Please cite this as: Hristova, H. and Petkova, K. 2023 What's Down the Hole? Archaeobotanical evidence on plant subsistence and vegetation during the Hellenistic period at an archaeological site near Voditza village, north-eastern Bulgaria, Internet Archaeology 62. https://doi.org/10.11141/ia.62.8

What's Down the Hole? Archaeobotanical evidence on plant subsistence and vegetation during the Hellenistic period at an archaeological site near Voditza village, north-eastern Bulgaria

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The archaeological site 5012-West in the territory of the village of Voditza, Targovishte Region, north-eastern Bulgaria, is interesting because of its features and wide chronological range. From an area of 7000m², a total of 116 structures from various chronological periods have been excavated. However, pits from the Hellenistic Period (late 3rd to early 1st century BC) are most numerous and provide invaluable archaeobotanical evidence on plant subsistence and local vegetation. The archaeobotanical remains have been recovered from flotation samples, collected from pitfills. The archaeobotanical assemblage comprises carbonised remains from several annual cereal crops – hulled and free-threshing wheats, naked barley (*Hordeum vulgare* var. *nudum* L.), millet (*Panicum miliaceum* L.), oat (*Avena sativa* L.) and chaff. The weedy flora is represented by annual ruderal and synanthrophic species such as goosefoot (*Chenopodium album* L.), bedstraw (*Galium aparine* L.), knotgrass (*Polygonum aviculare* L.), and wild mustard (*Sinapis arvensis* L.). Based on the discovered plant remains, we can only propose a partial reconstruction of the agricultural practices and local vegetation cover. However, the collection of samples from specific contexts – storage facilities and pits, provided an opportunity to observe the 'secondary environment' of the utilised plant resources and to identify possible depositional processes. Thus, taphonomic and contextual analyses gave us important insights into the behavioural factors that affected the composition of the archaeobotanical assemblage.

1. Introduction

The data regarding plant subsistence and natural vegetation in north-eastern Bulgaria during the Hellenistic period are still limited. Therefore, this article aims to present the important results of the archaeobotanical investigation of plant remains, collected from Hellenistic ritual and storage facilities at site 5012-West near Voditza.

As Georgieva (2015) mentions, numerous similar structures with likely utilitarian and non-utilitarian functions have been studied at different first-millennium sites within the country, mostly located in its southern part. The fills of the pits are almost identical, containing charcoal and ash layers with plant remains, whole vessels, luxury objects, less often animal and human skeletal remains. Despite their representative number and similarities between their characteristics, the interpretation of the data is still complex. In many of the cases utilitarian and non-utilitarian structures exist in close proximity to each other (Georgieva (2015 146–50). The Hellenistic pits at Voditza are among the recently discovered examples. The collection of samples from specific contexts – storage facilities and pits – provided an opportunity to observe the 'secondary environment' of the utilised plant resources and to identify possible depositional processes. Thus, taphonomic and contextual analyses gave us important insights into the behavioural factors that affected the composition of the archaeobotanical assemblage.

2. Archaeological Setting

Archaeological site 5012-West is located on the northern slope of a ridge in Popastnik locality near Voditza village, north-eastern Bulgaria. The ridge is bordered by the Kayadzhik river on the north and west, and there is a deep gully to the south. The site covers an area of approximately 7000m² (Figure 1). There is a difference in altitude of 26m from east to west. The site is also located to the north-east of a karst spring.

Figure 1: Location of the site and aerial photos in the beginning of the rescue excavations in 2020. Image credit: K. Petkova

The archaeological rescue excavations were carried out in 2020. More than 116 archaeological structures, dwellings and pits were discovered. The site is multi-layered and yielded structures dated to the transitional period between the Chalcolithic and Early Bronze Age (3800–3700 BC), and the transitional period between Late Bronze and Early Iron Age, dated to the 13th century BC.

Furthermore, pits and dwellings from the Late Hellenistic (middle of 2nd century BC to the beginning of the 1st century BC) and Roman period were investigated (Figure 2).

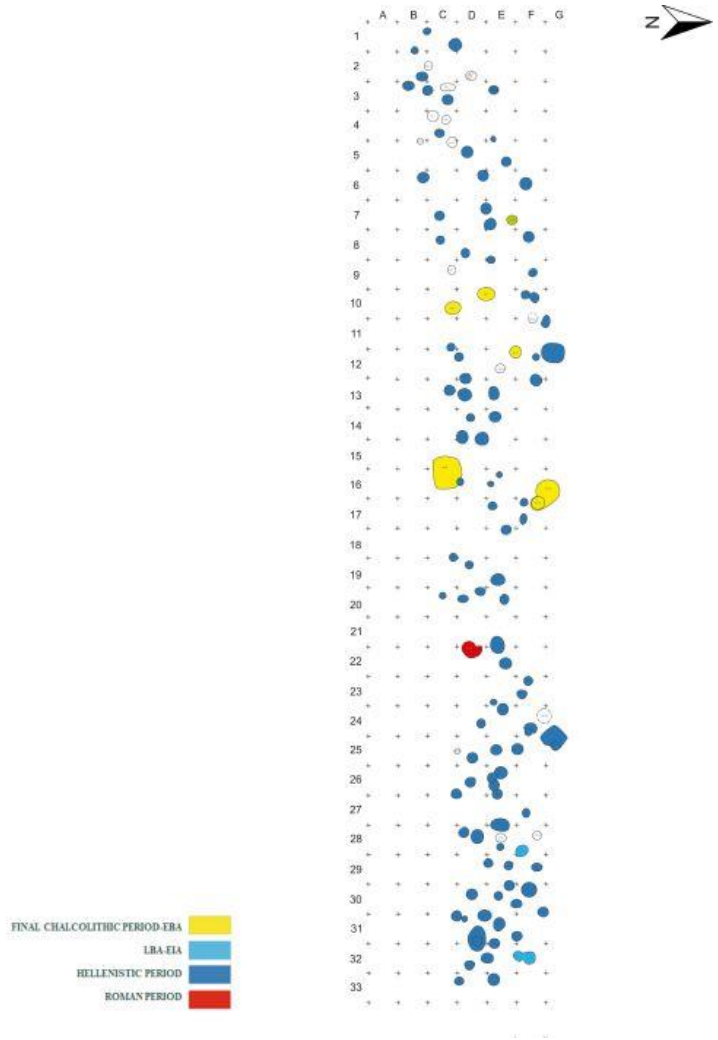

Figure 2: Distribution of structures from different periods of occupation of the site (within the boundaries of the studied area). Image credit: K. Petkova

The structures dated to the Hellenistic period are mostly represented by pits, but two dwellings were also discovered. The pit openings are either circular or oval in form, dug in the sterile layer. In most cases their filling was not homogeneous – layers of dark soil with organic inclusions and archaeological remains alternated with stripes of sterile soil fallen from the pit walls. Three of the pits contained animal skeletons (a dog, a lamb and two dogs respectively), which were found intact.

The interpretation of the discovered structures and the site as a whole is disputable. Pits represent an integral part of all studied settlements dated to the period between 2nd century BC and 1st century AD (and earlier) in the territory of north-eastern Thrace (Balkanska 1998; Ginev 2000; Stoyanov 2015; Varbanov 2013). These were mainly interpreted as household pits for storage and food supplies (Varbanov 2013 30) and only a small number of them seem to have functioned as ritual pits (after Георгиева 1991, 1-10). The contents of the recorded pits provide an

indication for the functions of the complex at Voditza. According to the diagnostic criteria for the identification and classification of the pits, namely: the presence of human remains, whole and miniature vessels, remains of fire, the intentional order and continuity in the fills of the pits, we may suggest that some of the pits in Voditza were related to ritual practices.

3. Archaeobotanical Methods and Materials

The applied field strategy involved selective sampling within representative features, taking into account the main objectives of the archaeological survey. The goal of the archaeobotanical survey was to establish the distribution of plant remains within the investigated area, to observe the 'secondary environment' of the utilised plant resources and to identify possible depositional and post-depositional processes.

Two types of structures were sampled 1) utilitarian – storage pit; 2) non-utilitarian – ritual pits. The ritual pit deposits consist mainly of whole or fragmented ceramic vessels, stones, daub pieces, and charred organic material, which includes animal bones, human skeletal remains and plant remains. The samples were collected from multiple depths/levels of the fill, applying the so-called pitch or scatter sampling (following Pearsall 2015), and from inside whole vessels.

A total of 21 soil samples were collected. The volume of each sample was measured prior to flotation. As a result, 510 litres were processed using a bucket flotation and a sieve with 1×1mm mesh size. Hand sorting under a stereomicroscope resulted in approximately 1500 charred remains from 14 different taxa. The ubiquity of each plant taxon has been calculated per context as a percentage proportion of the total number of remains found in each sample. Each fraction underwent preliminary visual examination using an illuminated magnifying glass. Identification of taxa was carried out using a stereomicroscope Bresser ICD Advance, at magnification 10×, 20×. For the charcoal analysis, each fragment was broken manually. The anatomical characteristics of the wood were observed in transverse, tangential and radial planes. Transverse planes were captured using a digital microscope Levenhuk DTX, at magnification 10×.

4. Results

The applied sampling strategy resulted in more diversity in taxa but less variability in density in some of the samples. The obtained data indicate that six types of cereal crops were grown: einkorn (*Triticum monococcum* L.), bread wheat (*Triticum aestivo/durum* L.) and club wheat (*Triticum aestivum* ssp. *compactum*), naked barley (*Hordeum vulgare* var. *nudum* L.), millet (*Panicum miliaceum* L.), oat (*Avena sativa* L.). Free-threshing wheats are present in relatively small quantities. The weedy flora is represented by four annual species: goosefoot (*Chenopodium album* L.), bedstraw (*Galium aparine* L.), knotgrass (*Polygonum aviculare* L.), and wild mustard (*Sinapis arvensis* L.) (Figure 3a-k). However, the archaeobotanical

assemblage from Voditza mainly comprises charred wood fragments from four different deciduous species: oak (*Quercus* sp.), hornbeam (*Carpinus betulus* L.), beech (*Fagus sylvatica* L.) and hazel (*Corylus avellana* L.).

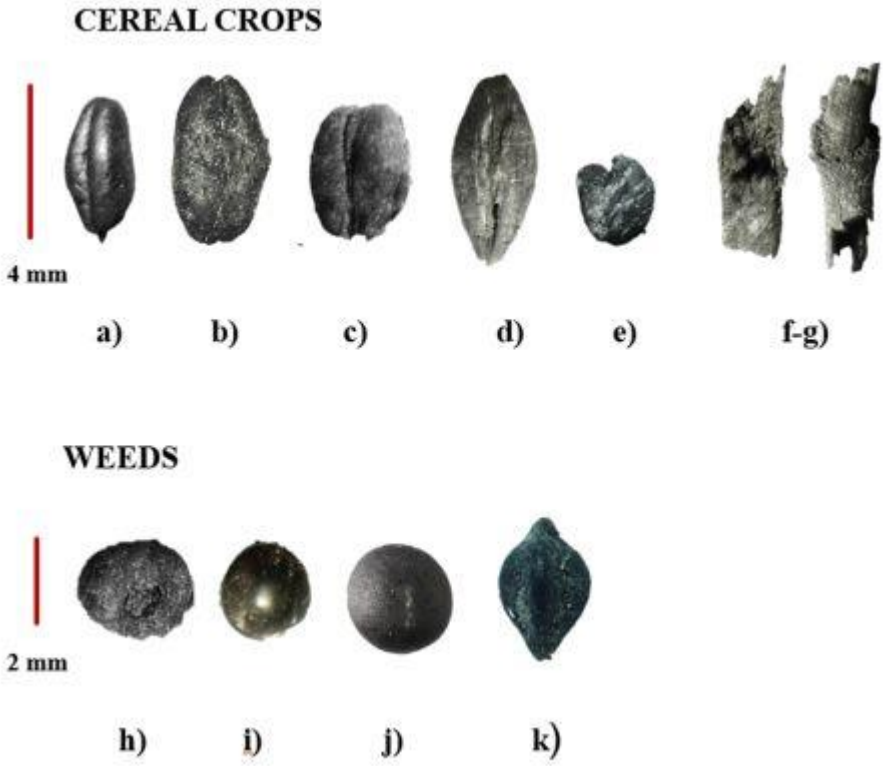

Figure 3: Charred plant remains a-g) remains of cereal crops (magnification x10); h-k) seeds of grass species (magnification x20). Microscope images: H. Hristova

4.1. Structure 11

The features of Structure 11 deserve special attention. The walls of the pit are stepped, and at the bottom another rectangular structure was discovered, with remains of a wooden construction on its periphery. Two samples were collected from a thin layer of burnt organic matter at the bottom of the structure, as it was the only uncontaminated area in the whole pit fill. The excavators suggest that the structure stood open for a long period of time, it was filled periodically, and finally was closed with a layer of stones. The analysis shows that the archaeobotanical assemblage consists of five types of cereal crops: einkorn (*Triticum monococcum* L.), bread wheat (*Triticum aestivo/durum* L.) and club wheat (*Triticum aestivum* ssp. *compactum*), naked barley (*Hordeum vulgare* var. *nudum* L.), millet (*Panicum miliaceum* L.), oat (*Avena sativa* L.), as well as some secondary products of the threshing process: fine chaff and wheat stems with well-preserved internodes. The weedy flora is represented by annual ruderal and synanthropic species such as goosefoot (*Chenopodium album* L.), cleavers (*Galium aparine* L.), knotgrass (*Polygonum aviculare* L.), and wild mustard or the so-called charlock mustard (*Sinapis arvensis* L.) (Figure 4). The cereal remains are well preserved, although their pericarp and testa are disturbed in places, probably owing to exposure to high

temperatures of burning. The charcoal analysis of wood fragments shows that the construction was made of oak and beech planks.

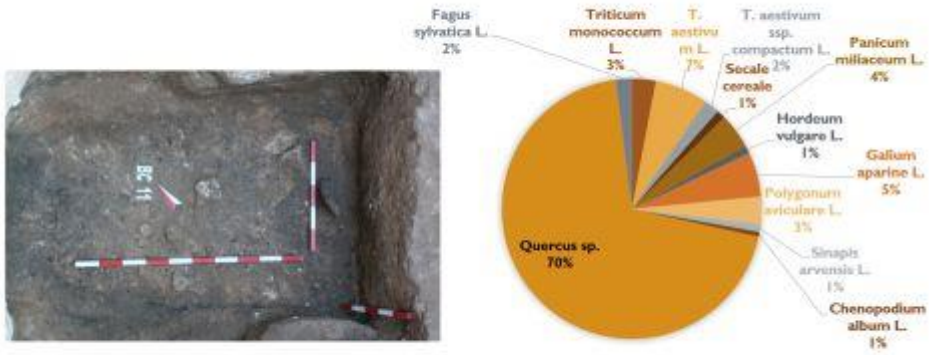

Figure 4: Structure 11 with the thick layer of burnt organic remains at the bottom and quantitative distribution of plant species, found in the samples.

4.2. Structure 50

Two archaeobotanical soil samples were collected from Structure 50, from inside a cup known as a Dacica type and from an ashy spot around the cup. As a result, a total of 379 remains from 8 plant species were recovered (Figure 5). The remains of both hulled and free-threshing types of wheat represent only a small proportion of the archaeobotanical assemblage. Wood remains and seeds of cleavers predominate. It is interesting to note that these cups are usually connected to ritual burning of different grasses and herbaceous plants. The seeds of *Galium aparine* are light and although they could be easily scattered by the wind and deposited accidentally in different areas, their representative number suggests intentional deposition or probably even ritual activity.

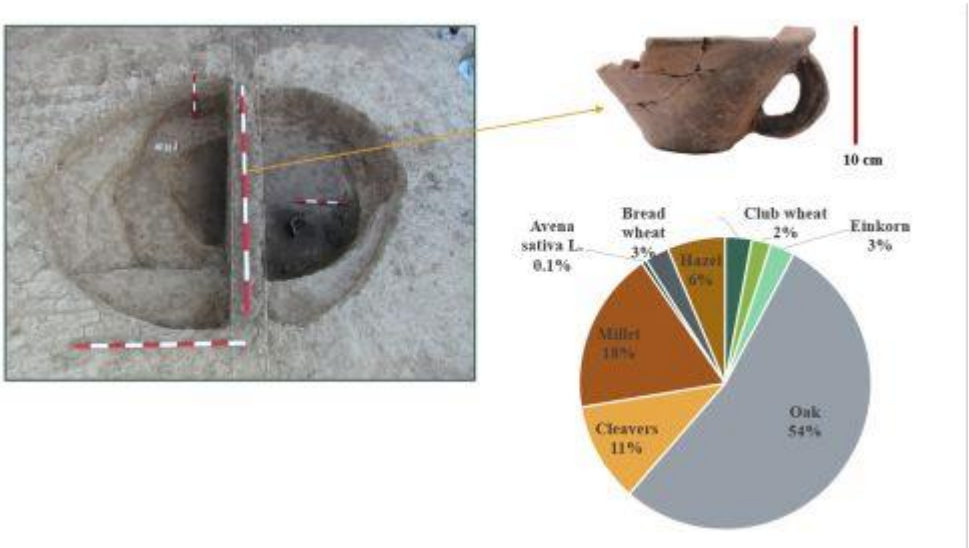

Figure 5: Structure 50 and quantitative distribution of plant remains, found inside the cup Dacica.

4.3. Structure 51

The archaeobotanical remains from Structure 51 were recovered from two samples. One of the samples was collected from the area around a Rhodian amphora and consisted of a few *Triticum aestivo/durum* L. grains, poorly preserved, and of numerous charred wood fragments of oak (*Quercus* sp.) and hornbeam (*Carpinus betulus* L.) (Figure 6). The vessel itself was probably reused after its original contents were consumed. Above the bottom on the side walls there are four symmetrical holes, probably from a repair, and when it was finally absolutely unusable it was placed in the pit.

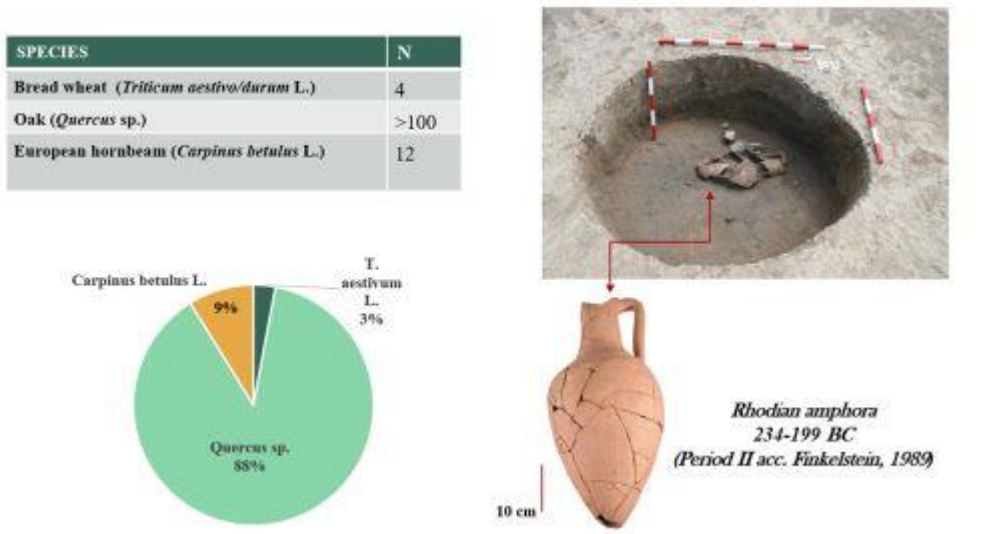

Figure 6: Structure 51 and quantitative distribution of plant remains, found around the Rhodian amphora.

The second sample was collected from an area with a concentration of burnt organic remains around a fragmented Dacica cup type, found in an ashy layer under the Rhodian amphora. The sample consists of einkorn (*Triticum monococcum* L.), bread wheat (*Triticum aestivo/durum* L.) and club wheat (*Triticum aestivum* ssp. *compactum*), naked barley (*Hordeum vulgare* var. *nudum* L.), and shapeless pieces of wood, mainly fragments of oak branches and twigs, varying in size between 2mm and 20mm in length and between 3mm and 20mm in diameter (Figure 7)

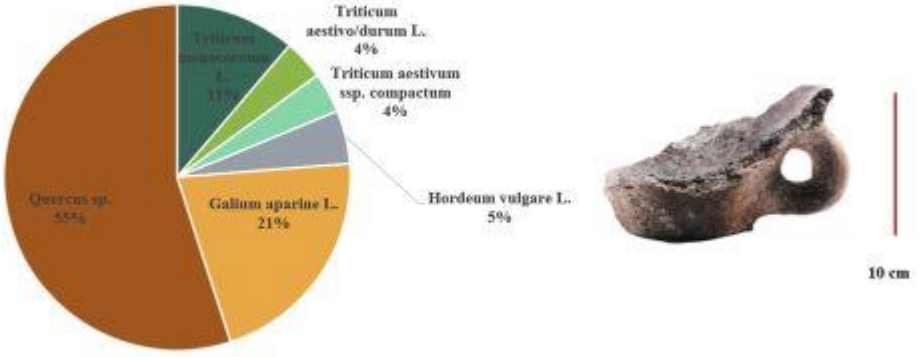

Figure 7: Structure 51 and quantitative distribution of plant remains, found around the cup type Dacica.

4.4. Structure 55

The pit was filled with stones, pieces of daub and wood charcoal, as well as fragmented ceramic vessels, which were broken in advance and subsequently deposited. The analysis of the wood fragments shows that they all belong to *Quercus* sp. (Figure 8a-c). The structure of the charred wood remains was slightly disturbed. Changes in the morphological characteristics were observed only in 43% of the studied fragments. If we suggest that the pit was full of refuse deposits, then daub debris and oak wood probably represent the remains of a construction.

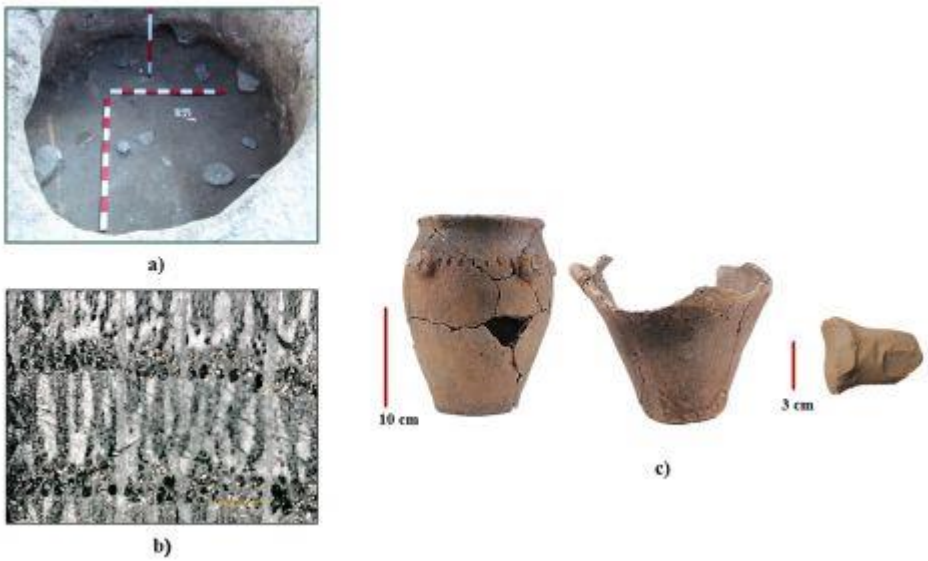

Figure 8: Structure 55: a-b) the ceramic vessels, deposited inside the pit; c) transverse plane of charred wood fragment of Quercus sp.; magnification 10x.

4.5. Structure 99

The deposit of Structure 99 consists of complete, although fragmented, ceramic vessels: a ceramic strainer and two ceramic jugs. The archaeobotanical samples resulted in a representative quantity of oak and beech fragments, predominantly oak (*Quercus* sp.) (Figure 9a-c). No significant disturbances were observed in the anatomy of the wood.

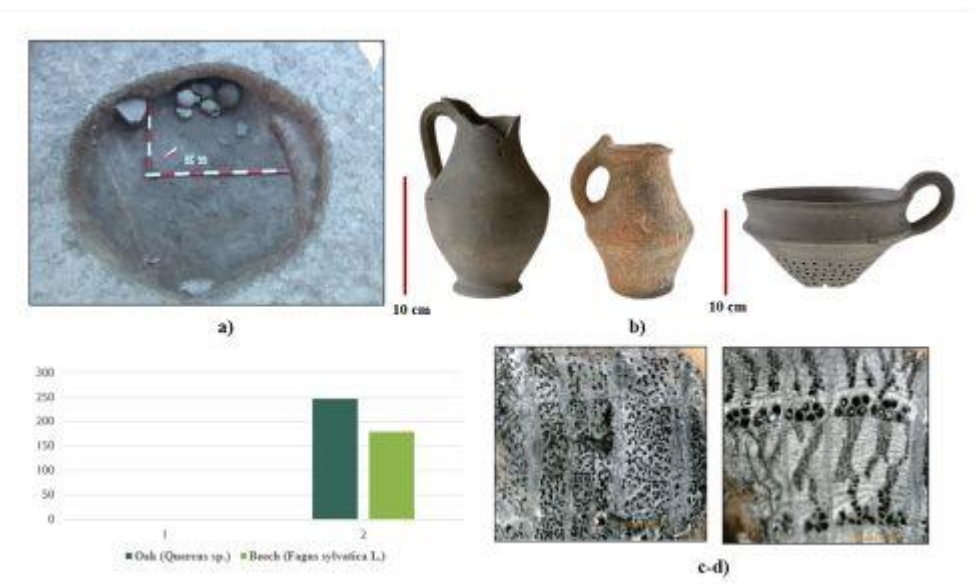

Figure 9: Structure 99: a-b) the ceramic vessels, deposited inside the pit; c) transverse plane of charred wood fragments of Quercus sp. and Fagus sylvatica L.; magnification 10x.

5. Discussion

5.1. Taphonomy and contextual analysis

Macro-botanical assemblages are shaped by the local environment from the time they were deposited to the moment they were found. Thus, in order to interpret the archaeobotanical data, we need to understand how the assemblages were created. If habitats can be identified in the natural environment, certain areas with concentrations of archaeobotanical materials can be identified within the excavated area. Hence the archaeological context may be seen as a secondary environment. In the case of Voditza, the collection of samples from specific contexts provided an opportunity to observe this *environment* and to identify possible depositional processes.

The archaeobotanical material mainly comprises plants that occur in their primary context of deposition; a stock of cultivated crops with its impurities within Structure 11, traces of burning and contents of ceramic vessels found in the ritual pits. However, the specific events that led to the charring of plants are difficult to determine. For the purposes of this study, Hubbard's (1980) classification can be applied. He differentiates the following groups regarding the nature of the charring and depositional processes: 1) plant material *in situ*, which was burned in the same place where it was later found; 2) plant remains charred once as a result of some

type of activity and subsequently re-deposited accidentally or intentionally. The latter group includes plant material that has been charred as a result of various and disparate events (Hubbard 1980). In most of the studied Hellenistic pits from Voditza, there are indications of intentional burning, except for Structure 11 (granary) where the fire was probably accidental or occurred after the pit stopped functioning. The samples from Structure 11 contain mixed cereal stock of well-preserved charred grains and chaff. However, if the depth of the pit and the volume of the soil samples are both taken into account, then the concentration of archaeobotanical material can be defined as relatively low. Alternatively, Hristova (2015) suggests that if a pit is used for storage, it is not absolutely necessary to find cereal grains inside as usually cereal stocks are being entirely used. If there was no incidence of fire, the remaining grains actually decay. We must note that the state of preservation of the analysed plant remains varied from one type of plant remains to another, but no considerable differences in the degree of carbonisation were encountered. There is no evidence that soil acidity affected any of the archaeological artefacts or the archaeobotanical material. We may also suggest that different types of cereal crops must have been stored in the facility over a long period of time. Thus, the archaeobotanical plant material represents the remnants of the last mixed grain stocks, stored in the pit just before it stopped functioning. The presence of chaff and weeds, on the other hand, indicate that the granary could have been used for storing fodder as well.

The presence of plant remains within a ritual context, however, raises different questions about the nature of the taphonomic processes and the characteristics of a given facility. As Berzovan *et al*. (2014) mention in their study of Dacian ritual pits in Romania, burning of offerings, digging the pit, deposition of the objects or organic remains, all require coordinated actions that take a certain amount of time (Berzovan *et al*. 2014 18). In this regard, one of the main questions is the motivation, the choice of certain plants to be used as ritual offerings – is their choice deliberate or accidental (Попова 2018, 60)? Although archaeobotanical assemblages from such ritual contexts show great taxonomic diversity, the most common finds are the remains of cereal crops (Hristova 2015 117–35; Попова 2009 71–166; Попова 2018, 39–62). Food offerings and especially cereal crops have a special role in Thracian ritual practices and are usually related to worship of fertility (Георгиева 1999 95). What we see from the archaeobotanical material from Voditza is that some of the plant species deposited in the storage facility are the same as those found within the ritual contexts. As Georgieva (2015) states, the existence of both utilitarian and non-utilitarian facilities in close proximity is evidence for the hypothetical existence of an invisible boundary between profane and sacred, which led to a ritualisation of everyday activities (Georgieva 2015 153). This phenomenon is also attested by the composition of the archaeobotanical assemblage, not only from Voditza but from other sites from the Hellenistic period. In the majority of the analysed pits, there are a very limited number of botanical remains (see Hristova 2015 117-35). The low quantities of plant remains found in ritual contexts may indicate that the amount of plant offerings would have been smaller, and if the ritual does not include burning then most of the uncharred remains would decay. This may result in minimal and selective preservation (see Hristova 2015 117–35; Попова 2002).

5.2. Plant subsistence and vegetation

Climate, water resources and relief are essential prerequisites for soil fertility and economic potential of a given area. Detailed and correct reconstruction of past environmental conditions requires the application of various interdisciplinary studies, including lithological, geological, archaeobotanical and archaeozoological analyses, and radiocarbon dates (Gaydarska 2008 61). Global climate change is often considered to cause fluctuations in the development and distribution of plant communities. The evidence on the climate in ancient Thrace during the first millennium BC is based on written sources and palaeobotanical data (Georgieva 2015 43). However, their interpretation is largely based on super-regional correlations with data from palaeoecological archives, and on similarities between modern natural processes and conditions in the past (Маринова *et al*. 2018 31).

The pollen diagrams from different parts of the country indicate that during the first millennium BC, there were alternating intervals of cooling and warming up, of varying duration and intensity. However, as Georgieva notes (Георгиева 2016, 110-113), these fluctuations were not sufficient to produce noticeable changes in the flora and fauna. During the Iron Age, anthropogenic indicators concern mainly pasture and it seems that the upper tree line was artificially lowered in order to extend the high mountain pastureland. Around 500–400 BC, human impact on the vegetation of South Bulgaria becomes clearly pronounced and continuous on a large scale (Valamoti *et al*. 2018 273).

Seven of the analysed samples from Voditza consist mainly of charcoal fragments of oak (*Quercus* sp.), followed by beech (*Fagus sylvatica* L.), and hornbeam (*Carpinus* sp.). These are among the most common species according to the available archaeobotanical data for the Hellenistic period in Bulgaria, followed by ash (*Fraxinus* sp.), hazel (*Corylus* sp.), maple (*Acer* sp.) and pine (*Pinus* sp.) (Georgieva 2015; Hristova 2015; Попова 2018). If we assume that the main criteria for wood collection and use might have been its availability in the region, we may suggest that there were areas in the vicinity of the site, occupied by mixed deciduous forests and open lands with ruderal vegetation. Nowadays, the composition of the vegetation cover is similar.

The crop plant spectrum of Voditza also shows certain similarities to other investigated sites within the territory of Bulgaria and the neighbouring countries like Greece and Romania (see Hristova 2015; Попова 2018; Valamoti *et al*. 2018). The presence of glume wheats and barley suggest the continuation of a long tradition in cultivation of these species. However, free-threshing wheats and millet appear to occur more frequently during the Hellenistic period (Valamoti *et al*. 2018 278–9). This phenomenon is also attested by the results of the current study. The weedy flora is represented by annual ruderal and synanthrophic species such as goosefoot (*Chenopodium album* L.), bedstraw (*Galium aparine* L.), knotgrass (*Polygonum aviculare* L.), and wild mustard (*Sinapis arvensis* L.). These wild-growing plants usually colonise areas of already disturbed natural vegetation and enter the cultivated fields as weeds, so they could be easily collected during harvest and stored together with the grain stocks.

6. Conclusion

Although the number of the recovered plant remains from Voditza is not large, the collection of samples from specific contexts provided important information about agricultural and ritual practices in the studied area. Despite regional variations, manifested in the archaeological and archaeobotanical record, the results from the current study showed significant similarities with other investigated regions of the country regarding plant subsistence and vegetation. It is always worth seeking what's down the hole.

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