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Inhalt

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Archaeobotanical analysis of the Neolithic site Bâlgarčevo, Southwestern Bulgaria

Elena Marinova

Abstract

The archaeobotanical research for the Neolithisation of Southeastern Europe provides crucial evidence for understanding the transfer processes of the Neolithic economy from the areas of its origin into Europe. The here presented archaeobotanical analysis of the site Bâlgarčevo serves as a case study on the development of the Neolithic agriculture and land use during the transition from the Early to the Middle Neolithic (5650-5450 cal BC) on one of the major Neolithisation routes – the Struma valley. Several sources of information: charred and mineralised plant macro fossils, wood charcoals and imprints of plants in wattle and daub were considered. The principal crops were hulled wheats – emmer and einkorn. Pulses also played a quite important role (dominated by pea and lentil). The occurrence of chick pea (Cicer arietinum) illustrates the diversity of pulses and suggests continuation of agricultural practices close to those in the Near East. Anthracological evidence shows that natural vegetation was dominated by oak forests and the existence of a variety of other habitats such as open woodland, pine forests and riparian vegetation could be proved around the site, which were apparently intensely used.

Keywords: Neolithic subsistence, early agriculture, land use

Zusammenfassung

Die archäobotanische Forschung zur Neolithisierung Südosteuropas bietet hilfreiche Hinweise für das Verständnis des Transfers der neolithischen Wirtschaft aus ihren Herkunftsgebieten zu den Umweltbedingungen Europas. Die hier präsentierte archäobotanische Analyse der Siedlung Bâlgarčevo dient als Fallstudie zur Entwicklung der neolithischen Landwirtschaft und Landnutzung während des Übergangs zwischen dem Früh- und Mittelneolithikum (5650–5450 cal. BC) an einem der Hauptneolithisierungswege – dem Struma-Tal. Dabei wurden verkohlte und mineralisierte Großreste, Holzkohlen und Pflanzenabdrücke in Lehmbaukonstruktionen berücksichtigt. Die wichtigsten Kulturpflanzen sind Einkorn und Emmer und verschiedene Hülsenfrüchte (dominiert von Erbse und Linse). Die Vielfalt der genutzten Hülsenfrüchte wird auch durch einen Kichererbsenfund illustriert und lässt eine gewisse Kontinuität zur nahöstlichen Landwirtschaft vermuten. Die anthrakologische Ergebnisse zeigen die weitgehende Nutzung der Eichenwälder und belegen gleichzeitig auch eine Vielzahl von Naturhabitaten, wie etwa offene Wälder, Kieferwälder und alluviale Vegetaion.

Schlagworte: Neolithische Wirtschaftsweise, frühe Landwirtschaft, Landnutzung

Introduction

In the Neolithisation of Europe, South Eastern Europe occupies a key position as mediator for the transfer of early agriculture from its area of origin (the Near East) to Central Europe (Fischer/Rösch 2004). One of the major routes for this transfer is considered to be the Struma valley, which represents the geographical linkage between the Aegean region and Lower Danube plain. Archaeobotanical research gives direct evidence on the adaptation of early agricultural practices and exploitation of the natural vegetation in the course of the Neolithisation of the region. In the following case study Neolithic plant economy from the Struma valley, namely from the site Bâlgarčevo, will be presented.

The site is situated in a transitional area between the Southern and Northern part of the Struma valley. It located on one of the western routes towards the Vardar valley and to the Starcevo and later Vinca cultural area, respectively. The position of the site makes it very interesting for tracing various regional connections and influences. Between 1977 to 1987, the site was studied by an archaeological team lead by L. Perničeva, Archaeological Institute and Museum, Sofia and with the participation of Malgorzata Grebska-Kulova and Ilia Kulov from the Historical Museum Blagoevgrad (Pernicheva-Perets et al. 2011). The archaeobotanical material which was collected in the course of this excavation campaigns gives valuable information about the subsistence and land use in the area of Southwest-Bulgaria during the end of the Early Neolithic and the Middle Neolithic. Important information about the transition between these two periods was obtained from archaeobotanical material originating in Bâlgarčevo. In general there are very few archaeobotanical studies of the Bulgarian Middle Neolithic, ensuring the importance of the present study. An attempt is made to present the materials found within their regional context.

Natural conditions

The site was situated on the right river bank of the river Struma approximatley 10 km NW of the town Blagoevgrad, on the slopes of the foot hills of the Vlahina Mountain – a small mountain with North-South orientation. The valley in which the northern part of Bâlgarčevo is situated, is enclosed by the surrounding mountains, but open towards the south to the Mediterranean influence coming from the Aegean region. Today, in the area of the Middle Struma (Strymon) valley a transition from continental to Mediterranean climate is dominant. It is also called "continental-Mediterranean" in the most recent works on the Bulgarian climate (Velev 2002). This corresponds to a mild winter with temperatures around or over 0 ºC during most of January and hot dry summers: The mean annual temperature is 12,5 °C. The precipitation maxima are in the spring (May) and autumn (Nov.) and the mean annual precipitation for the region of Blagoevgrad are about 520 mm. The soils in the wider area of the site are mainly alluvial, however on the slopes where the site was situated they are mainly leptosols – i.e. different types of shallow soils. The potential natural vegetation consists of xerothermic oak forests, which are heavily degraded by the agricultural activities in the area today. The closely situated rivers and their forests are an additional natural resource useful for the prehistoric population.

Archaeological settings

The site Bâlgarčevo belongs to the so called flat prehistoric settlements, a type wide spread in South-Western Bulgaria (Perničeva 1995). It had an area of about 10 ha and the cultural layers had a thickness of about 1,5 m. The site was occupied from the final Early Neolithic to the Early Chalcolithic period. The available ^{14}C data from the site at present, belong to the end of the Early Neolithic and the Middle Neolithic (5650–5450 cal BC) (Pernicheva-Perets et al. 2011), to the Late Neolithic (5070–4940 cal BC) and the end of the Neolithic 4930–4780 cal BC (Görsdorf/Bojadziev 1997). The best preserved layers are those of the Neolithic settlements. The Chalcolithic and Middle Bronze Age layers have been partially destroyed by agricultural activities (Perniceva 2002). Therefore archaeobotanical remains from the both last mentioned periods are scarce.

Methods and materials

This work is based on 33 manually collected archaeobotanical samples combined with 5 flotation samples additionally obtained. The complete material studied consist of charred plant macrofossils (seeds, grains, chaff, wood, etc.), which were accumulated in the settlement layers of Bâlgarčevo during the Neolithic occupation. The archaeobotanical material belongs to the Early and Middle Neolithic from the layers Bâlgarcevo IA, IB, II and in two samples originates from the Middle/Late Neolithic – Bâlgarčevo II–III. Most of the studied plant materials were collected manually during the excavation seasons between 1985–1987, and come from the Early Neolithic House 1. These samples were taken by the excavators manually from visible high concentrations of charred plant remains and consist mainly of crop plants and wood charcoal. Such finds – also called "storage finds" – are valuable for estimating which plants were cultivated, but usually do not contain the complete plant spectrum preserved in the cultural layers. With the aim to

obtain wider archaeobotanical information 5 additional samples from the profiles of the site were taken and flotated. For these samples, about 30–40 l of sediment was manually flotated in the laboratory of Palynology in the dept. Botany, Sofia University with sieve mesh widths of 1 and 0,4 mm.

The entire material was sorted and studied under a binocular with a magnification up to 40x. The wood charcoal particles were studied under a microscope using reflected light with a magnification to 200x. For the determination of the diaspores (fruits, seeds etc.) and the wood the reference collection of the dept. Botany, Sofia University and the corresponding specialised literature was used.

Additional information on crop husbandry practices in the site Bâlgarčevo were obtained from the analysis of the daub fragments of House 1. The daub fragments were manually broken and on the fresh broken surfaces the plant imprints were observed. Part of this material was taken for further laboratory analysis. Some of the well preserved imprints were further identified to genus or species level by comparison with modern reference material.

Results and discussion

The results of the analysis of seeds, fruits etc. called generalized diaspores (carpological analysis) and from the wood charcoal (anthracological analysis) are given in Tab. 1.1–1.3 in the appendix. The samples marked with * were obtained by flotation. These are the samples which contained the most various plant material. In these samples many plant species which could be potential weeds together with crop plants occurred. In Tab. 2 the results for the cultivated plants in the three periods studied are summarised. The identified plant imprints were counted, sorted by their origin from different architectural structures and are given in Tab. 3.

Carpological analysis.

The predominant cultivated plants are hulled wheats – einkorn (*Triticum monococcum*) and emmer (*T. dicoccum*). They are cereals which were the staple crop not only for the region of South-Eastern Europe, but for entire Europe and the Near East during the prehistoric period. It seems that in Bâlgarčevo between the two periods studied a change of importance of one to the other species occurs in Bâlgarčevo I and II. In the samples from Bâlgarčevo IA emmer is clearly prevailing (grains as well as chaff). In the majority of samples from Bâlgarčevo IB and II emmer and einkorn occurr in a 1:1 relation or einkorn is even prevailing. Similarly is the picture in the synchronous site Kremenik-Separeva Banja (Čakalova/Sarbinska 1986), where the main cereal crop was einkorn.

The hulled wheats were found in numerous storages in the layers of Bâlgarčevo and in all cases together which leads to the assumption that they were cultivated together. In the storage samples from house one, in some cases chaff and straw particles were preserved (Fig. 1). This points to

Tab. 2: Summarized results about the cultivated plants found in the three archaeobotanically studied periods. The values express seed or grain total numbers; G - grain; Rf - rachis fragment.

	Bâlgarčevo IA **Early Neolithic**	Bâlgarčevo IB **Final Early Neolith.**	Bâlgarčevo II **Middle Neolithic**
Cereal crops			
Triticum monococcum (G)	136	174	194
T. dicoccum (G)	285	312	113
T. aestivum/durum (Rf)	4	-	-
Triticum sp. (G)	224	108	47
Hordeum vulgare (G)	35	2	5
H. vulgare var. vulgare (G)	-	-	1
Leguminous crops			
Pisum sativum	358	1153	114
Lens culinaris	272	23	20
Vicia ervilia	-	-	4
Cicer arietinum	-	-	5

Tab. 3: The identifiable plant imprints found in the daub fragments of the Early Neolithic House 1, Balgarchevo I.

plant imprints identified	walls	floors	bottom of oven	others
Triticum cf. monococcum (spikelet)	7	-	-	-
Triticum cf. monococcum (ear)	2	-	-	-
Triticum cf. dicoccum (spikelet)	3	-	-	-
Triticum sp. (spikelet)	14	2	-	6
Triticum sp. (ear)	5	-	-	1
Hordeum cf. vulgare (chaff)	4	1	-	2
cultivated cereal (chaff)	21	9	5	15
cereal steam	19	38	8	17
deciduous tree leaf fragment	3	1	-	-
wood	6	-	14	2

storing of the cereal crops in an unthreshed state. This is a good precondition to conserve hulled wheat for longer time and to preserve its ability to germinate. The hulled wheats could be harvested in two principal ways i.) as ears or ii.) as sheaves. In this context the occurrence of straw- and leaf remains could be interpreted in two ways. Firstly, straw was added to the stores of ears as insulation and for keeping them dry or second, the hulled wheats were harvested with their stems and were stored as sheaves. The presence of some weeds which grow relatively low (up to 40 cm) for example *Setaria verticillata/viridis*, *Polycnemum arvense*, *Fumaria* sp. etc. could be an indication of a relative low harvest near ground level and thus indicate storing as sheaves. This hypothesis could possibly be further supported by the results from the analysis of the flint assemblages.

Among the hulled wheat material from Bâlgarčevo of all the three periods einkorn grains belonging to the two-seeded form of this crop were found (Fig. 2). Usually the cultivated einkorn produces only one grain per spikelet. By this form two grains develop in one spikelet. This find is interesting because it shows the diversity within the cultivated hulled wheat species in the Neolithic.

In the flotation samples from Bâlgarčevo IA naked wheats (*Triticum aestivum/durum*, Fig. 3) also occured. They are present as rachis fragments of the ears, which is a certain proof of this kind of wheats. The naked wheat played probably only a minor role in Neolithic agriculture, but its presence confirms the wide range of crops used by Neolithic farmers introduced to the study area from the Near East.

Another cereal crop – barley (*Hordeum vulgare*) is also present at the site. It appears frequently in all periods, but in very small quantities. In the storages from house 1 there are also some barley grains. They seem to belong to the hulled form of the barley (*Hordeum vulgare* var. *vulgare*) the form most typical for Western Bulgaria and the Starcevo and Vinca cultures.

Important parts of the prehistoric crop inventory in Bulgaria together with the cereals are the leguminous plants. It seems that during the whole period studied, the most important of them were pea (*Pisum sativum*) and lentil (*Lens culinaris*). Both occur in the storages of house 1 and house 4. During the Early Neolithic of Bulgaria the pea is quite common and during the second half of the Early Bulgarian Neolithic pea storages are also registered frequently in Cavdar (Dennel 1978) and Azmak (Hopf 1973). Considering the good water resources in the area of Bâlgarčevo it is probably not surprising that the most water demanding leguminous crop of the Neolithic – the pea – prevails there. It has the advantage above the other Neolithic pulses that it has large seeds and it contains no poisonous alkaloids like the bitter vetch (*Vicia ervilia*) or the grass pea (*Lathyrus sativus*). The last mentioned is fully absent in the studied archaeobotanical material from Bâlgarčevo. This is quite surprising because the grass pea is quite common in other sites for example, the region of Kovacevo (Marinova 2006) or Slatina (Dotcheva 1990), where a storage of it was found. But probably due to the good cultivation conditions there was no need to cultivate dryness resistant pulses like the grass pea. Of course it could not be excluded that this absence of grass pea has some cultural reasons. In samples from Bâlgarčevo II some seeds of *Vicia ervilia* occasionally

Fig. 1: Remains from chaff and straw from the hulled wheat storages found in House 1 (scale 1 mm).

Fig. 2: Grains of two seeded einkorn, Bâlgarčevo IA (scale 1 mm).

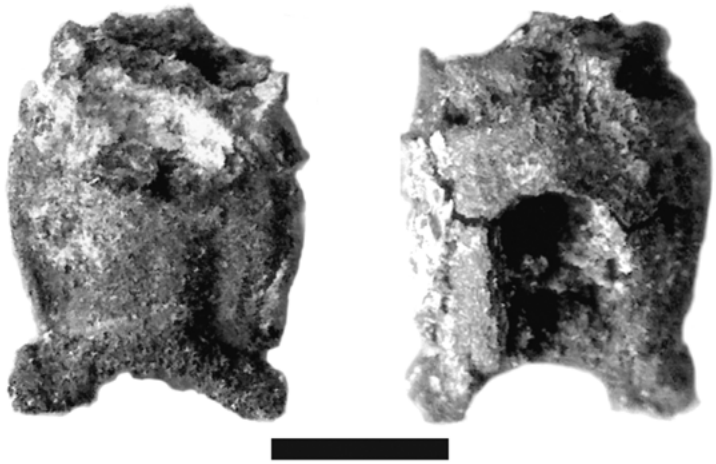

Fig. 3: Rachis fragment of the ear of naked wheat (Triticum aestivum/durum) (scale 1 mm).

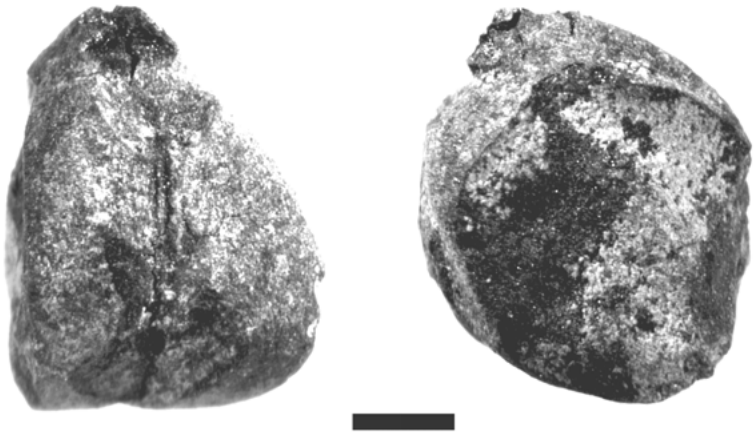

Fig. 4: Seed of chick pea (Cicer arietinum) (scale 1 mm).

appear. This crop starts to be more important for later in periods of the Bulgarian Neolithic and becomes one of the main leguminous crops in Thrace from the Late Neolithic to the Bronze Age. In the layers of Bâlgarčevo II another interesting find was established - the chick pea (*Cicer arietinum*, Fig. 4). In Bulgarian prehistory the finds of chick pea are relatively rare, up to now. The two previous finds of chick pea come from Galabnik III and from the second half of the Early Neolithic of Kapitan Dimitrievo (Marinova 2006). This third find shows that this Mediterranean crop probably played a more substantial role in the Bulgarian Neolithic than previously assumed (Marinova/Popova 2008). This crop appears during the Neolithic in Thessaly (Kroll 1991). At present there is no evidence of chickpea it from the Starcevo culture but this could be connected to the state of reserach and not necessarily to a lack of it.

In the storages and flotation samples many wild plant species were found which could be weeds. Most of them are common for the Bulgarian prehistoric period.

Almost the whole spectrum of collected wild plants characteristic for the region are present. Most abundant are fragments of stones of cornelian cherry (*Cornus mas*). Fragments of wild wine (*Vitis vinifera* ssp. *sylvestris*), together with this of plums (*Prunus* sp.) and apple/pear (*Malus/Pyrus*) show the use of the riverine forests.

Also strawberry (*Fragaria vesca*) and blackberry/raspberry (*Rubus* sp.) were collected.

Anthracological analysis

The wood charcoal record found in Bâlgarčevo is dominated by oak (*Quercus* sp.). This is the most abundant tree species in the area and it dominated the natural vegetation. Apart from this oak delivers very valuable building wood. It should be mentioned in this context that at Bâlgarčevo as well as at the most other prehistoric sites, almost all of the posts were made of oak.

It is interesting to notice that although fruits of hazel (*Corylus avellana*) are quite frequent no wood of this bush was identified. This could be due to the small number of samples or to the fact that the inhabitants of Bâlgarčevo collected the fruits from some distance away. However close to the site, wood of other trees which could replace the use of hazel twigs was available. For wattle the wood of cornelian cherry and willow could be used. Both are quite frequent in the wood charcoal samples from the site. In general many of the wood species growing in the riverine forests are present in the wood charcoal record: *Salix/Populus, Fraxinus, Ulmus,* Prunoideae etc.

In some of the samples wood of juniper (*Juniperus* sp.) occurs. This plant grows in light places where no forests are developed and can probably be considered as an indicator for the opening of the oak forests for some pasture activities or natural occurence of patches of open vegetation.

In the samples from Bâlgarčevo some wood of pine – most probably black pine (*Pinus nigra*) – was found. This points to the availability of sub-Mediterranean black pine forests in the area and obviously – as in other parts of the country – they were eradicated by the human action in recent times.

Analysis of daub materials

The plant material found in the daub fragments consists mainly of chaff and straw used for tempering. These are mostly imprints of different chaff parts – in a few cases also mineralised chaff material was also preserved inside. Good material for analysis was available especially in the daub fragments from the walls (Fig. 5, A.B). It seems that there the concentration of chaff tempering

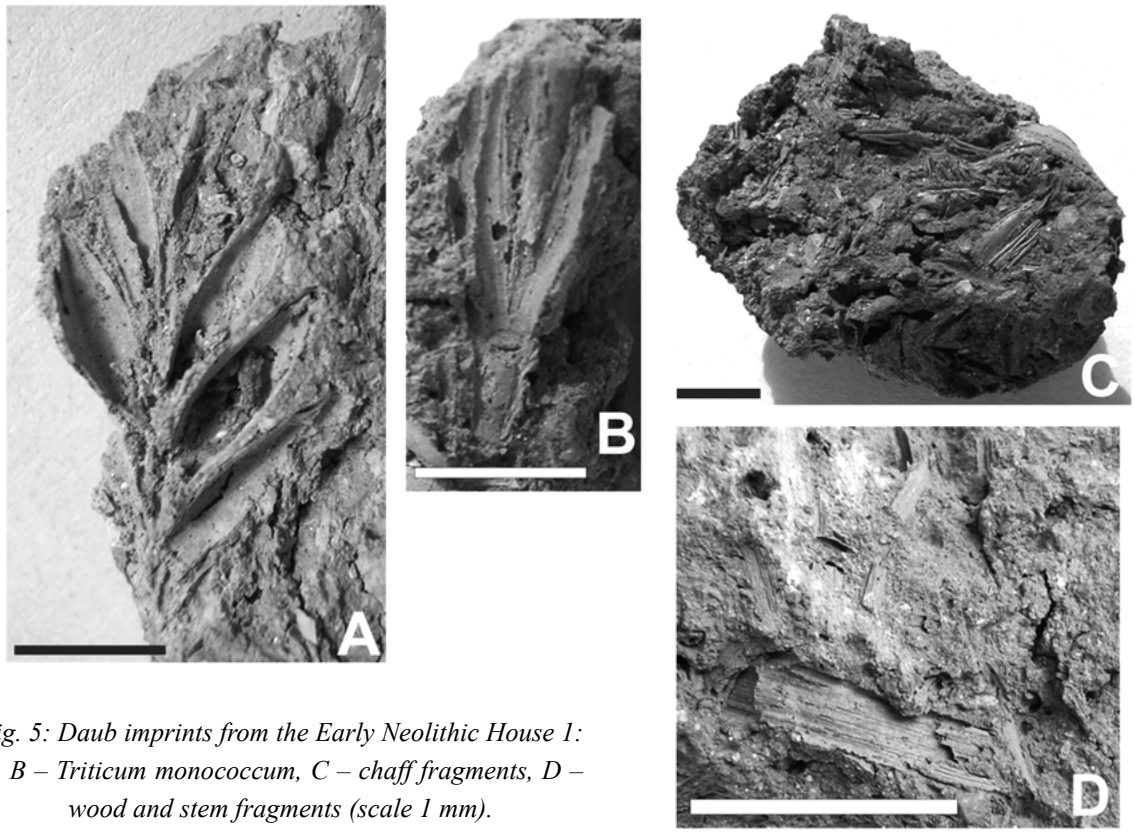

Fig. 5: Daub imprints from the Early Neolithic House 1: A, B – Triticum monococcum, C – chaff fragments, D – wood and stem fragments (scale 1 mm).

material was higher, probably due to making the walls lighter. Higher chaff content corresponds to a higher air content of the building material and provides better insulation of the house. In the walls, most of the identifiable imprints and many whole spikelets and ears of hulled wheats were found. Fragmentary leaf imprints of deciduous trees were also present in the walls. They were not further identifiable. Such leaf imprints could originate from twigs forming the wattle construction. In some of the studied daub fragments the wooden building elements like posts, beams and woodwork were also observed as imprints. As they are only imprints and wooden structure was preserved no identification was not possible. The studied daub fragments from the floors were much more compact and richer in coarser clay and sand, than those from the walls. They had far less plant tempering material or this material had undergone stronger destruction (Fig. 5, C; Tab. 3). In the base of an oven mainly wood and straw imprints were identified (Fig. 5, D) and it seems that almost no chaff was used there. This could be explained with the special function of this structure. The wood and chaff imprints were concentrated in the bottom of the oven base and probably represent some supporting structures on which the oven was built.

The taxonomic composition of the materials found, is dominated by hulled wheats. Most of the imprint fragments could not be identified to species level. Only in some cases due to excellent preservation ears of einkorn (Fig. 5, A) and spikelets of both einkorn and emmer were observed. From the imprints identified to species level einkorn (*Triticum monococcum*, Tab. 3) slightly prevails. This result does not coincide with the results of the analysis of charred seeds and fruits from the period Bâlgarčevo I where emmer is the prevailing wheat. Probably the tougher chaff of the einkorn was preferably used for tempering of the daub, but it should not be disregarded that the charred material and imprints represent different preservation conditions and taphonomy. It should be stressed that only a small area and quantity of sediments of the site were studied archaeobotanically (see Methods and materials) and hence the results should be interpreted with caution. As in the analysis of charred plant material in the study of plant imprints on daub specimens of barley were also identified. The cereal stems originate most probably from the cultivated cereals. Regardless if the harvest was mainly performed with sickles or done by ear plucking, the availability of straw shows that this valuable raw material was also used and included in the tempering material.

Conclusions

The site Bâlgarčevo gives the opportunity to investigate the development of the Neolithic agriculture and land use in the transition between the Early and Middle Neolithic in Southwest Bulgaria.

The principal crops were hulled wheats – emmer and einkorn. Pulses also played a quite important role – especially the pea and lentils. The find of chick pea (*Cicer arietinum*) shows this crop in a new light. It was obviously much more widely used than formerly thought in the Bulgarian Neolithic.

Wood charcoal shows the wide use of dominating oak forests and together with this the use of a variety of habitats around the site. The wood of juniper in some samples shows that the forests were already open. The existence of Sub-Mediterranean black pine forests in the area is suggested by finds of black pine wood.

The riverine forests provided a wide range of wood and other plant resources – from there originate the remains of fruits of wild wine, apple/pear and plums.

The plant material found shows a wide range of cultivation and use of the vegetation resources at the site.

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Apendix

Tab. 1.1: Results of the archaeobotanical analysis of the Neolithic of Balgarcevo (*-marks flotation samples; G - grain; S - glume basis; Rf - rachis fragment, if nothing indicated seed/fruit remains).

Sample №	13	19	20	21	22	29	30	32	33	34*	35*
	Early Neolithic										
Bâlgarčevo period	IA	IA	I	IA	IA	IA	I	I	I	IA	IA
Cereal crops											
Triticum monococcum (G)	71	19	.	.	38	.	.	.	.	4	4
T. monococcum (S)	18	.	.	.	.	.	.	.	.	7	9
T. dicoccum (G)	224	34	.	.	19	.	.	.	.	3	5
T. dicoccum (S)	47	.	.	.	.	.	.	.	.	11	7
T. aestivum/durum (G)	.	.	.	.	.	.	.	.	.	.	.
T. aestivum/durum (Rf)	.	.	.	.	.	.	.	.	.	1	2
Triticum sp. (G)	182	.	.	.	9	.	.	.	.	19	14
Triticum sp. (S)	61	.	.	.	.	.	.	.	.	14	10
Hordeum vulgare (G)	27	.	.	.	.	.	.	.	.	.	8
H. vulgare (Rf)	.	.	.	.	.	.	.	.	.	4	2
Leguminous											
Pisum sativum	163	15	.	.	164	.	.	.	.	5	11
Lens culinaris	27	.	.	.	237	.	.	.	.	2	6
Vicia ervilia	2	.	.	.	.	.	.	.	.	.	.
Collected fruits											
Cornus mas	.	.	.	.	1	.	.	.	.	.	.
Prunus sp.	.	.	.	.	.	.	.	.	.	.	1
Malus/Pyrus	.	.	.	.	.	.	.	.	.	1	.
Vitis sylvestris	.	.	.	.	.	.	.	.	.	1	.
Potential weeds and others											
Bromus sp.	.	.	.	.	.	.	.	.	.	2	.
Chenopodium album	.	.	.	.	3	.	.	.	.	3	6
Coronilla sp.	3	.	.	.	.	.	.	.	.	.	.
Fumaria sp.	.	.	.	.	.	.	.	.	.	.	2
Gallium sp.	2	.	.	.	1	.	.	.	.	1	.
Medicago sp.	1	.	.	.	.	.	.	.	.	.	.
Polycnemum arvense	.	.	.	.	.	.	.	.	.	3	.
Polygonum convolvulus	5	.	.	.	.	.	.	.	.	2	.
Setaria verticillata/viridis	6	.	.	.	4	.	.	.	.	4	.
Teucrium chamaedrys	8	.	.	.	.	.	.	.	.	.	.
Trifolium sp.	.	.	.	.	.	.	.	.	.	1	.
Wood charcoal											
Quercus	8	.	18	5	.	9	23	.	14	8	.
Ulmus	.	.	.	.	.	.	.	4	37	.	.
Fraxinus	.	.	.	.	.	.	4	.	1	.	.
Rosaceae-Maloideae	.	.	7	.	.	.	.	.	3	.	.
Rosaceae-Prunoideae	2	.	3	.	.	.	5	.	.	3	.
Cornus	.	.	5	.	.	.	.	.	1	2	.
Salix/Populus	.	.	4	.	.	.	12	.	.	.	.
Carpinus/Ostrya	.	.	23	.	.	.	.	.	.	.	.

Specification of the samples

Sample No.	Levelling	Square	Description	Taken at:
13	VII	VI-E	pit near S-profile	28.07.1986
19	VIII	10-E	N-ditch, mud bricks	05.08.1986
20	VIII	9-C	NW-part	19.07.1987
21	VII	8-B	trench with post holes, 40 cm depth	28.07.1986
22	VII		House 1, object №8	10.07.1987
29	VI-VII	VI-D	post hole	26.08.1985
30	VII	V-D	pit	22.08.1985
32	VII	V-D	E part	07.09.1985
33	VII	V-D	W part	23.08.1985
34*			S-profile	20.10.2004
35*			S-profile, wooden floor	20.10.2004

Tab. 1.2: Results of the archaeobotanical analysis of the Neolithic of Balgarcevo (*-marks flotation samples; G - grain; S - glume basis; Rf - rachis fragment, if nothing indicated seed/fruit remains).

Sample №	1	3	4	5	6	10	11	16	17	18	24	26	27	28	36*
	Final Early Neolithic														
Bâlgarčevo period	I	I	I	IB	IB	IB	IB	I	I	IB	IB	IB	I	I	IB
Cereal crops															
Triticum monococcum (G)	42	12	.	29	.	.	.	3	12	8	7	.	49	.	7
T. monococcum (S)	.	.	.	3	.	.	.	.	5	.	11	.	7	.	13
T. dicoccum (G)	58	29	.	47	.	.	.	11	49	.	21	.	63	28	6
T. dicoccum (S)	.	.	.	8	.	.	.	.	13	.	17	.	15	.	8
Triticum sp. (G)	.	.	+	22	+	.	.	.	.	.	32	.	48	4	2
Triticum sp. (S)	.	.	+	19	+	.	.	.	.	.	9	.	37	7	9
Hordeum vulgare (G)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Leguminous															
Pisum sativum	561	317	.	.	.	.	.	179	4	87	.	.	.	.	5
Lens culinaris	7	.	.	.	.	.	.	.	1	2	.	.	.	.	13
Collected fruits															
Cornus mas	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Corylus avellana	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Prunus sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Rubus idaeus s.l.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Vitis sylvestris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Potential weeds and others															
Bromus sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Chenopodium album	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Festuca/Lolium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Gallium sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Malva sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Polycnemum arvense	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4
Polygonum convolvulus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Setaria verticillata/viridis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5
Trifolium sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Wood charcoal															
Quercus	.	.	.	.	.	15	37	.	.	.	.	11	.	.	17
Ulmus	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.
Rosaceae-Maloideae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Rosaceae-Prunoideae	.	.	.	.	.	6	.	.	.	.	.	.	.	.	.
Cornus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5
Carpinus/Ostrya	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.

Specification of the samples

Sample No.	Levelling	Square	Description	Taken at:
1	VII	10-E	House 1	08.06.1985
3	VII	10-E	House 1, first stage, W-part	21.08.1986
4	VII	9-E	House 1, S-part, destructions, pit	04.08.1986
5	VI-VII	V-5	under stones, central part of square	05.08.1986
6	VII	9-E	House 1, E 2,10 N 2,10	04.08.1986
10	VII	V-D	post hole	04.08.1986
11	VII	VI-E	post hole, E part of square	28.07.1986
16	VIII	9-E	House 1	04.07.1986
17	VIII	10-E	House 1	15.08.1986
18		9-D	House 1, N-ditch, pit near S-profile	30.07.1986
24		9-E	House 1, S-part, pit, in destructions	04.08.1986
26	VII	VII-E	the base of W-profile	02.09.1985
27	VII	V-C	pit 5	27.08.1985
28	VII	10-E	pit, W-profile	28.07.1986
36*		VII-F	W-profile	02.10.2004

Tab. 1.3: Results of the archaeobotanical analysis of the Neolithic of Balgarcevo (*-marks flotation samples; G - grain; S - glume basis; Rf - rachis fragment, if nothing indicated seed/fruit remains).

Sample №	2	7	8	9	12	23	25	31	37*	38*	14	15
	Middle Neolithic										**Middle/Late N.**	
Bâlgarčevo period	II	II	II	II	II	II	II	II	II	II	II-III	II-III
Cereal crops												
Triticum monococcum (G)	.	.	18	.	42	.	19	.	4	5	72	34
T. monococcum (S)	.	.	.	.	.	.	.	.	6	7	15	6
T. dicoccum (G)	.	.	54	.	.	.	22	.	2	6	29	.
T. dicoccum (S)	.	.	.	.	.	.	.	.	4	8	5	.
Triticum sp. (G)	.	.	.	.	14	+	.	.	5	2	18	8
Triticum sp. (S)	.	.	.	.	6	+	.	.	8	9	9	11
Hordeum vulgare (G)	.	.	.	.	.	.	.	.	.	5	.	.
H. vulgare (Rf)	.	.	.	.	.	.	.	.	2	2	.	.
H. vulgare var. vulgare (G)	.	.	.	.	.	.	.	.	.	1	.	.
Leguminous												
Pisum sativum	.	.	.	.	.	.	46	.	5	16	.	47
Lens culinaris	.	.	.	.	.	.	5	.	12	3	.	.
Vicia ervilia	.	.	.	.	.	.	.	.	.	4	.	.
Cicer arietinum	.	.	.	.	.	.	1	.	2	6	.	.
Collected fruits												
Cornus mas	.	.	.	.	.	.	.	.	2	.	.	.
Rubus idaeus s.l.	.	.	.	.	.	.	.	.	2	.	.	.
Malus/Pyrus	.	.	.	.	.	.	.	.	.	2	.	.
Vitis sylvestris	.	.	.	.	.	.	.	.	.	1	.	.
Fragaria vesca	.	.	.	.	.	.	.	.	3	.	.	.
Potential weeds and others												
Bromus sp.	.	.	.	.	.	.	.	.	.	.	.	.
Chenopodium album	.	.	.	.	.	.	.	.	3	1	.	.
Festuca/Lolium	.	.	.	.	.	.	.	.	2	.	.	.
Gallium sp.	.	.	.	.	.	.	.	.	.	2	.	.
Phleum sp.	.	.	.	.	.	.	.	.	1	1	.	.
Polygonum convolvulus	.	.	.	.	.	.	.	.	.	1	.	.
Rumex sp.	.	.	.	.	.	.	.	.	1	.	.	.
Setaria verticillata/viridis	.	.	.	.	.	.	.	.	.	9	.	.
Vicia tetrasperma/hirsuta	.	.	.	.	.	.	.	.	.	2	.	.
Wood charcoal												
Quercus	11	6	.	9	.	.	.	7	14	17	.	.
Ulmus	.	3	.	1	.	.	.	2	5	4	.	.
Fraxinus	.	12	.	.	.	.	.	.	3	.	.	.
Rosaceae-Maloideae	.	2	.	.	.	.	.	.	.	.	.	.
Rosaceae-Prunoideae	.	.	.	.	.	.	.	.	.	4	.	.
Cornus	5	.	.	.	.	.	.	.	2	.	.	.
Salix/Populus	.	.	.	.	.	.	.	.	.	1	.	.
Juniperus	.	.	.	.	.	.	.	.	8	2	.	.
Pinus cf. *nigra*	.	.	.	.	.	.	.	.	.	4	.	.
indet.	.	.	.	.	.	.	.	.	5	2	.	.

Specification of the samples

Sample No.	Levelling	Square	Description	Taken at:
2	VII		House 4, post hole	
7	VII	V-F	bottom of pit	23.07.1986
8	VII	IV-F	near SW post	23.07.1986
9	VII	VII-D	SE part	24.07.1986
12	VII	IV-D,V-D IV-C,V-C		20.08.1986
23	VII		House 1, object 4a	09.06.1985
25	VIII	8-D	House 4	01.08.1985
31	VI-VII	VI F	N sector, big pit	23.08.1985
37*			S-profile	20.10.2004
38*		VII-F	W-profile	20.10.2004
14	VII	IV-F	S-part of square	23.07.1986
15	VII	IV-F	pit, E-part of square	23.07.1986