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Diet at the Roman Village of Virovitica Kiškorija South, Croatia

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ABSTRACT

The Virovitica Kiškorija South site was a Roman village. In this paper archaeological, archaeobotanical, and archaeozoological finds are presented and interpreted, then compared with similar sites and information available from ancient sources. The site was divided into complexes that made a whole. The finds within each complex are presented and compared to similar archaeological sites, as well as data from ancient written sources. The goal of the paper is to determine which kind of diet was present at this Roman village in Pannonia, and to analyze the differences and similarities between this village and analogous sites.

Key words: *rural settlement, Pannonia Superior, archaeology, Roman period, diet, food, bioarchaeological finds*

Introduction

The site of Virovitica Kiškorija South is situated in the northern part of Croatia, at the western entrance to the town of Virovitica (Figure 1).

It was discovered during a rescue excavation in 2005 when eight archaeological sites from different periods were excavated before constructing Virovitica's western bypass (Figures 2-3). Both Roman and early medieval villages were found at the Virovitica Kiškorija South site, with the former dating back to the period between the 2nd and 5th centuries and the latter to the period between the 8th and 10th centuries. The site is situated on a plain between Bilogora Mountain and the Drava River, which served as an important communication route in Roman times. An important road also passed between the village and Bilogora Mountain, connecting Roman *Poetovio* (Ptuj, Slovenia) and *Mursa* (Osijek, Croatia)[1,2]. Roman villages located in the Croatian part of the Roman province of *Pannonia* have only been excavated for the first time in the last several years[3] and this particular site was the first to be excavated at a large scale. The settlement consisted of various types of wooden houses, many pits for storage or disposal, ditches, fences, hearths, and furnaces. It appears that the village was organized by family households, though this theory is sometimes difficult to factually support because of the extremely complicated stratigraphy. Archaeological finds, especially pottery, were the subject of earlier publications referenced in this paper, and contain a large amount of data that exceeds the scope of this article.

Our multidisciplinary approach to analyzing this village and its finds provides us with the opportunity to study the nutritional and economical aspects of this type of settlement in Croatia for the first time. Furthermore, this approach demonstrates that a larger amount of information can be gathered, and more elaborate conclusions drawn, when scientists from different fields work together to study archaeological units and finds and archaeobotanical and archaeozoological samples.

Remains of different kind of structures were found at the site: sunken houses, storage and working structures, as well as many pits. They differ in size, depth, and purpose. Three wells were discovered, one of which (Stratigraphic unit (further in text: SU) 802/803) contained archaeobotanical and archaeozoological remains.

Furnaces and fireplaces were used in food preparation, though the remains of these structures are too modest to enable their reconstruction[4]. They are located either near sunken houses or near postholes (often remains of the cottages).

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Fig. 1. Virovitica Kiškorija South – position of the site (prepared by Renata Šoštarić).

Fig. 2. Virovitica Kiškorija South site, a view from the south (photo by Kristina Jelinčić).

At first sight the Virovitica Kiškorija South site seems to be positioned on a plain, but after closer examination it becomes clear that certain areas have different heights. This fact was crucial when deciding where to build houses, storages, working structures, or pits. Obviously, a small area was suitable for living, and structures were repaired and rebuilt many times. That is why today we have many postholes within a small area, and why it is difficult to interpret each stratigraphic unit and reconstruct single complexes (Figure 3). Furthermore, the area of the Virovitica Kiškorija South site has been recently used as arable land for chamomile and corn growing. For this reason, the upper layers of all the stratigraphic units have been destroyed, making the interpretation of the excavated units even more difficult.

Material and Methods

89 archaeobotanical samples from the soil were excavated with a clean tool and subsequently stored in 51 clean bags. Samples were taken from sunken houses, pits, furnaces, wells, and larger postholes. During the flotation process different screens were used: 1, 0.5, and 0.3 mm. After flotation the samples were dried and prepared for archaeobotanical investigation. In some stratigraphic units complete ceramic vessels were found, and the vessel's fill was taken for further investigation (SU 34/35 – storage vessel SF (special find) 9 (Figure 5: right/eastern part of the pit); SU 76/77 – bowl: SF 11; SU 196/197 bowl: SF 16).

Animal remains were collected *in situ*, washed with clean water, and, after drying, stored in clean bags. A few

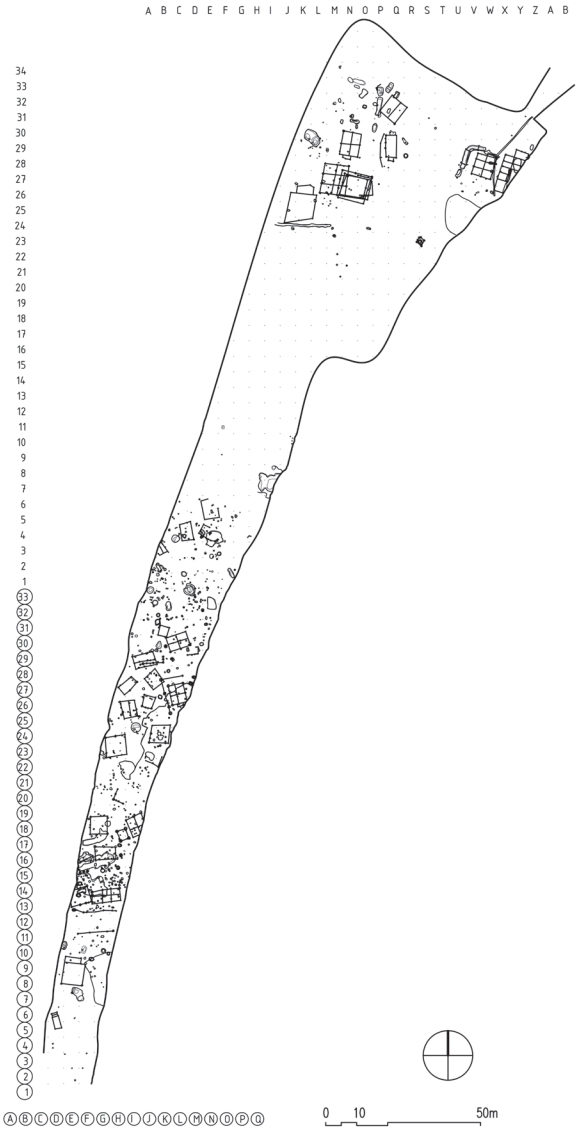

Fig. 3. Plan of the Virovitica Kiškorija South site (drawing by: Kristina Turkalj, Maja Šunjić, Kristina Jelinčić).

TABLE 1
VIROVITICA KIŠKORIJA SOUTH, LIST OF PLANT REMAINS

			3rd & 4th c.	3rd c.	2nd-4th c.	4th c.	3rd & 4th c.	3rd & 4th c.	3rd & 4th c.	beg. of 3rd c.	1st-2nd c.			beg. of 5th c.	
Taxa:	Carbonized plant remains:	Ecological groups:	A compl.	B compl.	C compl.	D compl.	E compl.	F compl.	G compl.	SU 802/ 803	SU 966/ 967	SU 1012/ 1535/ 1013	SU 1363/ 1364	Total
Cerealia	grain	Cu-Ce	1			49	3		59			11		123
cf. *Cerealia*	grain segment	Cu-Ce	3					1			1		13	18
Hordeum vulgare	grain	Cu-Ce	3						84					87
cf. *Hordeum vulgare*	grain segment	Cu-Ce							6			1		7
Triticum aestivum gr.	grain	Cu-Ce	1		1	2								4
Triticum spelta	grain	Cu-Ce				1								1
Secale cereale	grain	Cu-Ce				1			1					2
Panicum miliaceum	grain	Cu-Ce	2					2	276	1		2		283
cf. *Panicum miliaceum*	grain	Cu-Ce	1			1			55					57
Panicum/Setaria sp.	grain	Cu-Ce							20					20
Setaria cf. *italica*	grain	Cu-Ce							4					4
Vicia faba	seed	Cu-P		6										6
Prunus domestica	fruitstone	Cu-F	1*											1
Rubus fruticosus agg.	pip	W	1			1								2
Agrostemma githago	seed	WR							1					1
cf. *Spergula arvensis*	seed	WR								1				1
Poaceae	grain					1								1
Total			13	6	1	56	3	3	506	2	1	14	13	618

SU – stratigraphic unit, Cu-Ce – cultivated plants – cereals, Cu-P – cultivated plants – pulses, Cu-F – cultivated plants – fruits, W – wild useful plants, WR – weeds and ruderal plants

animal remains recovered from flotation were added to the total assemblage and included in this analysis. Number of Identified Specimens (NISP) was used as a quantification method (Table 2), with NISP being calculated following the definition of »specimen« as either a single complete bone or tooth, or a portion thereof[5]. However, the following minor modification to this rule was applied. Since all of the material is very poorly preserved and subject to further breakage and destruction due to its fragility, whenever possible more highly fragmented pieces appearing to come from the same bone or tooth were coded as a single specimen. Although this practice lowered the total number of animal remains (NISP) in comparison to the actual number of fragments, it more accurately represents the actual size of the faunal assemblage from this site.

Methods for determining the relative age of animals at the time of death were often not applicable due to the extreme fragmentation and generally very poor condition of the material. However, in a few cases of relatively well-preserved dental material, standard references were used[6-8].

TABLE 2
VIROVITICA KIŠKORIJA SOUTH. ANIMAL REMAINS (NISP) IDENTIFIED TO TAXON AND BODY SIZE BY STRATIGRAPHIC COMPLEX (COMPL.) AND STRATIGRAPHIC UNIT (SU)

	3rd and 4th c.	3rd c.	2nd-4th c.	4th c.	3rd and 4th c.	3rd and 4th c.		beg. of 3rd c.						beg. of 5th c.		
Taxa:	A compl.	B compl.	C compl.	D compl.	E compl.	G compl.	SU 732	SU 802	SU 1037	SU 1221	SU 1233	SU 1310	SU 1333	SU 1363	SU 1453	Total
Ovis / Capra		1		1			1		1		1	1			4	10
Sus sp.				1												1
Bos taurus		7	1	6				1								15
Equus / Asinus				3												3
Subtotal (ID to taxa)		8	1	11			1	1	1		1	1			4	29
Small-sized animal				1									1	3		5
Medium to large-sized animal					1	1									1	3
Subtotal (size categories)				1	1	1							1	3	1	8
Indeterminate	1	1	1	2	2	1		1		1						10
Total	1	9	2	14	3	2	1	2	1	1	1	1	1	3	5	47

The phasing of the site and relative chronological relationships between SU were done by combining interpretations of archaeological finds and the radiocarbon dating of several charcoal samples, performed by the Leibniz Labor für Altersbestimmung und Isotopenforschung, Christian-Albrechts Universität, Kiel and Beta Analytic Inc., Miami, Florida.

Results

After the analysis of 99 archaeobotanical samples from Virovitica Kiškorija South, 953 plant remains (82% carbonized and 18% non-carbonized) were found and 14 plant taxa were identified. 50 samples contained plant remains, 38 of them with a total of 804 remains originating from the Roman period and the rest of them from the Middle Ages. In the context of this locality, non-carbonized plant remains show signs of recent contamination. Therefore only carbonized remains from the Roman period were considered for future analysis and comments (Table 1).

The most frequent carbonized plant remains (93%) are cereals: barley (*Hordeum vulgare*, Figure 9A), bread wheat (*Triticum aestivum*, Figure 9C), spelta wheat (*T. spelta*, Figure 9B), broomcorn millet (*Panicum miliaceum*, Figure 9D), rye (*Secale cereal*, Figure 9F), foxtail millet (*Setaria italica*), and quite a lot of remains of cultivated broad grain cereals (*Triticum/Hordeum/Secale/Avena*) named *Cerealia* because of the difficulty of identifying them more precisely. Broomcorn millet, *Cerealia,* and barley are the most represented cereals, while the other types of cereals were found in much smaller numbers. Only one remain of corn cockle (*Agrostemma githago*), a typical cornfield weed, and one of corn spurrey (*Spergula arvensis*), a weed and ruderal plant, were found, so we consider archaeobotanical finds as highly purified cereals for food. Only a very small amount of other cultivated plants were found: broad bean (*Vicia faba*, 1%) and plum (*Prunus domestica*, 0.2%, Figure 9E). The only specimen of a wild useful plant found on the site was blackberry (*Rubus fruticosus* agg., 0.3%).

A total of 47 animal bones and teeth fragments were recovered (Table 2), of which approximately 60% (NISP=29) were identified to taxa. The most numerous belong to cattle (*Bos taurus*; NISP=15), followed by sheep/goat (*Ovis/Capra*; NISP=10) and equid (*Equus/Asinus*; NISP=3), with only a single fragmentary molariform tooth of a pig (*Sus* sp.; NISP=1). Among the taxonomically unidentifiable remains, eight bone and/or teeth fragments were assigned to general size categories (small-sized animal and medium to large-sized animal; NISP=8), while extreme fragmentation and small size prevented any identification of the remaining ten fragments.

The majority of collected animal remains are enamel and dentine fragments of teeth (60%; detailed frequency

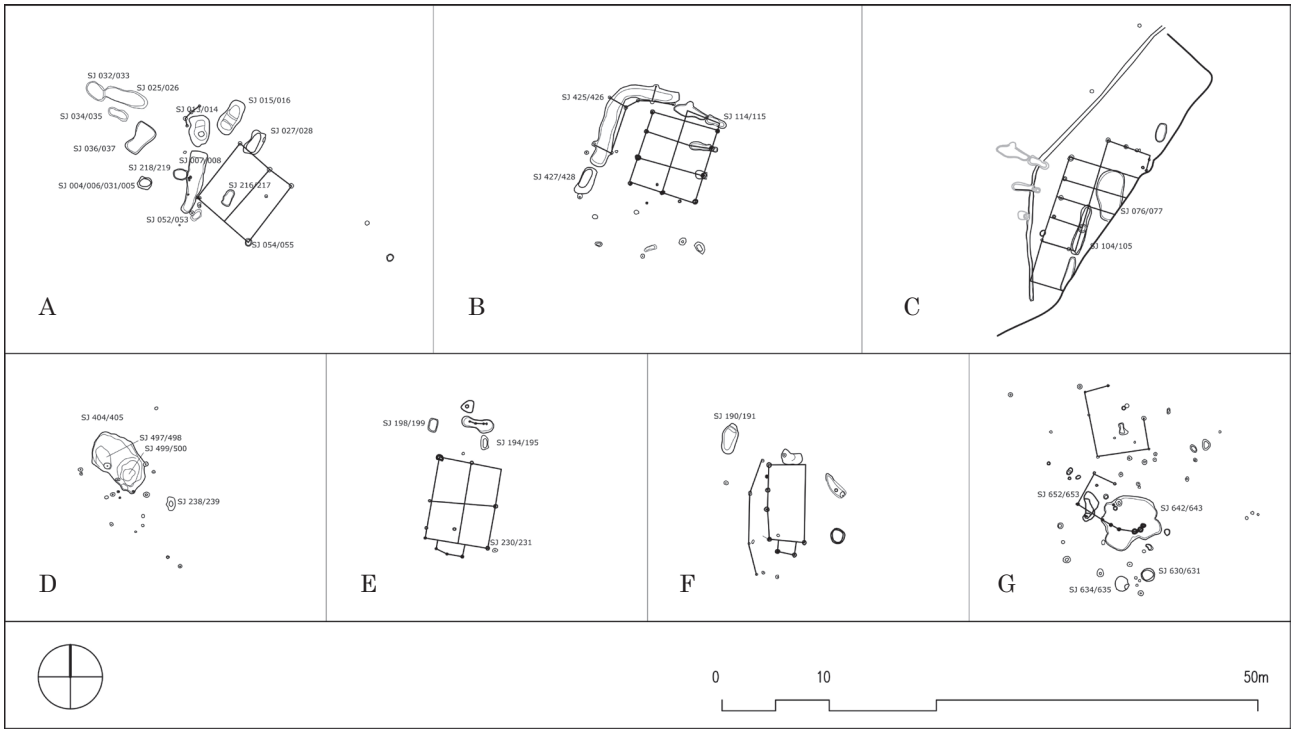

Fig. 4. Complexes A-G at the Virovitica Kiškorija South site (drawing by Kristina Turkalj, Maja Šunjić, Kristina Jelinčić).

of anatomical elements by taxa can be seen in Radović 2015, 306, Table 7)[9]. This is not surprising considering the generally very poor preservation conditions of the corrosive soil (soil chemistry data are discussed below). This can be catastrophic for bones[10], while teeth have a higher mineral content[7] that makes them harder and more resilient to destructive diagenetic processes in the soil.

Thirteen unidentifiable fragments were totally burned (27%) and all of them were completely calcined (white in color and chalky in texture), suggesting they had been exposed to very intensive burning[11]. Since none of the anatomically and/or taxonomically identified fragments show traces of burning, it is impossible to establish any patterns from this observation.

A comprehensive listing of the archaeological, archaeobotanical, and archaeozoological samples recovered from the storage pits, postholes, furnaces, well, and other different structures and sunken houses is given below.

We present a comprehensive listing of the archaeologica[14,12–16], archaeobotanical, and archaeozoological finds from the Roman period, recovered from storage pits, postholes, furnaces, well, and other different structures and sunken houses.

Where possible, the archaeological site and the samples will be presented by complex (Figure 4A-G). Otherwise the SU will be presented and interpreted individually. The term complex in this context means a group of several stratigraphic units that represent an assemblage given their mutual relationship, chronology, finds, and their relationships with other possible complexes. For example, a complex could represent one household: a house (cottage or sunken house) or its remains (postholes), pits (storage and/or disposal), fences, and sometimes a hearth or other parts of the household. We have to keep in mind that sometimes only a part of the complex has been excavated because the remaining part was positioned outside the Virovitica bypass i.e. outside the excavation area.

In the first complex (Complex A – Figure 4A) there are several sunken structures, pits, and a hearth. Ceramic finds (glazed *mortaria*) date to the 3rd and 4th centuries[4,16,17]. In SU 013/014, 015/016, 025/026, 032/033,

Fig. 5. SU 034/035 with storage pot in situ (photo by Tajana Sekelj Ivančan).

034/035 (Figure 5), and 052/053 archaeobotanical remains were found, and in the cooking structure SU 004/006/031/005, both archaeobotanical and archaeozoological remains were collected.

Small amounts of different cereals were found in complex A: barley (*Hordeum vulgare*, SU 004/006/031/005), bread wheat (*Triticum aestivum*, 013/014), broomcorn millet (*Panicum miliaceum*, SU 004/006/031/005) and *Cerealia* (SU 004/006/031/005, 034/035), as well as individual fruit remains of plum (*Prunus domestica*, SU 004/006/031/005) and blackberry (*Rubus fruticosus*, SU 013/014) (Table 1).

The only animal remain is a single completely burnt, very small fragment of an indeterminate bone found in SU 052/053 (Table 2).

SU 004/006/031/005[4,12] was a structure for food preparation. Given the poor quality of its remains, it is not possible to reconstruct its original appearance. However, it is clear that it was used for food preparation and not for pottery or tile making. A few sherds belong to vessels that were used for serving food (a fine pottery jug and a *terra sigillata* bowl of indefinite form, probably from a Rheinzabern workshop)[4]. The structure was found in numerous but very small fragments. This tells us that it was broken or destroyed and then filled with its remains along with other objects ready for disposal. This might explain the presence of serving vessel fragments[12]. SU 034/035 is an elongated pit where the remains of a large storage pot of local production were found (Figure 5). Inside that pot, found *in situ,* were archaeobotanical remains[4].

The second complex (complex B – Figure 4B) consisted of postholes and a ditch that were the remains of a cottage that was likely used as a working area. This ditch was covered with some type of roofing because postholes were found on either side of the ditch. In this unit archaeobotanical (SU 427/428) and archaeozoological remains were found (SU 425/426), possibly thrown away after consumption. In the entire investigated locality, the remains of pulses (broad bean, *Vicia faba*, Table 1) were found only in complex B. Together with ceramic[4,13] and numismatic finds[14] an iron comb for animals was also found, suggesting the presence of animals in the village as a source of not only meat and milk, but also as a source of wool. Pottery was mostly locally produced, with the rare exception of plates from Pannonian production centres[4] In one of the pits, animal bones were also found (SU 114/115). Numismatic finds (*Faustina* II and *Gordianus* III or *Gallienus*), along with ^{14}C analyses, date this complex to the 3nd century. Postholes from this complex could belong to a wooden cottage. The structure's remains, however, are too few to allow for the reconstruction of its function (working or living area).

In the southern part of this complex a shallow pit SU 427/428 was found. It contained a lot of locally produced pottery fragments, as well as the fragment of a late Roman glass bracelet[16].

A total of nine animal remains were recovered (Table 2). Seven fragmentary teeth were identified as belonging to domestic cattle (*Bos taurus*; SU 114/115, 425/426, 427/428). A single fragment of an indeterminate molariform tooth bud (SU 362/363) was identified as belonging to a young sheep or goat (*Ovis/Capra*). Several other very small fragments of enamel and dentine, collected sepa-

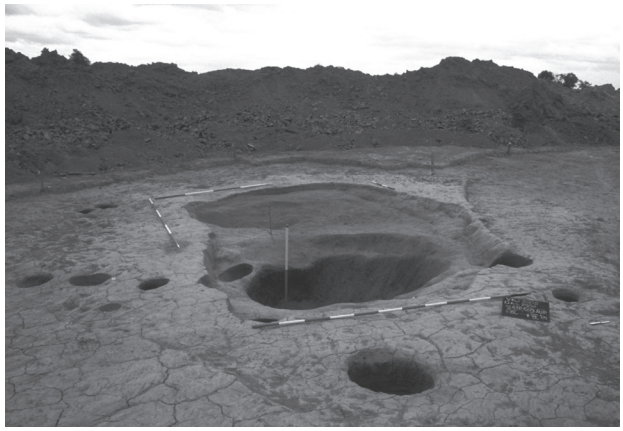

Fig. 6. Sunken house SU 404/497/499/510/405 with postholes, a view from the south-east, (photo by Kristina Jelinčić).

Fig. 7. Remains of the SU 630/631 – Structure for food preparation (photo by Maja Šunjić).

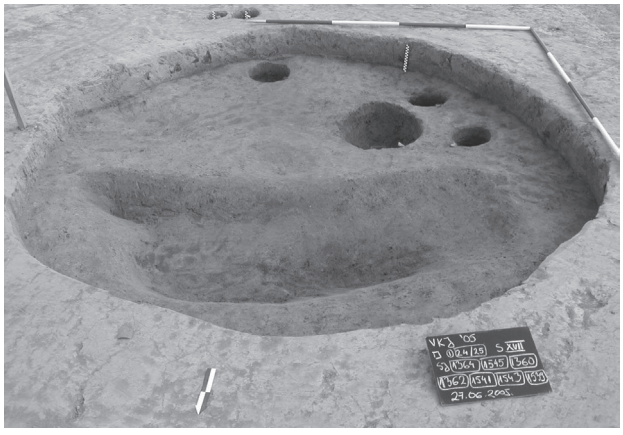

Fig. 8. Circular structure SU 1363/1364, a view from north (photo by Kristina Jelinčić).

rately from the above cattle teeth from the same SU 425/426), could not be taxonomically identified.

The neighbouring complex (complex C – Figure 4B) is separated from complex B by a fence that cuts postholes belonging to complex B. Complex C consists of a series of postholes and shallow structures. These are the remains of a sunken house (SU 076/077), possibly used as a living space, in which a number of animal bones (SU 104/105) were recovered, along with a single archaeobotanical specimen – a carbonized grain of bread wheat (*Triticum aestivum*, SU 076/077) (Table 1). The animal remains recovered from this complex (Table 2) include a single fragment of the proximal end of the right metacarpal bone of cattle (*Bos taurus*; SU 104/105) and several very small unburnt fragments of an indeterminate bone (SU 076/077).

The complex is dated to between the 3rd and 4th centuries[4,13]. The stratigraphic data clearly show that complex C (the fence and house) is later than complex B. Along with locally produced pottery, fragments of colored finely-made pottery were found that were clearly not produced locally, as well an iron knife. Two fragments of bronze vessels, one of which is a strainer, were recovered from a surface layer above SU 104/105. Because of the previously mentioned ploughing activities, these specific finds cannot be connected to this complex with certainty.

The fourth complex (complex D – Figure 4D) is dated to the 4th century by ^{14}C analysis[4,13]. It is comprised of a sunken house (SU 404/497/499/509/510/405), (Figure 6), postholes, and a small pit (SU 238/239). A high percentage of archaeobotanical and archaeozoological remains derive from here. Most of the archaeobotanical findings belong to cereals with large grains (*Cerealia*, SU 404; *Secale cereale* and *Triticum spelta*, SU 499). A very small amount of broomcorn millet (*Panicum miliaceum*, SU 510) and sporadic remains of blackberry (*Rubus fruticosus*, SU 510) (Table 1) were also found. This context had the majority (NISP=14; Table 2) of all the collected animal remains from the site, eleven of which were identified to the taxa. Cattle (*Bos taurus*) remains consist of five isolated upper teeth (SU 499), forming two articulated partial dentitions (left M^2-M^3 and right M^1-M^3) and a fragment of a single lower molariform tooth (SU 404). Based on the approximate crown height and occlusal wear, all six cattle teeth could belong to the same adult animal. An indeterminate equid (*Equus/Asinus*) is represented by a number of very small enamel and dentine tooth fragments (SU 510) that, based on refitting and reconstruction, came from at least three different lower molariform teeth. Most of these fragments, however, could not be associated with any of the identified teeth due to their extreme fragmentation. A single fragment of an indeterminate molariform tooth bud (SU 404) of a very young (suckling?) pig (*Sus* sp.) is the only remain of this genus recovered from the site. Finally, one small fragment of a horn core (SU 497) was identified as belonging to a sheep or goat (*Ovis/Capra*). Three taxonomically unidentified specimens were completely burnt. One of them was anatomically identified as a cranial fragment of a small-sized animal (SU 499), whereas the remaining two (SU 238, 404) were unrecognizable.

Also, a lot of pottery used for preparing, serving, and storing food, as well as fragments of glass vessels, a glass bracelet[4,16], iron knives, a chisel, and a fragment of a bronze vessel were found. The pottery was mostly locally produced (pots, flagons, plates and lids), though rare examples of Pannonian gray and red fired vessels of indefinite form and production center are present. Locally produced pottery is coarse, and was possibly made in the village itself[4,12]. If *mortaria* were imported, they came from one of the production centers in the province and not from far away, because otherwise they would have been more expensive. They are covered with glaze – typical for Late Roman *mortaria*- and fit within the suggested dates[4]. There can be no doubt that this complex was a living area with a small food storage space at the bottom of the sunken house.

The fifth complex (complex E – Figure 4E) is comprised of postholes, probably belonging to a house, and several pits. Archaeological finds are rare but suggest dates in the 3rd and 4th centuries[4].

Both archaeobotanical (a very small amount of cereals (*Cerealia*, SU 194/195, 198/199) (Table 1)) and archaeozoological (SU 194/195, 230/231) remains were collected. The faunal assemblage (Table 2) consists of several highly fragmented tooth remains (SU 194/195) generally associated with a medium-large sized ruminant, and two completely burnt fragments of an indeterminate bone (SU 194/195, 230/231).

Along with pottery and daub, a ceramic loom weight found in SU 194/195 suggests textile fabrication[4].

The sixth complex (complex F – Figure 4F) can be dated to the 3rd and 4th centuries based on the presence of Late Roman glazed *mortaria*[4,15]In the pit (SU 190/191) only archaeobotanical remains (cereals) were found (*Cerealia, Panicum miliaceum*). Due to the scarcity of the finds, a detailed interpretation of this complex cannot be provided.

Complexes A-F (Figure 4A-F) belong to the northern part of the village and are separated from the southern part by a lower part of the terrain. During excavations, this area would stay submerged for days after a rain. It is possible that in Roman times the villagers of Virovitica Kiškorija South site faced the same problem, and therefore avoided this zone for living. The southern part of the village is very difficult to interpret because of the higher density of features. This area is also higher than the northern part of the village, and the natural sterile ground is sand while in the north it is clay. This means that the southern area was drier, and therefore more suitable for living.

In the seventh complex (complex G – Figure 4G), both archaeobotanical and archaeozoological remains were found in structure SU 642/643. This complex can be dated to the 3rd and 4th centuries based on the analysis of the archaeological finds[4,15]. This sunken structure cuts across postholes from an earlier wooden structure. In front of SU 642/643, there are fragments of two cooking structures. In one of them many archaeobotanical remains were found

Fig. 9. Carbonized plant macro-remains from Virovitica Kiškorija South: A – barley (Hordeum vulgare, Lenght: 7 mm), B- spelta wheat (Triticum spelta, L: 4.8 mm), C – bread wheat (T. aestivum, L: 4.9 mm), D – broomcorn millet (Panicum miliaceum, L: 1.9 mm), E – plum (Prunus domestica, L: 21 mm), F – rye (Secale cereale, L: 6 mm) (drawing: Renata Šoštarić).

(SU 630/631) (Figure 7). In complex G the largest quantity of plant remains – cereals – were found. Broomcorn millet (*Panicum miliaceum*, SU 630/631, 642/643) is the most frequent, while barley (*Hordeum vulgare*, SU 630/631) and other cereals with large grains (*Secale cereale*, *Cerealia*, SU 630/631) are present in smaller numbers along with foxtail millet (*Setaria italica*, SU 630/631). A single seed of corn cockle (*Agrostemma githago*, SU 630/631) (Table 1) was also discovered. The only two animal remains from this context are a mandible fragment from a medium-large-sized animal and a single completely burnt indeterminate bone fragment (SU 642/643; Table 2). No samples for ^{14}C dating were available, nor were there any other archaeological finds that could help determine the chronology of the complex. Since we have two structures from different periods (earlier wooden structure with postholes and the 3rd-4th century structure SU 642/643)[4,15], as well as two cooking structures without any stratigraphic or physical connection directly to them, it is impossible to relate the furnace and hearth with these structures. In structure SU 642/643 many pottery sherds were found, among them different types of Late Roman glazed *mortaria* from the 3rd-4th century. *Mortaria* had many different purposes[4,17] but in this context they were used for food preparation. We assume this structure was a living area used for food preparation and cooking. In the southern part of this complex there is also a fence that could have easily belonged to either house.

Given the complexity of the remaining stratigraphic data, we were not able to single out other complexes and will consider each of the following stratigraphic units individually. Some of the units contained a small number of fragmented finds insufficient for a detailed interpretation.

It seems that pit SU 732/733 was used for disposal. Only one extremely fragmented indeterminate molariform tooth (Table 2) was identified as belonging to a sheep or goat (*Ovis/Capra*). In this pit, three fragments of a red fired *Faltenbecher* were found[4]. This type of beaker was used in the 2nd century[18].

Pit SU 966/967 is probably part of a complex that could not be defined clearly. Only one archaeobotanical remain – a badly preserved cereal grain (*Cerealia*) – was found here (Table 1), along with an elegant thin walled beaker produced with a mould and dating to the 1st – 2nd centuries. Together with a sharp-profiled brooch and a silver ring, this beaker is the oldest find from the site.

In well SU 802/803, among many archaeological (Late Roman glazed *mortaria*, *terra sigillata* – Drag. 32 of Reinzabern production, locally produced pots, bowls and plates, Pannonian red and grey fired pottery, fragments of two Late Roman glass bracelets, millstone, whetstones, fragments of daub and slab)[4], archaeobotanical (one millet grain /*Panicum miliaceum*/ and one weed seed /*Spergula arvensis*/, Table 1), and archaeozoological remains were found. Out of two faunal samples (Table 2), one was determined to be a highly fragmented cattle tooth (*Bos taurus*), possibly coming from the lower dentition, while the other consists of only a few small unidentifiable dentine (?) fragments.

This well was dated to the beginning of the 3rd century with ^{14}C analysis[4,13]. Finds support this date. This is one of three wells that were found at the site, but it is the only one dating to the Roman period. The well has one fill. It was probably deserted and then filled with earth and broken items unsuitable for further use. The abandonment of the well might explain the presence of animal remains here, since they would not have been thrown into the water during the well's use because of concerns about contamination[19].

Animal remains were found in SU 1037/1038 and 1453/1454 (Table 2). In the former (SU 1037/1038), a fragment of an upper indeterminate molariform tooth of a sheep or goat (*Ovis/Capra*) was found with a very small fragment of maxillary bone still attached to the root. The latter (SU 1453/1454) contained a fragmented mandible with teeth (dP_4, M_1, M_2) from a goat (*Capra hircus*) that is, based on its attrition stage and occlusal wear, suggested to be from a one to two-year old animal[8]. In the same unit (SU 1453/1454) an indeterminate cancellous bone fragment, possibly part of an astragalus, was attributed to a medium-large-sized animal. These units cannot be interpreted with certainty at this moment since the archaeological finds of pottery, glass, and metal are very fragmented and unrecognizable.

Another structure for food preparation was also found (SU 1012/1535/1013). This one cannot be related to any

TABLE 3
FOODSTUFF AND ITS CONSUMPTION

Plants/animals	Products
Barley (lat. *Hordeum vulgare)*	Bread Bear Various dishes: porridge, gruel, *pollenta,* Animal food
Broomcorn millet (lat. P*anicum miliaceum*)	Bread Bear Various dishes: porridge, gruel
Foxtail millet (lat. *Setaria italica*)	Bread Bear Various dishes: porridge, gruel
Rye (lat. *Secale cereale*)	Bread Bear Animal food
Spelt (lat. *Triticum spelta*)	Bread Bear
Wheat (lat. *Triticum aestivum*)	Bread Bear Various dishes Animal food
Broad bean (lat. *Vicia faba*)	Various dishes: porridge, gruel
Blackberry (lat. *Rubus fructiosus*)	Eaten fresh and dried, preserved in honey Medicinal use Syrup with honey
Plum (lat. *Prunus domestica*)	Eaten fresh and dried preserved in honey, boiled with wine Various dishes: sauces Medical purpose
Cattle (lat. *Bos taurus*)	Mostly draught animal Meat Milk Leather
Pig (lat. *Sus* sp.)	Meat Leather
Sheep/Goat (lat. *Ovis/ Capra*)	Meat Milk Leather Wool
Horse/Donkey/Mule (lat. *Equus/Asinus*)	Traveling Draught animal

structures, but yielded a small amount of cereals (*Cerealia*; Table 1). This is the case also with SU 1333/1334, which has a small concentration of hearth fragments and a completely burnt shaft fragment from a small-sized animal (Table 2). Only the bottom of these structures was found.

SU 1221/1222 is a shallow pit where only the archaeozoological remains of several small cancellous fragments of a single completely burnt indeterminate bone were found (Table 2).

SU 1233/1234 is a posthole where a small amount of Roman pottery and achaeozoological remains were found. The Roman pottery finds are small and impossible to determine closely. Several fragments of an indeterminate molariform tooth from a sheep or goat (Ovis/Capra) are the only find in SU 1233/1234.

SU 1309/1310 is a small circular pit containing some pottery. Among sherds of locally produced coarse ware, the base of a red painted jug and a grey bowl were found. The grey bowl belongs to *Pannonische Glanzton Ware*. This type of pottery was produced from the end of the 1st into the 3rd c. in Pannonia, with an emphasis in the 2nd c[4,20]. An isolated fragment of a lower third molar (M_3) from an adult sheep or goat (*Ovis/Capra*) was also recovered from SU 1309/1310.

There is a circular structure (SU 1363/1364) (Figure 8) dated to the beginning of the 5th century with ^{14}C analyses[4,13]. This structure cuts an older one with its postholes. Pottery fragments (Late Roman glazed *mortaria*, locally produced pots and bowls, Red fired Pannonian plates), a fragment of a bronze Late Roman crossbow brooch, iron mattock and pick, knife, bronze bell, and two ceramic loom weights were found there[4]. We assume this structure was not used for living, but for working and/or storing tools, vessels, and food. Both archaeobotanical (cereals /*Cerealia*/, Table 1) and archaeozoological remains were found here, including three very small fragments of a small-sized animal, two of which were completely burnt (Table 2). The bronze bell could have been used for both sheep and goats[21].

All finds (archaeobotanical, archaeozoological, archaeological) were found in small amounts. Three soil samples were analyzed to determine its acidity (pH). The samples gathered from different areas of the site show small differences in the results. Two samples, S-291 and S-293, were taken from a deep sterile layer where all SU had been cut. Sample S-293, collected in the southern part of the site, was more acidic (pH 4.13) than the northern sample, S-291 (pH 5.43), although the difference is small. The third sample was taken from the middle of the site where a sterile layer was mixed with humus and its pH was 6.18. The acidity of the soil destroyed non-carbonized archaeobotanical and archaeozoological finds, and affected the preservation condition of the pottery.

The quantity and characteristics of the pottery, glass, and metal finds suggest that the inhabitants of the village had as much as they needed and produced the amount of food necessary for everyday life. As was the case with Roman villas, the inhabitants always had the principle of self-sufficiency in mind[22,23]. Among the pottery found at the site, for example, locally produced vessels are the dominant ones. Only an extremely small quantity of the

vessels were imported (two beakers, two sherds of *terra sigillata*, and small fragments of undefined forms) [4]. A small number of finds, such as a comb or a bronze bell, suggest that there was no extensive animal breeding but only to the extent required by the needs of the villagers[4,21].

Discussion

Numerous written sources, frescoes, and mosaics provide information about the Roman diet.

Samples gathered during archaeological excavation and subsequent analyses help us to gain a better understanding of the alimentation of a small provincial community and trace the differences in dietary patterns between different regions and different periods.

Each archaeological site has its own characteristics and should be considered individually, even when concerning the diet of its inhabitants. Only when the archaeological, archaeobotanical, and archaeozoological finds are analyzed together can one understand the dietary habits and everyday life at the site.

Cereals, legumes and fruits

As this is the first large-scale investigation of a Roman village in Croatia, the first archaeobotanical findings for this kind of site are presented in this paper. A few previous findings from Croatia (Southern Pannonia) come from the early Roman graves at Ilok (*Cuccium*) and Šćitarjevo (*Andautonia*)[24] and a Roman urban settlement in Osijek (*Mursa*)[25]. Numerous archaeobotanical investigations of Roman localities were done in Hungary (*Pannonia*)[26,27]. Archaeobotanical results from Virovitica Kiškorija South are more or less similar to the findings available from the sources mentioned above. Various cereals were the most important part of diet in Roman times. The degree of their consumption varied at different sites, but the most frequent types were wheat, barley, and broomcorn millet. Different pulses such as lentil, pea, broad bean, and perhaps bitter vetch had a very important role in the diet as well, although they appeared in much smaller quantities. In addition to the cultivation of various fruit trees (e.g. apple, plum, grape vine), the collection of wild fruit (blackberry, cornelian cherry, strawberries, elders) was highly important and frequent too. The only similar archaeological site with directly comparable finds is in neighboring Hungary – the Roman settlement near Babarc[27], according to the available literature. Among the findings grains also prevail; half of these are bread wheat, and a significant amount is barley. Rye occurs in small amounts but is in almost all of the samples. Therefore, the authors believe that it had an important role in the community, along with pulses which were also found in small quantities (lentils, peas, and bitter vetch). Walnuts are the most common fruits found at the site. Both ancient sites in Croatia and Hungary have assemblages dominated by grain and also include pulses, growing of fruit trees, wild fruits, and the complete absence of »exotic« Mediterranean elements that appear in larger and wealthier urban Roman settlements. Available data from earlier periods in Croatia and surrounding countries[26,28] show that crops like barley, spelt, wheat, and broomcorn millet were cultivated before Roman times, as were various pulses. So, there is no noticeable evidence of a Roman agriculture influence on the spectrum of crops in rural communities. This could indicate tightness and self-sufficiency of rural ancient communities.

Barley, wheat, spelt, rye, broomcorn millet, and foxtail millet are cereals found in Kiškorija pits. They were most probably stored and then prepared for usage. There were also some remains of broad bean, blackberry, and plum. In Ancient Rome, broad beans, spelt, and barley were some of the most commonly eaten foods.

Many Roman authors wrote about the importance of grain in their diet. Cato specified the quantity of wheat and bread suitable for a household, and *Plinius* (in *Naturalis Historia*) and *Varro* (in *De re rustica*) devoted a considerable part of their books to the cultivation, storing, and consumption of grains. *Vegetius* also listed grain among the provision rations that soldiers carried[29-32].

Barley (lat. *Hordeum vulgare,*) was a cereal grain widely used in ancient times for food, as an important animal fodder, and as base malt for beer. Pliny the Elder noted that barley was part of a special food for gladiators, and that they were even called barley-eaters – *hordearii*[31]. It was used for the preparation of various dishes such as porridge (*puls*) and its thicker variant called gruel (*tisana, conchicla*). It was used for making bread and for *pollenta*[33-35]. In Roman times wheat replaced barley as a staple, and barley bread was used as food for cattle (*Plinius N.H.*, XVII, 29). *Pollenta* is a sort of barley cake that was eaten by humans or given to small animals such as goslings[36]. Beer was not popular among the Romans, as it was considered a beverage for the poor and drinking it was considered barbaric behavior. In Roman Pannonia, however, beer was very popular. Even the emperor Valens, who was born in *Cibalae* (Lower Pannonia), loved beer so much that he was called *sabaiarius* (beer drinker or beer belly)[36-39]. Beer was also made from most of the other grains found at Virovitica Kiškorija South. Broomcorn millet and foxtail millet belong to small-seeded cereals. Both of them were used in the Roman period, but broomcorn millet was more popular. Accordingly, millet is the most common grain at Virovitica Kiškorija South from a statistical point of view. As stated by Plinius, several kinds of bread were made from millet and it was cooked as porridge[31]. He also described millet as being used to make leaven. Millet flour was dipped in must, then kneaded and dried. Cakes made in this fashion would remain viable for a whole year[31]. According to Dio Cassius, barley and millet were traditionally consumed in Pannonia, where, he said, they »eat it and drink it«[40].

Wheat was extremely important to the Roman diet, and one of the major economic products. Pliny the Elder wrote that there were numerous kinds of wheat that received their names from the countries where they had been first produced[31]. The type found in Virovitica

Kiškorija South is *Triticium aestivum* – bread wheat. There were many types of bread, but the variety in Roman times was the same as it is today: white bread (*panis mundus*), wholegrain bread (*autopyrus*), and leavened or unleavened. The bread could be named according to its preparation, shape, how it was baked (*panis depsiticus – kneaded bread*), according to the origin of the flour or meal, or it could be mixed with other substances like cheese (*libum*) or pepper[29,31,33,41,42].

Pliny the Elder wrote that rye was a very poor food and only served to avert starvation, recommending that spelt be mixed into it to mitigate its bitter taste. Even then, though, it was most unpleasant for the stomach[31]. Rye is mostly grown north of the Alps[35]. In the archaeological contexts of the Rhine, the Danube, and in the British Isles there is evidence that it was also used in beer production[33,43]. Spelt was also found at Kiškorija South. Spelt (*Triticum spelta*) is a glume wheat and was known in Rome only from the first century CE. It was never a significant food cereal[35]. When threshed, the head of wheat breaks up into separate spikelets while the grain is still enclosed in the glume surrounding it. The glume wheat can be prepared simply by pounding. This was likely the preferred method when making leavened bread. Glume wheat can be transported to the point of consumption in separated spikelet form and the final preparation, prior to milling, can be done there[33].

A legume found at Virovitica Kiškorija in a jug is a broad bean (*Vicia faba*). In his book *De re rustica*, Varro *Varro* RR reported that in Ancient Rome broad beans were one of the most commonly eaten foods, together with spelt and barley. Pliny the Elder also wrote about a widespread sacrificial dish called puls fabata that was made with barley and broad beans[31]. The importance of legumes can be seen in Apicius' cookbook, as he dedicated a whole chapter to instructions on how to cook them[44].

From the first century onwards, the Romans had access to a variety of fruits[35]. Blackberries (*Rubus fruticosus*) and plums (*Prunus domestica*) are the fruits found at Virovitica Kiškorija South, and are important evidence of the use of cultivated and wild fruits at the settlement. Varro in his *Res Rustica* strictly warned that fruit was best when eaten fresh and that fruits lasted longer if they were picked green from the trees, though they still had to undergo the ripening process which was denied to it while still on the tree[30]. Apicius gave instructions on how to preserve fruit in wine[44]. In Roman times, blackberry was gathered as wild fruit.[45] Seeds were found in latrine deposits at Cologne (*Germania*) and many other Roman sites. It is known for its medicinal purpose[46,47]. *Palladius* in the 4th century[48] gave a recipe for *diamoron*, blackberry syrup, made of two parts juice and one part honey[42].

Fleshy fruits such as plums were also pickled and conserved in a variety of ways in brine of various strengths, vinegar, *sapa, defrutum*, honey, and *passum*.[35] Plums (*P. domestica*) found at Virovitica Kiškorija South were probably cultivated in orchards and present evidence of well developed horticulture at the site[49].

Pliny described different types of plums[31,50]. At this point it is difficult to determine whether the plum found at Kiškorija South was cultivated in Pannonia or imported to the site.

Apicius suggested that plums should be served as an appetizer and that they could be mixed in sauces. When he speaks about plums, he uses the term *Damascena,* which is sometimes interpreted as a dry plum instead of a variety of plum[44]. Pliny said that plums boiled in wine were useful for the tonsilar glands, the gums, and the uvula, and that the mouth should be rinsed with the decoction every now and then. He also wrote that plums were relaxing to the bowels[31].

Animals

Animal bone samples were found in much smaller quantities and poorly preserved, and are therefore hard to interpret. In total, four mammalian taxa have been identified: domestic cattle (*Bos taurus*), horse/donkey (*Equus/Asinus*), sheep/goat (*Ovis/Capra*) and pig (*Sus* sp.). This combination is consistent with faunal assemblages found at Roman settlements in the wider region[51,52].

Identified animal taxa give us a glimpse of the animal husbandry practices present at Kiškorija South, but in order to understand them we must refer to ancient authors. Pliny, Varro, and Collumella made many observations about the management of animals[30,31,53]. Cattle, sheep, and goats were kept for their meat, milk and hides, while horses and donkeys were eaten only if absolutely necessary because they were mainly used for travelling. Eating horse was considered a taboo[33,50].

The most numerous remains are from cattle (51.7% of taxonomically identified NISP). This fact indicates that cattle-breeding was very important at Virovitica Kiškorija South. These remains are very fragmented and anatomically selective due to the extreme post-depositional destructive processes in the acidic soil, and as such are insufficient for detailed archaeozoological analysis. As the exact purpose of keeping cattle in this village is unknown, it can only be hypothesized. Were cattle kept for milk and cheese making, as draught animals, or for meat to enhance diet? No clue whatsoever can be deducted from the archaeological context. Nevertheless, it seems safe to assume that the consumption of beef was one of the sources of animal protein for the local inhabitants.

In all ancient societies beef was eaten sparingly because cows were raised for working, either to produce milk or to be beasts of burden[33]. Cows were usually slaughtered when they were old and ceased to breed[50,54]. In Italy, dairy cows were a very expensive commodity, except in the Po Valley and northward, due to the shortage of suitable pasturage.

Various dairy products were made from milk. Pliny mentions that the production of sour milk is the tradition of »barbarian tribes«, a statement that suggests such products were foreign to Rome[31]. On the other hand, Columella gives explicit directions for making three distinct prod-

ucts from sour milk (*oxygala, melca*, and *schiston*) and even Apicius includes a recipe for one[44,53]. Butter (*butyrum*) was rarely used in ancient Rome except as a cosmetic[31,42]. Cheese was a very important dairy product and there is evidence from ceramic material (moulds or strainers for cheese) for its production at both urban and rural sites of Pannonia[55].

The second most common taxa is sheep/goat (*Ovis / Capra*; 34.5% of taxonomically identified NISP). Unfortunately, except for a single goat mandible with teeth (SU 1037/1038), it was not possible to positively identify these remains as belonging to sheep or goat. However, the presence of an iron comb for wool (complex B) suggests that sheep were also kept in the village.

Both sheep and goats were kept for meat and for milk to make excellent cheese. Their milk was more appreciated than cow's milk[30,33,54]. Sheep were also kept for their wool, while goat skin made good leather[50].

Romans considered pigs to be the most useful of animals and pork was probably the most frequently eaten meat. Varro said that there was no Roman farm without swine[30]. Every single part of the animal is useful. They were easy to keep as they would eat almost anything, even each other. *Apicius* in *De re coquinaria* shows over 50 ways to prepare pork (*suila*, *porcina*)[44,56]. Pork was boiled or roasted, and covered with honey or different sauces. Bacon (*lardum*) was part of soldiers' rations[32]. Pork loin was appreciated, as was suckling pig. Pork can be processed into sausages and pigs even provided the casings from their intestines. Their lard (*laridum*) was used for cooking, rarely also for lighting instead of olive oil. Parts of the pig could be mixed with different meat, even fish, in a dish called *patina*[50].

Scarce equid remains could not be attributed to a specific genus (*Equus* or *Asinus*) and/or species. They could have belonged to horses, donkeys, or mules. All of them were present in Europe during the Roman period[51,57-59]. It is generally thought that Romans did not eat horse meat[33,50], although there are rare exceptions to that rule, evidenced in some provinces where local Romanized populations did occasionally eat horse meat[60]. Unfortunately, in the case of Virovitica Kiškorija South, we can only confirm the presence of at least one equid, but nothing else.

Conclusion

The Roman settlement at the Kiškorija jug site is dates from the 2nd to the 5th centuries. It shows typical features of a Roman village, with cottages, structures made of wooden pillars and dried mud, pit dwellings, channels, fences, furnaces and hearths, storage and disposal pits, as well as various working areas. Analyzing the archaeological, archaeobotanical, and archaeozoological finds from this Roman village together and then comparing them to ancient written sources and published data from contemporary sites in this region introduced us to the dietary habits of its former residents as well as everyday life in this village. Eating habits during the Roman period were diversified, and in the provinces of the Empire were influenced by locally available ingredients and traded commodities. Analysis on material from Virovitica Kiškorija South confirms the statement by *Dio Cassius* that barley and millet were traditionally consumed in Pannonia. Cereals and legumes from the site could have been used as gruel, porridge, bread, or beer ingredients, which is considered a typical Pannonian food. Most of the finds were likely locally grown.

The identified animal taxa are very far from being representative and are insufficient to draw any precise conclusions. Among the fragmentary mammalian bones and teeth, the most numerous ones were from cattle, followed by sheep/goat and even fewer equid (horse/donkey/mule) and pig remains. One cannot exclude other smaller animal taxa common in the Roman period (e.g. rabbits and poultry), although none of these is confirmed in the analyzed assemblage and we can only speculate that their remains, if ever present, were completely destroyed by the high soil acidity. Animals could have been kept for milk, meat, leather, wool and/or used as working animals, but due to extreme fragmentation of the finds this cannot be confirmed archaeozoologically. The assumption is rather drawn from historical data and comparison with contemporary sites. The picture of diet given by the Virovitica Kiškorija South site can be considered typical for rustical sites in Roman Pannonia.

As small as the samples are, it can be concluded that the villagers relied on grain for the carbohydrates they needed, while vitamins came from homegrown and wild fruit. Vegetal and animal proteins completed their alimentation, although the evidence is certainly fragmented. Calcium levels would have been maintained with dairy products, mainly from sheep or goat milk. Solid stuff food in necessary quantities was available to enhance the cooks' imagination while feeding their family.

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PREHRANA U RIMSKOM SELU VIROVITICA KIŠKORIJA JUG, HRVATSKA

S A Ž E T A K

Lokalitet Virovitica Kiškorija jug je rimsko selo. U radu se predstavljau arheološki, arheobotanički i arheozoološki nalazi, uspoređuju se s nalazima sličnih lokaliteta i antičkih izvora te se tumače. Lokalitet je podijeljen u komplekse koji sadržavaju arheološke jedinice koje čine cjelinu. Nalazi su predstavljeni unutar kompleksa, uspoređuju se s nalazima sličnih arheoloških lokaliteta i podacima kojima raspolažemo zahvaljujući antičkim pisanim izvorima. Cilj rada je bio otkriti vrstu prehrane na lokalitetu Virovitica Kišorija jug – rimskom selu u Panoniji te razlike i sličnosti u prehrani ovog sela i analognih lokaliteta.