the most important archaeological sites from the Roman period in Serbia. The first excavations took place in the 19th century, and research has been ongoing since the 1970s, courtesy of the Belgrade Institute of Archaeology (Milkovic 2011: 11).

Camel bones were found in two sectors of Viminacium: the eastern necropolis and the amphitheater. The former contained a near-complete first anterior phalanx from a left forelimb, which had been gnawed at the distal end. In the amphitheater the researchers found:

- a complete atlas vertebra
- a fragment of the right tibia, with distal epiphysis and traces of chopping on the shaft
- the complete right talus bone
- an almost complete right medial/left lateral first anterior phalanx, with traces of gnawing on the distal end
- 3 thoracic vertebra[2]
- 1 lumbar vertebra
- 1 rib
- 1 distal femur
- 1 distal radius
- additional 1st phalanx

Bones from both sectors came from adult individuals. Apart from the first phalanx, all the specimens were identified as most likely belonging to the Bactrian camel. The first phalanx is a bone of contention; according to Steiger's method (1990) it is difficult to assign it to a particular species without doubt. Measurements of the epiphyses point to Bactrian camel, but the width of the shaft is too small. In this set of bones the distinction of sex and information about minimal number of individuals are unknown.

The publication by Vuković and Bogdanović (2013) brought new information about camels breeding in Viminacium. The researchers found the partially preserved skeleton of one individual at the old amphitheatre. The deposit was dated to the 4rd century AD; the sex of animal was not determined because of the lack of pelvic bones. The animal was adult, over 5 years in age (Vuković, Bogdanović 2013: 263). The Serbian researchers drew an interesting conclusion about the species' identity for this individual. The indicators described by Steiger (1990) gave mixed results, so this camel could be a hybrid. Steiger did not elaborate on this issue; however, hybridization has been applied since the 1st century AD (Potts 2004: 158), and is known from many ancient sources. Perhaps this individual was an offspring of a male Bactrian camel and a female dromedary, as this cross gives the strongest animals (Potts 2004: 156).

Tanais is an ancient city located in the Don River delta. Inhabited since the 3rd century BC, it was once an important trade center. Tanais was a place where the interests of Roman cities of the Black Sea crossed with those of the

northern cities of the Azov Sea. Conquered in the 1st century BC by the Bosporan king Polemon, Tanais developed up until the 3rd century AD, when barbarians (probably the Goths) destroyed it. The city was definitively abandoned in the mid-5th century AD. Excavations in Tanais began in the 1950s with a Soviet mission (Treister, Vinogradov 1993: 551). The works have been continued by Polish and Russian archaeological expeditions from the University of Warsaw and the Archaeological Expedition of the Lower Don River of the Russian Academy of Science. Among numerous excavation reports, an article about animal bones by Mâgkova was published in 2000. Of 39,000 fragments, few came from camel skeletons. 92 of 93 fragments (material was poorly preserved) were from the Roman period layers; one bone was from the 2nd century AD, two were from the 3rd century AD, and 89 were from the 4th century AD. In the first two layers each set came from a different individual. The author assessed the number of individuals from the latter as being between one and seven. All the bones belonged to adult individuals, and only the 2nd century AD layer contained two bones of young animals (Mâgkova 2000: 6).

Camel bones from Novae

Novae is a site located near the Danube, in modern north Bulgaria. In Roman and Byzantine times it was an important military center, and after the 4th century AD, one of the most important towns in Moesia Inferior.

An international team of researchers (including those from the Universities in Warsaw and Poznań, among others) has been working at this site since the 1960s (Dyczek et al.: 2001). The remains of animals at the long-occupied site are still numerous and the team's annual archaeological reports include studies of zooarchaeological materials. Four of them describe the camel bones from Novae: two of which were authored by Schramm (1975; 1979), one by Grężak and Piątkowska-Małecka (2001) and another by Chrzanowska and Molenda (1983). Schramm elaborated on two assemblages of animal remains, the first one excavated during the 1970 and 1972 seasons (1975), and the second one in 1974 (1979). The research of the first one included 3162 fragments of bones, mostly from domesticated animals. They were dated to the end of the 1st century AD. Among them 20 were identified as camel remains. Nineteen of those originated from the area of the western gate, and one bone came from the northwestern corner of the forum. The anatomical distribution of these bones was omitted; the author described only those that were well-preserved. These included:

- a dental arch with upper molars (total length: 114 mm)
- an atlas (length of wings: 113 mm)
- the proximal epiphysis of a femur (width: 130 mm)

In addition, another illustration used in the report shows a fragment of a mandible. The other bones were not described; it could be possible that their condition made the identification difficult. The assemblage from 1974 (1979) included bones from the northwestern corner of the forum (3567 fragments) and the north gate (237 fragments), dated to the turn of the 2nd and 3rd centuries AD. Among the forum's remains, archaeologists found 26 camel bones in two different layers consisting of:

- two fragments of skull bones
- two fragments of thoracic vertebrae
- five fragments of lumbar vertebrae
- five fragments of sacrum bone
- four fragments of ribs
- two fragments of femurs

There is lack of information for measurements in this assemblage, except in one case: a fragment of a femoral distal epiphysis that measured 116 mm. Schramm identified all bones from both excavation seasons as Bactrian camel. The author did not explain the method she used. She could not used the Steiger elaboration, as it was published more

than ten years later. Schramm pointed out that she compared measurements of bones (not included in her report) to the bones of modern camels, and found a few differences (Schramm 1975: 233). The author also did not mention the source of her comparative material. Thus this species identification is in doubt and the bones from Novae's forum should be reanalyzed.

Chrzanowska and Molenda (1983) described a set of bones excavated in 1977 and 1979 from Novae. The information about specific context was lost but the authors distinguished six bones as the remains of camels:

- teeth, without information regarding type
- the distal epiphysis of a tibia
- the second phalanx

The researchers did not take any measurements, nor did they identify side, age, or species of the bones (Chrzanowska, Molenda 1983: 2011).

In the assemblage of a hypocaust basement from the headquarters buildings, elaborated by Gręzak and Piątkowska-Małecka (2001), 642 bone fragments were found. The layer containing this material is dated to the late 4th century AD. Among the remains, only one of the bones – the first phalanx – was derived from a camel. The bone was completely preserved and was measured; however, the authors did not identify the species of camel. I conducted my own attempt at identification in order to verify the findings of Schramm and determine the principia phalanx's origin. I used published measurements of long bones from Novae and the measurement tables from Steiger's dissertation (1990). In Schramm's work, the osteological analysis of camel bones was a minor topic. Due to a scarcity of material, she did not describe them as thoroughly as the bones of cattle, goats, and sheep. Thus, the measurements of camel remains are selective: out of 46 bones, only four were measured. The dental arch cannot be interpreted using Steiger's method, since it is only applicable to the postcranial skeleton.

All of the 11 proximal epiphyses of dromedary femurs measured by Steiger were narrower than 130 mm. This is a frequent result in measurements of Bactrian camel bones. The same rule applies to distal epiphyses. None of the width measurements of dromedary distal ends even approaches the size of the Novae bones (see **Table 2**). These measurements allowed me to conclude that the long bones from Novae most likely belonged to average-sized Bactrian camels.

The length of the atlas wings does not identify the bone to either species. The average, calculated by Steiger, suggests it is closer to the dromedaries' measurements. Still, only

Bones described by Schramm	Measurement (mm)	Mean size in mm (Steiger (1990))	
		Dromedary	Bactrian camel
Mandible dental arch	Length – 114	–	–
Atlas	Length of wings – 113	113,3	115,8
Femur	Width of proximal epiphysis – 130	122,8	132,4
Femur (1979*)	Width of distal epiphysis – 116	106,7	118,4

Table 2: The comparison of measurements of Novae bones (elaborated by Schramm (1975; (1979)) for suitable measurements from Steiger's dissertation (1990).

* – Information about this bone were taken from Schramm's publication from 1979; all others from 1975. The femur fragments are not identical.

one barely-measurable dimension of the vertebra is known. A result close to 113 mm is viable for both dromedaries and Bactrian camels. The atlas varies little between specimens and generally is not used by zooarchaeologists to differentiate between species. In this case I have too little information to ascertain whether this bone belonged to a dromedary. I lean towards the opinion that it belonged to a small-sized Bactrian camel, or a hybrid. The interpretation made by Schramm, although achieved through an unknown method, was the most accurate.

The comparison of the first phalanx from Novae measurements (described by Grężak and Piątkowska-Małecka (2001)) to the average size of either dromedary or Bactrian camel qualifies this bone as belonging to the two-humped species or its hybrid (see **Table 3**).

Discussion

The study of the nature of the camel's occurrence in the northeastern provinces, based on existing osteological remains, is a problematic challenge. Bones are scarce, originate from different countries, and have been investigated by different researchers. The inconsistency of the research is also an issue. The minimal number of individuals, age estimations, and measurements of all bones (not simply the best-preserved or most common) are lacking. Only three reports included the total number of remains from the site. The lack of data hinders any opportunity of appraising the relation of camel remains to other animal remains. The most comprehensive analysis has been done on the material concerning Novae, but even these publications do not include all information. However, some conclusions could still be made.

The earliest and the largest assemblages of bones are derived from the easternmost sites, Novae and Tanais. At all sites, camel bones are not well-preserved. At the sites where it was possible to assert species (Novae, Tanais, Hrušica – Ad Pirum), the remains of this animal are scarce. Sometimes they are scarcer than bones of other animal taxa and are usually rare among zooarchaeological material. The context where bones have been found is also interesting. In some cases, the place of discovery was not reported, but the fact that they have never been found as isolated occurrences is noteworthy. The camel, a rare animal, was not buried intentionally. Even the discovery of a partially-preserved skeleton in Viminacium's amphitheatre does not indicate a special burial. This amphitheatre was abandoned several dozen years before the death of this camel (Vuković, Bogdanović 2013: 254). Thus, after death the camel remains were treated the same as the bones of other animals: they were placed in trash pits and similar deposits. Some bones have traces of gnawing or chopping (Viminacium), which could serve as evidence

Measurement	Mean measurements of dromedary's first phalanx (Steiger 1990) in mm	Mean measurements of Bactrian camel's first phalanx (Steiger 1990) in mm	First phalanx from Novae in mm
Length	101,4	102,2	108
Width of proximal end	41,5	46,3	47
Width of distal end	38,9	40,6	38
Width of shaft (the smallest diaphysis)	20,9	23,6	25

Table 3: The comparison of measurements of first phalanx from Novae (studied by Grężak and Piątkowska-Małecka (2001)) to suitable measurements of Steiger's dissertation (1990).

of consumption. But in Novae, where the set of bones was one of the largest, no trace of human modification was noted (Schramm 1975: 238). Therefore, on the basis of present reports, it is not possible to confirm whether camels were routinely consumed.

Identification of species was possible at four out of six sites. At all sites the bones were predominantly the Bactrian camel. Only the remains from Hrušica – Ad Pirum were unequivocally identified as dromedaries'. The second place where a one-humped camels' bones were probably found is Viminacium, although new research from this site (Vuković, Bogdanović 2013) indicates the breeding of hybrids also took place here. The elaborations of Ajdovščina – Casta and Tanais did not include information about species. Moreover, the bone measurements that would allow me to conduct my own analysis were omitted. In Ajdovščina – Casta only teeth were found, and so far no method can suitably identify them. However, in spite of the lack of osteological information about camels from Tanais, I would assert that Bactrian camels lived there. The introduction of dromedaries to the city located to the extreme northeast of all sites discussed in this paper, and at the same time the closest to the natural breeding grounds of Bactrian camels, would have been irrational and unprofitable. Moreover, few bones of young individuals were found in Tanais, which could be a sign of systematic local breeding.. Noteworthy is the fact that dromedaries were only present on the west of the discussed area. Further east only Bactrian camels' bones were found. The presence of dromedaries is a certainty in this area of the Roman Empire, where using them was convenient and profitable. In eastern provinces, using the Bactrian camels was easier. Both species are resistant, but Bactrian camels cope with changes of climate much more easily (Lasota-Moskalewska 2005: 154).

I would like to compare my conclusions to the work of Morales Muñiz and his colleagues (1995) and to Pigière and Henrotay's article (2012). Both concern the camels' occurrence in northwestern provinces of the Roman Empire and thoroughly detail this subject.

In the case of camel bones from the Roman Period, Morales Muñiz and colleagues (1995) described data provided by other scientists, previously unpublished. The findings from all four sites, including Conimbriga (urban settlement), Complutum (urban settlement), El Val (villa) and Cartago Nova (amphitheatre), are single bones of adult individuals. The earliest source is mandibular coronoid process from Cartago Nova, dated to about 70–80 AD. According to the authors, this bone represents the earliest evidence of camels introduced to the continent (Morales Muñiz et al. 1995: 373); however, it is contemporaneous with the Bactrian camels that have been found from Novae (Schramm 1975).

Pigière and Henrotay supplemented their own results from the Arlon-Neu site in modern Belgium to analyze other researchers' work. Out of 22 Roman sites where an occurrence of camels was confirmed, species identification was performed at eight. Three of these (Abodiacum, Vemania, Brisiacum) were military complexes. The remains from two sites were identified as Bactrian camels (Abodiacum, Vemania), and from the third as dromedary (Brisiacum). The five remaining sites are "civilian", urban, and rural locations. In three of these sites bones were identified as dromedary (Arlon-Neu, Bordeaux-Cité Judiciaire, Kompolt-Kisier), and in the other two as Bactrian camels (Mauerbach, Vindobona). This arrangement of bones indicates a mixed presence of both species in the western provinces, without distinction of the type of housing. Still, some regularity is noteworthy. The sites described by Pigière and Henrotay, Bordeaux-Cité Judiciaire, Arlon-Neu and Brisacum, are located respectively in Aquitania, Belgica and Germania Superior – all western provinces (discussed in this work). At the sites located further to the east – Abodiacum, Vemania, Meuerbach and Vindobona – only Bactrian camels' remains

were found. My conclusions about proportional increase of the importance of Bactrian camel in the eastern provinces would therefore seem quite reasonable (see **Figure 2**).

The scarce osteological data does not allow me to assert unambiguously the goal of breeding camels in the northeastern provinces. The majority of remains discussed here originate from layers dated to the 3rd century AD, while the increased importance of camels in the Roman army was noticeable since the time of Constantine the Great (Toynbee 1973: 139). All the aforementioned sites, both legionary and civilian, played important roles in trade and transport, and were connected by a network of roads. This would lead me to conclude that camels, especially Bactrian camels, were primarily used as draft and pack animals. The use of camels for labor was also confirmed in written sources. Strabo described the existence of such caravans in his *Geography* (XI, 5, 8). Bactrian camels are not as fast as dromedaries (Lasota-Moskalewska 2005: 154) and their role as cavalry mounts in the areas where faster and more agile horses can be used had to have been marginal.

Summary

Both species of camels lived in the northeastern provinces of the Roman Empire. The vast majority of osteological material from the aforementioned discussed sites belonged to Bactrian camels. The role of the dromedary, as an animal imported and not as well adapted, was minor; for now it seems the dromedaries lived mostly in the western areas of the Empire. Camels were not treated differently to other livestock, and they did not have a 'special' status, as their remains were deposited within the same contexts as other animal remains.

My work does not exhaust the subject of occurrence and role of camels in the Empire. The new evidence for hybridization should be considered. This paper is only a starting point for further, more detailed studies, which could be possible with progress of zooarchaeological work on other sites. If more reports become available widely, more opportunities to study the problem of occurrence and spreading of camels will emerge. All the results of these future studies should be standardized; the differences of how information was obtained in various

Figure 2: Sites where occurrence of camel remains and their species identification was confirmed (Modeled by Juszczyk and Tomczyk on the basis of *Verteilung der* (*33*) *Legionen im Romischen Reich* (*um. 200 n. Chr.*) at *Der Nueu Pauly* 7: 11, Brill Online, 2007).

publications are significant. The standardization of research would make the comparison of the results from different sites easier, and promote our knowledge of camel occurrence across the Roman Empire.

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All omissions and errors are my own.

Competing Interests

The author declares that they have no competing interests.

Notes

[1] All information about camel remains from Vranj and about the first camel bone assemblage found in 2008 in Viminacium is from the poster of Sonja Vuković and Svetlana Blažić *Camels from Roman Imperial Sites in Serbia,* presented at the conference "International Council of Archaeozoology" in Paris, 2010 (http://alexandriaarchive.org/bonecommons/exhibits/show/icaz2010paris/session1_3/item/1636 – access 12.01.2013).

[2] Information about this and following bones on the list was taken from Vuković-Bogdanović and Blažić, 2014.

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