An amphora with millet from the Roman citadel at Olbia Pontica, Ukraine

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Zusammenfassung – Dieser Beitrag stellt einen Hirsevorrat aus der letzten römischen Belegungsphase der römischen Zitadelle in Olbia Pontike (Ukraine) vor. Er befand sich in einer Amphore pontischer Herkunft (Typ Zeest 75), die durch Feuer zerstört und anschließend in einer Grube entsorgt wurde. Das Pflanzenspektrum des Vorratsfundes wird von *Panicum miliaceum* dominiert und umfasst sowohl unverkohlte als auch verkohlte Reste. Die Rolle von Hirse in der römischen Ernährung wird im Kontext der landwirtschaftlichen Produktion im Hinterland und vor dem Hintergrund aktueller Isotopenanalysen diskutiert.

Schlüsselwörter – *Panicum miliaceum*, Hirsevorrat, Olbia Pontike (Ukraine), römische Zitadelle, Amphore vom Typ Zeest 75

Abstract – This paper covers a millet deposit of the final Roman occupation phase from the Roman citadel at Olbia Pontica (Ukraine). It was found in an amphora of Pontic origin (type Zeest 75) that has been discarded in a pit after its destruction in a fire. The plant spectrum is dominated by *Panicum miliaceum* and comprises subfossil dry and charred preservation. The consumption of millet by Romans is discussed in the context of the agricultural production of the hinterland and against the background of recent isotope studies.

Keywords – *Panicum miliaceum*, millet deposit, Olbia Pontica (Ukraine), Roman citadel, amphora type Zeest 75

Introduction

The assemblage of cereals presented below originates from an amphora found in a pit in the citadel area in Olbia Pontica (Ukraine) (**fig. 1**). The amphora has been dated to the 1st half of the 3rd century BC (Zeest 1960; Krapvina 2009). The former ancient port city of Olbia is located on the estuary of the Bug River, near the modern village of Parutyne, close to Mykolaiv (**fig. 2**). It is one of the most important cities founded at the end of the 7th to the beginning of the 6th century BC in the course of the Great Greek Colonization of the Northern Black Sea by the settlers from Ionian Miletus. With an area of about 50 ha, Olbia reached its greatest extent and significance between the 5th and the 3rd century BC. From the first half of the 3rd century BC onwards, the city and rural areas began to decline economically, which is generally attributed to the arrival of Celtic tribes (Vinogradov/ Kryzickij 1995; Schultze et al. 2006). Since the second half of the 2nd century BC, the military, political, and economic crisis intensified. The Polis became dependent of Mithridates Eupator, the Pontic king. In the middle of the 1st century BC, the city was destroyed by the Getae. It started to be rebuilt at the end of the 1st century BC, and at the same time, life in the rural settlements in its surroundings thrived as well. However, Olbia did not reach its former size and wealth again. As early as the 1st century AD, Olbia was involved in the sphere of political interests of the Roman Empire and since the end of the 2nd century AD or the very beginning of the 3rd century AD, it belonged to the province *Moesia inferior*. The last point is still under discussion. Howbeit, in the second half of the 2nd to the middle of the 3rd century AD, a Roman garrison was stationed there. The Roman military contingent was probably present from the second half of the sixties of the 2nd century AD to the middle of the 3rd century AD (Zubar/ Krapivina 2000). So far it was believed that the city was occupied until 275 AD because the political situation near the eastern borders of the Empire changed at that time. As a result, the Roman garrison was removed from Olbia and the city was destroyed – according to Jordanes – by the barbarian Goths (Iord. Get. 67). Recent finds of pottery vessels made by Goths indicate that after that it might have been occupied in the second half of the 4th up to the 5th century AD (Twardecki et al. 2017).

The site of Olbia was discovered in the late 18th century and soon became a topic of scientific research, with extensive excavations taking place from the late 19th century onwards. Since 1921, Olbia has been under official protection and is presently a national historical and archaeological site administered by the National Academy of Sciences of Ukraine. Since then, the Institute of Archaeology of the National Academy of Sciences of Ukraine has conducted fieldwork in the urban core area of Olbia, revealing a wealth of important information on its genesis[1].

Fig. 1 Olbia Pontica. Topographic map of the city with location of the excavation areas and pit no. 1231 (arrow) at the Roman citadel.

Fig. 2 Map of the northern Black Sea with the location of Olbia (star) on the estuary of the Bug River, near Mykolaiv.

In 2014, during the annual campaign of the Institute of Archaeology of the National Academy of Sciences of Ukraine in Olbia Pontica, a large pit (no. 1231, sector R-25) was excavated in the south-eastern part of the Roman citadel, which was built in the south of the Upper Town in the middle of the 2nd to the 3rd century AD (**fig. 3**). The place has been identified to belong to the periphery of the citadel territory (**fig. 1**). The pit is located outside of, but connected to a large house with an inner courtyard which is related to the building activity of the Roman garrison, near the main street of the citadel, which had continued to exist since the late-archaic period (Bujskikh 2015). Like other pits nearby, it was used as dumping ground for various types of garbage and unused ceramics, mainly amphoras, kitchen and table ware. The archaeological materials found inside the pit originate from the middle of the 3rd century AD (Bujskich et al. 2014), hence reflecting the latest period of the Roman garrison in Olbia. The precise dating of the pit is based on some unbroken amphoras of south Pontic origin[2] and a large red-clay amphora of Pontic origin[3]. The body of this amphora had been damaged by stone impact (**fig. 4a**). Its lower part, nearly 50 cm in diameter, however, was almost intact and contained many plant remains (**fig. 4b**). Altogether they weighed almost 2 kg. A sample with a volume of 150 ml was made available to the Laboratory of Archaeobotany, Goethe-University Frankfurt, for investigations. The plant material was neither wet-sieved nor otherwise treated.

Results and discussion

The sample contained 27 335.5 fruits and seeds, which were sometimes baked together. Not all were completely preserved. Millet caryopsis fragments were often broken in halves, and accordingly counted as such. When there was only one fragment per species, as in *Centaurea* cf. *jacea*, it was counted as one (**fig. 5**). With 95 % of all finds, *Panicum miliaceum*, called common millet or broomcorn millet, dominates the plant spectrum in the sample. The common weeds *Echinochloa crus-galli*, *Setaria viridis*, and *Digitaria sanguinea* also occur in large numbers. Foxtail millet (*Setaria italica*) is less common. Apart from broomcorn

Fig. 3 View over the excavation area R-25 at Olbia near Mykolaiv.

millet, two lentils (*Lens culinaris*) and one emmer caryopsis (*Triticum dicoccon*) have been detected as additional cultivated plants. The remaining seeds and fruits belong to various weeds or ruderal plants, but only white goosefoot (*Chenopodium album*) and black bindweed (*Polygonum convolvulus*) are common. The remaining wild plants are single finds.

Some of the millet remains were only partially charred or occurred in a subfossil dry state. These traits were considered in the analysis and classified respectively. In addition, glumed, partly glumed and millet caryopses without glumes as well as (fragmented) glumes have been distinguished (**fig. 6**).

All uncharred caryopses had their glumes still attached, while caryopses without glumes only occur in a charred state. Partly glumed caryopses are either completely (98 %) or partly charred (2 %). The sample also contained a lot of small fragmented glume remains which could not be categorized as well as ash dust from charred plants. Many glumes were completely burned or incinerated and therefore could not be included in the statistics, however indicating that the majority of caryopses in the amphora had their glumes attached before charring. *Setaria viridis*, and to a lesser degree also *Digitaria sanguinalis* are charred and glumed (**fig. 6**). Only the glumes of *Panicum miliaceum* have been preserved in a charred condition.

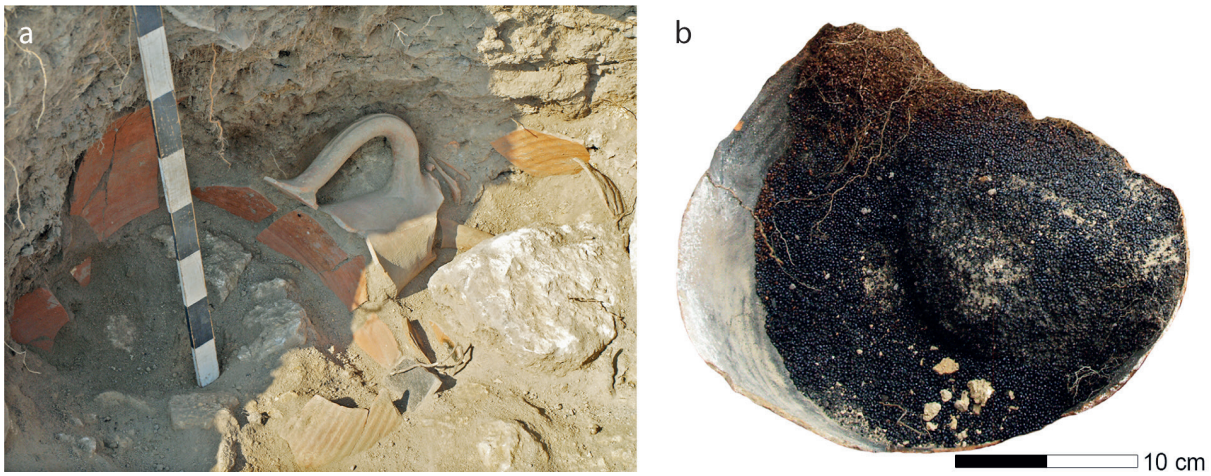

Fig. 4 a The large red-clay amphora during excavation in 2014, **b** the millet deposit in the broken amphora.

	Residue type	Sum	Common name
Cultivated plants			
Panicum miliaceum	frs	26 085	Common millet, Broomcorn millet
Panicum miliaceum	g	960	Common millet, Broomcorn millet
Triticum dicoccon	frs	1	Emmer wheat
Lens culinaris	frs	2	Lentil
Wild plants (ruderal/segetal)			
Digitaria sanguinalis	frs	303.5	Hairy fingergrass, Purple crabgrass
Setaria viridis	frs	492.5	Green foxtail, Wild foxtail millet
Setaria viridis	g	1	Green foxtail, Wild foxtail millet
Echinochloa crus-galli	frs	342	Cockspur, Barnyard millet
Echinochloa crus-galli	g	1	Cockspur, Barnyard millet
Chenopodium album	frs	50	White goosefoot
Polygonum convolvulus	frs	25.5	Black bindweed
Setaria italica	frs	24	Foxtail millet
Setaria italica	g	3	Foxtail millet
Avena fatua	frs	3	Common wild oat
cf. *Avena fatua*	recep	3	Common wild oat
Galium sp.	frs	2	Bedstraw
Plantago lanceolata	frs	2	Narrowleaf plantain
Centaurea cf. *jacea*	frs	1	Brown knapweed
Picris hieracioides	frs	1	Hawkweed oxtongue
Silene vulgaris	frs	1	Bladder campion, Maidenstears
		27 335.5	

Fig. 5 Plant remains in the 150 ml sample from the Olbia amphora without separation of preservation state. The fragments were added up (frs fruit/seed; g glume and glume fragments; recep receptacle).

The deposit of millet

Earlier archaeobotanical studies (Pashkevich 2001) in sector R-25 at Olbia revealed that *Hordeum vulgare* and *Triticum aestivum* were dominant within the oldest features of the 1st century AD. This situation was also attested in the rural surroundings of Olbia in the 1st to 3rd centuries AD. There, *Panicum miliaceum* amounted to 17 % of the assemblages in the 3rd century AD. Only in the 4th century AD, the finds of millet exceeded those of barley, while naked wheat remained constantly important. However, the majority of millet caryopses was found without glumes attached.

The archaeobotanical remains from the amphora are probably an assemblage of untreated cereals with glumes. The latter cannot be deduced directly from the proportion of charred caryopses, which are almost all without glumes, but from the large amount of almost incinerated glume residues and above all from the fact that all uncharred millet caryopses are with glumes (**fig. 6**).

It seems that it was the charring that first led to the loss of glumes from the majority of the caryopses. The millet species *Setaria viridis* and, to a lesser extent, *Digitaria sanguinalis*, are still glumed charred, since their smaller and more stable glumes do not burn or incinerate as quickly as other millets. The advantage of glumed millet caryopses is that they are much better storable than those without glumes. This was particularly important in cities where a certain quantity of millet might be stored as a precaution against poor harvests or other forms of shortage (Spurr 1983).

The charring probably took place under nearly complete exclusion of air. The different conservation of plant seeds (charred, partly charred and subfossil dry) is due to their different size and texture, their location within the amphora and the likely irregular temperature of the fire.

The millet storage has a purity of 95 % and only a few, mostly typical weeds of millet fields are present. As *Panicum* panicles ripen gradually, multiple harvest rounds are needed. Millet findings are always very pure, as in this case, due to this selective cutting (Kroll/Reed 2016, 179).

The meaning of millet in Roman times

Panicum is a warm season crop which tolerates intense heat, poor soils, and severe droughts. It is known to ripen quickly; only two to three months are required until it can be harvested. During germination, the plants need less moisture than other crops. *Panicum miliaceum* or broomcorn millet has been recovered at European archaeological sites from the end of the 3rd millennium BC (Dalby 2003, 99; Boivin et al. 2012; Valamoti 2016). Small in volume, transportable and storable (when glumed), drought resistant, a late summer crop, simple as far as food preparation is concerned – all of these characteristics of millet justify its obvious preference first by nomadic tribes and later by agriculturalists. As can be gleaned from ancient Greek writings by Herodotus, Demosthenes, Xenophon, and Sophocles, millet was disdained by Athenians but cultivated in Sparta, Thrace and along the coast of the Black Sea as well as in Cilicia in the East. In Roman times, Plinius mentions that millet was the preferred cereal of the people inhabiting the Black Sea region (Amouretti 1986).

Ancient texts on agriculture underline the ecological preferences and multiple uses of millet. It is frequently mentioned as fodder for domestic animals including birds (Killgrove/Tykot 2013), or in the context of famine and food shortages (Spurr 1983). This selective use is confirmed by Strabo, who remarks that in the Po valley, millet was an appropriate agent to counterbalance famine when other crops failed (Strab. geogr. 5,1,12). Regarding its nutritional value, millet is richer in carbohydrates but poorer in digestible proteins than other cereals. Its consumption, for example as porridge, is therefore very well suited to appease hunger and to fill hungry stomachs. In addition, a porridge made of millet is quickly prepared and is the oldest and simplest method to make a meal of crushed grains. A small open fire with a temperature of 60°C in the cooking pot is sufficient for this (Junkelmann 1997). Columella praised millet porridge with milk: a food not be to despised even in time of plenty (Colum. 2,9,19). First and foremost, when describing

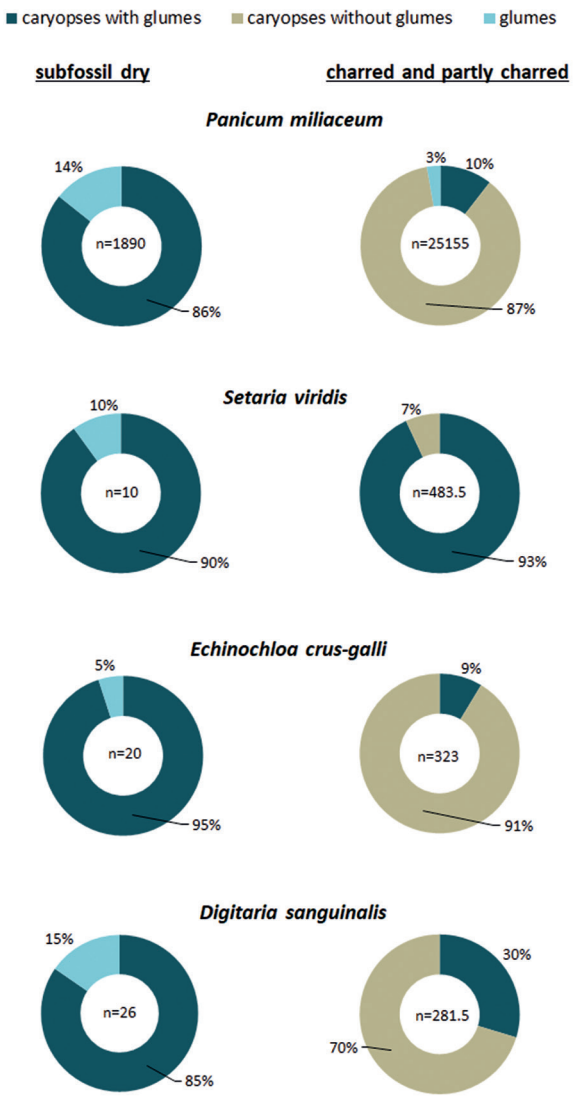

Fig. 6 Millet remains in the 150 ml sample from the Olbia amphora. Different states of preservation (subfossil dry vs. charred and partly charred). Due to the small number of finds, *Setaria italica* was not included.

Roman cereal consumption, the use of wheat is mentioned, which is underlined by the fact that, in Latin the term *frumentum* does not refer to cereals in general, but specifically to unmilled wheat (Junkelmann 1997, 104). Barley played a role, but it is primarily considered a typical concentrate for horses and mules, although it was also often eaten as porridge. It is also known that wheat flour was commonly mixed with other cereals. Despite the preference for wheat, the consumption of cereals obviously comprised a larger variety than what is evident from written sources (Junkelmann 1997, 104). Millet is not believed to have played a major role in the diet

of soldiers since millet finds are regular but only occur in small quantities in military and civilian settlements on both sides of the Alps.

Recently, however, the view of the importance of millet in human nutrition in the Roman world has changed fundamentally. Recent archaeobotanical and isotopic evidence has shown that millet was consumed in the Roman period, throughout the Roman Empire (Murphy 2016). However, comparisons between individual eating habits at Casal Bertone and Castellaccio Europarco with Imperial period sites from the Italian peninsula show that there was no uniform 'Roman diet'. Whereas individuals living closer to the city of Rome depended more on aquatic resources, those in suburbia made greater use of millet, leading us to conclude that the varying importance of millet may have been influenced by socioeconomic status (Killgrove/Tykot 2013). Millet has also been proven archaeobotanically in many buildings in the city of Pompeii and it is believed that millet was consumed by wealthy Romans, including their servants and slaves (Murphy 2016). It seems that millet was continuously present in the Roman diet, but potentially underestimated due to its rare retrieval, likely due to its very small size and the fact that millet was normally processed by boiling and thus would be unlikely to be preserved in the archaeological record (Murphy 2016). In addition, charring experiments have shown that *Panicum miliaceum* has less chance of becoming carbonized in archaeological sites than other cereal grains (Märkle/Rösch 2008). Even in the civilian city of Carnuntum, a burned-up storage facility (*horreum*) could be uncovered, in which *Panicum miliaceum* had been stored, thus testifying the consumption of millet (Thanheiser/Heiss 2014).

Amphoras of type Zeest 75

Besides small amphoras with narrow necks, made of light clay, the large amphoras of type Zeest 75 with broad neck, made of red, orange or dark pink clay represent the main group of the amphoras of the 3rd century AD in Olbia Pontica (Zeest 1960; Krapivina 2009). Earlier, the large sized amphoras with spikes were considered as having been used for storage of dry goods such as cereals or flour (Böttger/Shelov 1998, 33). However, according to their morphological characteristics, the amphoras of this type were likely used for storage and transport of sliced and salted fish (*salsamentum*) and occurred in various sizes and variants in the northern Pontic area (Opaiț 2007). The millet deposit found at Olbia is therefore considered to represent a secondary use of the vessel. The numerous *dipinti* (inscriptions) which were found on amphoras at Olbia and Tanais (Russia) probably indicate this secondary use, as they were needed to label the new content which differed from the original (salted fish).

Conclusion

The millet deposit in an amphora – which was formerly used for fish – seems to indicate that the Roman soldiers at Olbia used to eat millet. This is hardly surprising since the majority of commodities was produced locally (also owing to potential problems of constant supply), and millet was cultivated at a large scale in the region. This is documented by other millet finds from Olbia and a comparable millet supply from the hillfort Zolotoy Mys, at the bank of the Dnieper estuary, which was connected with the chora of Olbia (end of the 1st century BC to the middle of the 3rd century AD) (Pashkevic 2001). At that site, 1 100 grams of millet caryopses have been documented, together with one lentil.

Thus, the presented find of a millet supply at the citadel gives new information to our knowledge about diet in the Roman world and the Roman presence at Olbia.

Notes

[1] As part of the German-Ukrainian DFG research project *„Antike Stadtentwicklung an der Grenze der griechischen Oikumene. Archäologische Untersuchungen im Vorstadtareal Olbia Pontikes"* (J. Fornasier, Frankfurt/Main, A. Bujskikh, Kiev), interdisciplinary investigations in the suburb have been carried out by the Goethe-University since 2015, in which archaeobotany is involved as well.

[2] Late type D after Shelov 1978.

[3] Type 75 after Zeest 1960, Pl. XXXI, 75.

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Fig. 1 Map after VINOGRADOV/KRYZICKIJ 1995.
Fig. 2 Map source: d-maps.com.
Fig. 3–6 A. Stobbe/A. Bujskikh/L. Rühl/L. Seuffert.

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