# Aegean - Marmara - Black Sea: the Present State of Research on the Early Neolithic

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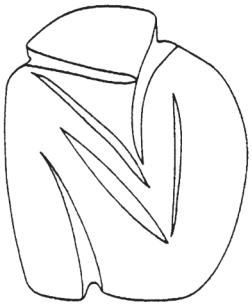

# Content

# Archaeobotanical studies of the Bulgarian Neolithic. The current state of research and perspectives for future studies

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## Introduction

Bulgaria is situated on the route of the spread of Neolithic agriculture into Europe. This allows us to observe the transition and adaptation of the Near Eastern agriculture to European conditions. The territory of present-day Bulgaria is an area where Atlantic, Mediterranean and continental climate and vegetation meet. Under these manifold environmental conditions the first agriculture was introduced to South-East Europe in the 7th millennium BC and a more intense interaction of human population and vegetation started. This was connected with the introduction of new technological activities: forest clearance, crop cultivation, collecting of wild plant resources etc. which have left traces in the settlement layers and in some waterlogged sediments around the sites. This archaeobotanical record could help us to understand better the spread of Neolithic agriculture, its development, and the role, which it played for the Neolithic economy and its connections with other regions.

The aim of this paper is to assess the results of some recent archaeobotanical studies of the Bulgarian Neolithic sites together with the available data from previous studies. It is also to further evaluate and summarize the archaeobotanical information, which has already been published and to point out the perspectives for future studies in this interdisciplinary field of science, in the region of Bulgaria.

## Sources of archaeobotanical information for the Bulgarian Neolithic

The data which could give us the natural sciences for an archaeological site could be categorized as "on site" data which is collected from the site's cultural layers and "off-site" data which come from the site's surroundings or other sources[1].

The archaeobotanical "off site" data, which is provided by pollen analysis, are of particular importance. Due to the dry continental climatic conditions in Bulgaria most of the places suitable for pollen analyses are situated in the mountains, where the anthropogenic impact started much later than in the lowlands. In most of the (studied) pollen diagrams from Bulgaria, the anthropogenic changes are noticeable since the Late Chalcolithic/Bronze Age[2]. The reason for this is, as mentioned above, that no appropriate sediments for palynological investigation exist near the Neolithic sites. Another reason might be the small scale of the Neolithic exploitation of the plant recourses[3]. Exceptions for this are the studies of the lakes Varna[4] and Durankulak[5] on the Black Sea coast and the study of Mire Kupena[6] in the Rhodope Mountains. There, some pasture activities are noticeable in the pollen record from the late Neolithic.

The archaeobotanical "on site" data can be any plant material found in the settlement layers. In Bulgaria these are usually plant macrofossils such as seeds, fruits, wood etc. Such data exist on many Bulgarian Neolithic sites. These are the main sources for archaeobotanical data for the Neolithic in the region and they will be the main focus of this paper. This plant material originates from the daily human activities on the site and it therefore gives direct information about those plants, which were mainly cultivated, collected and used on site. The plant material also gives indirect information about the anthropogenic change of the vegetation.

The continental climate in the area determines the dry preservation conditions on most of the sites. The layers are exposed to atmospheric oxygen, temperature and moisture fluctuations so that no organic material could be conserved. In such conditions the plant remains are preserved carbonized and mineralized when phosphoric enrichment was available. Only a few Bulgarian sites (Gălăbnik, Ezero) with layers below the water level provide waterlogged plant remains.

*Fig. 1* shows the locations of the Neolithic sites with studies of plant macrofossils that are considered in this paper. The information about the main established crop plants from all the sites is summarized in *tab. 1*. The partition of this region is according to

1 Kreuz 1995.

2 Atanassova 1995, Božilova/Stefanova 1995; Lazarova/Božilova 2001; Filipovich/Stefanova 1998.

3 Willis/Bennet 1997.

4 Božilova/Beug 1994.

5 Božilova/Tonkov 1998.

6 Huttunen et al. 1992.

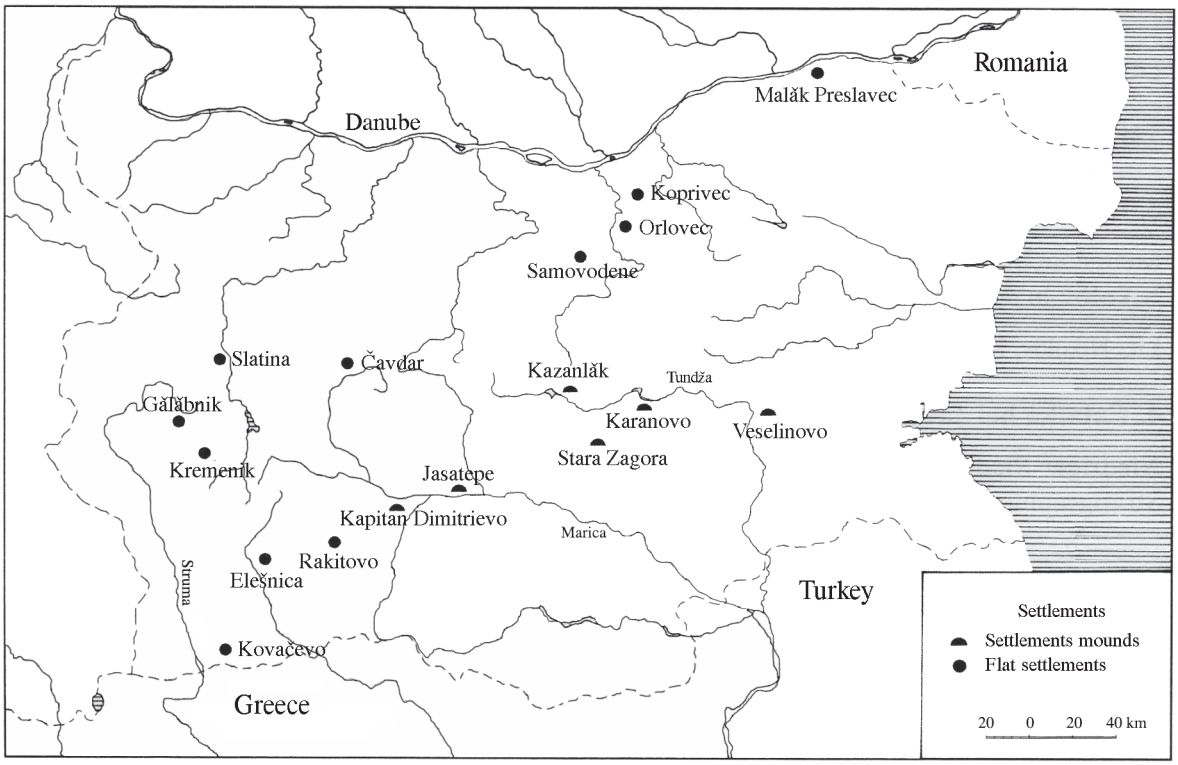


*Fig. 1. Map of Bulgaria with the sites mentioned in this article (after Nikolov 2002)*

H. Todorova, I. Vajsov[7] and V. Nikolov[8], which divide the territory of Bulgaria in four zones: North-West Bulgaria, North-East Bulgaria, Struma Valley (South-West Bulgaria) and Thrace (South-East Bulgaria). The different zones of the country are studied to a different extend. Most of the archaeobotanically studied Bulgarian Neolithic sites are situated in the south of Bulgaria and especially in the Thracian Plain. From the north-eastern part of Bulgaria, although archaeobotanical data is available from seven sites, there is only little information available and only some preliminary results have been published. So far almost no reliable information exists from the north-western part of Bulgaria.

In most cases, archaeobotanical studies in Bulgaria are analyses of chance finds of storage sites. Such data provide relatively fragmentary information, because they represent an isolated activity. However, they could be used as sources for evidence about cultivated plants and crop husbandry practices. In many cases, especially in the earlier studies, the plant material was collected from the storage contexts and no flotation sampling was used. This restricts the information as well, because many small plant remains could not be recovered. The sites where flotation sampling was applied are marked with "#" on *tab. 1* and those where only plant imprints were studied are marked with "$". More data could be obtained through flotation sampling, which allows for the retrieval of various plant remains, which were accumulated during the existence of the cultural layer. Systematical archae-obotanical sampling study of many flotation samples from different archaeological contexts was carried out on only a few of the sites. Such sites are Kovačevo, Čavdar, Kazanlăk, Slatina, Kapitan Dimitrievo and Karanovo.

There is also archaeobotanical information from 17 Early Neolithic and nine Late Neolithic sites. Of the nine Late Neolithic sites from two sites only the archaeobotanical evidence only from plant imprints (a much-restricted source of information) is studied and of four other sites only storage contexts were investigated. That means that the Early Neolithic is much better studied than the Late Neolithic. Continuous archaeobotanical studies of all of the existing layers have only been carried out on a few sites.

In this paper only publications with unambiguous and detailed dated archaeobotanical material were considered.

7 Todorova/Vajsov 1993.
8 Nikolov 1998.

## Early Neolithic

All of the cultivated plants known from the first half of the Neolithic in Bulgaria were found on sites considered in this paper. The hulled wheat (emmer and einkorn), being typical for the prehistoric agriculture, are well presented at the sites and they are the most numerous finds in the Neolithic settlements in the storage contexts as well as in the flotation samples. Usually both kinds of hulled wheat were found together in the storage contexts, which indicates that they were sown together. They were the most important crop plants in the area under study as well as in Anatolia and Thessaly. These staple crops reach Central Europe and are also the most important crops of the LBK.

There are some regional and chronological differences in one or the other of the hulled wheat prevailing, but because of the small number of studied samples and sites it is difficult to establish clear tendencies. It seems that environmental conditions (temperature, soil, water supply, etc.) are the main reasons for the prevailing of emmer or einkorn. The einkorn is much more resistant to unfavorable environmental conditions. Einkorn prevails on some sites, which are situated in about 600-700 m altitude (Kremenik, Elešnica) with less advantageous conditions compared to Thrace. Another reason could be the less fertile light and stony soils, which predominate near the sites of Kapitan Dimitrievo and Poljanica Platoto where also einkorn was the main cereal crop during the Neolithic. In most of the Early Neolithic sites in Thrace however emmer is prevailing.

There are many records of naked wheat from the Bulgarian Neolithic. Some of them are from storage contexts, which indicate their cultivation. Based on grain finds they are identified by most of the earlier authors as *Triticum aestivum* s.l., which means hexaploidic naked wheat. Concerning new archaeobotanical concepts, the hexaploidic naked wheat could not be identified with certainty. Paying attention to the morphological characteristics of the grains, the rachis internods of the ears are necessary[9]. The recently found rachis internod fragments of naked wheat in Kovačevo, Karanovo and Kapitan Dimitrievo[10] can throw light on the question from which type the naked wheat were in Bulgaria. They all have the morphological features of hexaploidic naked wheat. Most likely this was the prevailing naked wheat during the Neolithic period of Bulgaria. This wheat is nowadays economically the most important wheat species in the world and does not have a wild hexaploidic progenitor in nature[11]. Together with Servia[12] in North Greece these finds are one of the earliest evidence of hexaploidic naked wheat in the region.

Another element of the Neolithic crop assemblage is barley. There are records of it in all of the sites but usually in smaller quantities than the hulled wheat. At sites where quantitative estimation was possible, the proportions of barley to hulled wheat vary from 1:3 to 1:6. Considering its nutrition qualities, wheat was most likely preferred to barley. The latter is more resistant to bad climatic conditions and might have been sown in addition in case the wheat harvest failed. Although both the hulled and naked forms of barley are present since the beginning of the Neolithic, it seems that the hulled barley played a bigger role during the Early Neolithic in comparison to the later periods. This is especially valid for western Bulgaria.

Another important groups of cultivated plants, which are used during the Neolithic, are pulses. During the Early Neolithic lentil, pea, bitter vetch and grass pea were sown as evidence in storage contexts show. It should be mentioned that in the roots of all these plants nitrogen fixation takes place, which can improve the soil nutrition quality after their cultivation. However still with modern archaeobotany methods it is not yet possible to prove if Neolithic farmers knew this. In the storage contexts found in Early Neolithic houses pulses are about 20-30 % of all of the stored crops. In the flotation samples of Kovačevo, Slatina, Kapitan Dimitrievo and Karanovo it seems that the legumes are more numerous in the Early Neolithic layers than in the Late Neolithic ones.

The grass pea (*Lathyrus sativus/cicera*, *fig. 2*) is typical mainly for the Early Neolithic and from this period are the majority of finds of it from the Bulgarian prehistory. The grass pea is very resistant to dryness and can cope with poor soil quality. Pulses also

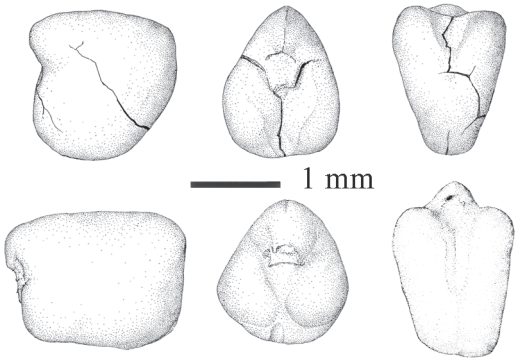


*Fig. 2. Kapitan Dimitrievo (Early Neolithic). Grass pea (Lathyrus stivus/cicera)*

9 Jacomet/Kreuz 1999.
10 Marinova, forthcoming.
11 Zohary/Hopf 1994.
12 Hubbard/Housley 2001.

| | Early Neolithic 1 6000-5650 cal BC | | | | | | | | Early Neolithic 2 5650-5450 cal BC | | | | | | | | | | Middl.Neol. | | | Late Neolithic 5450-4900 cal BC | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | South BG | | | | N BG | | | | South BG | | | | | | | | | N | S BG | | N | South BG | | | | | | North BG | | |
| | SW | | | Thr. | NE | | | | SW | | | | | Thrace | | | | NE | Thrace | | NE | Thrace | | | | | | NE | | |
| | # | | # | # | # | $ | # | # | # | # | # | | # | # | | | # | # | # | | # | # | # | | # | | | $ | $ | # |
| | Gălăbnik | Slatina * | Eleshnica | Kovačevo | Karanovo | Poljanica Platoto | Koprivec | Orlovec | Slatina | Kovačevo | Čavdar* | Rakitovo* | Kremenik | Kap. Dimitrievo* | Azmak* | Okrazna bolnica | Karanovo | Mălăk Preslavec | Karanovo | Kazanlăk | Samovodene | Kap. Dimitrievo | Kazanlăk | Azmak | Karanovo* | Vesselinovo* | Yassa tepe | Podgorica | Drinovo | Samovodene |
| **Cultivated plants** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Einkorn | X | X,v | X | X | X | X | X | X | X | X | X,v | X | X,v | X,v | X | X,v | X,v | X | X | X,v | X | X | X | | X, v | | | X | X | X |
| Emmer | X | X,v | X | X | X,v | X | X | X | X | X | X,v | X,v | X | X,v | X,v | X,v | X,v | | X | X,v | X | X | X | X,v | X, v | X, v | | | X | X | X,v |
| Nacked wheat | X | X,v | X | X | X | | | | X | X | X | X ? | | X | X,v | | X | | X | | | X | X | | X | | | | X | |
| T. aestivum (rachis) | | | | X | | | | | | X | | | | X | | | | | X | | | X | | | X | | | | | |
| Barley | | X,v | X | X | X | X | X | X | X | | X,v | | | X | | | X | | X | | X | X | X | | X | | | | | |
| Hulled bardey | | | X | X | X | | | X | | X | | X,v | | X,v | X | | X | | X | | | X | | | X | | | X | | X,v |
| Naked barley | | | X | X | | | | X | | X | | X,v | X | X,v | X | X,v | | X | X | X | X | X | | | X,v | | X,v | X | X | |
| Lentil | X | X | X | X | X | | X | X | X | X | X | | | X | X | | X | X | X | | X | X | X | | X,v | | X,v | | | X |
| Bitter vetch | | | X | | X | | | | X | | | | | X | | | X | | X | | | X | X | X,v | X,v | | X,v | | | X |
| Pea | X | X | X | X | X | | X | X | X | X | X,v | | | X,v | X,v | | | X | X | | | X | X | X,v | X,v | | | | | |
| Grass pea | X | X,v | X | X | X | | | | X | X | | | | X,v | X,v | | X | | X | | | X | | | X,v | | | | | X |
| Cicer arietinum | X,v | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | |
| Flax | | X | | | | | | | X | | X | | | X,v | | | | | X | | | | X | | X | | | | | |

*Tab 1. Crop plants found in the Bulgarian Neolithic sites*

***X*** *– availiable in the site* ***X,v*** *– availiable in storages* *X – prevailing*

*Gălăbnik: Marinova et al. 2002; Slatina: Dontcheva 1990; Marinova, forthcoming; Elešnica: Dontcheva, unpublished; Kovačevo: Marinova, forthcoming; Azmak: Hopf 1973; Karanovo: Arnaudov 1938; Hopf 1973; Thanheiser 1997; Marinova, forthcoming; Poljanica Platoto: Hopf 1988; Koprivec, Orlovec: Marinova, unpublished; Čavdar: Hopf 1973; Dennel 1978; Rakitovo: Tchakalova/Božilova 2002; Kremenik (Sapareva Banja): Čakalova/Sarbinska 1986; Kapitan Dimitrievo (Banjata): Marinova, forthcoming; Malăk Preslavec: Panayotov et al. 1992; Kazanlăk: Hopf 1973; Dennel 1978; Veselinovo: Arnaudov 1936; Yassa Tepe: Hopf 1973; Podgorica, Drinovo: Popova 1995; Samovodene: Marinova, unpublished*

have a high content of proteins (25-29 %). Probably because of these advantages it was used during the establishing of agriculture during the Early Neolithic. Although it also contains the poisonous neurotoxin *lathyrin* which could be avoided be soaking the seeds in water.

A find of a leguminous crop plant, which confirms the connection with the Near East is chickpea (*Cicer arietinu*, *fig. 3*) identified at two Early Neolithic sites: Gălăbnik and Kapitan Dimitrievo. Chickpea, together with other crop plants of Bulgarian Neolithic sites like emmer, einkorn, barley etc., belongs to the typical Early Neolithic grain crop assemblage of the Near East[13]. So far it has not been recorded in other prehistoric periods in Bulgaria and probably it played no significant role in crop husbandry. Chickpea is a crop plant adapted to subtropical and Mediterranean climate and possibly it did not find favorable conditions in Bulgaria where the climate is sub Mediterranean to transitional continental.

Together with plant cultivation wild plant resources were widely used. This proves a profound knowledge of wild plant resources by the Neolithic population. The most abundant collected plant in the sites is the cornelian cherry (*Cornus mas*), a helophilous bush encouraged in its spreading by the forest degradation. Its fruits are rich in vitamin C. Frequently elder, plums, blackberries and raspberries are also found. In addition wild vine seeds were also recorded on many of these sites. In some cases also physalis (*Physalis alkekengi*) occurs. Like the vine, physalis is a liana, which grows in the river forest predominantly in the southern parts of the country. In the material from Karanovo and Kapitan Dimitrievo red dogwood and strawberries are recorded. In Kovačevo and Kapitan Dimitrievo also the stones of the Sub-Mediterranean bush terebinth (*Pistacia terebrinthus*) are available in the archaeobotanical record. The terebrinth has rich in oils stones (30-40 %) and in antiquity it was used for obtaining oil for lamps[14].

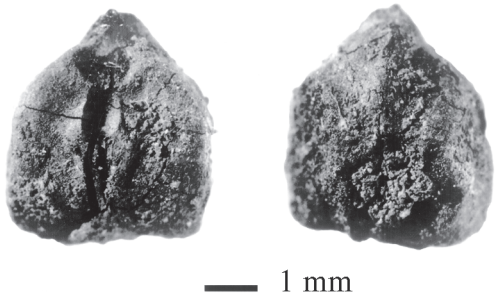


*Fig. 3. Kapitan Dimitrievo (Early Neolithic). Chick pea (Cicer arietinum)*

[13] Zohary/Hopf 1994.
[14] Stojanov/Kitanov 1963.

## Late Neolithic

Most of the tendencies observed during the Early Neolithic continue during the Late Neolithic. The main cultivated cereals are hulled wheat. Of the barley the naked form prevails. With pulses grass pea loses its importance and bitter vetch becomes more significant. Lentil continues to be well represented in the same way as during the Early Neolithic.

An interesting example shows the storage contexts of a house in Tell Karanovo from the late Neolithic. Whole ears of emmer (*Triticum dicoccum*, *fig. 4, left*) and – in smaller quantities – einkorn were discovered. Together with the ears also the stems of the crop are available *(fig. 4, right)*. In addition to food the straw could be used as a valuable raw material for building, matting, animal feed etc. Most likely these finds represent the fact that the crop was stored in the house as whole sheaves. The storing of the unthreshed hulled wheat prevented their spoiling and kept the seeds fertile for the next sowing. Similar finds of whole ears or unthreshed cereal crops (disarticulated to spikelets) are recorded at the sites marked with "*" in *tab. 1*. This seems to be a common practice in the considered period.

In the storage contexts and in the flotation samples many plants were found which could be considered as weeds or potential weeds (not directly connected with storage). Most of the weeds connected with wheat storage are typical today for winter crops. Considering the climatic conditions in the area as well as the fact that wheat sown in winter delivers a bigger harvest than spring sown ones, it could be assumed that during the Neolithic wheat was sown predominantly in winter. Many of the weeds are characteristic for light soil. Such soil coincides well with the agricultural techniques used during this period. Some of the weed species found grow on nutritious soil. In the Late Neolithic an increase of the weeds which thrive on light acidic soil – maybe due to the advanced soil exhaustion connected with a more intensive farming – is noticeable. Many of the weeds are archaeophytes, which were introduced to the Bulgarian flora during prehistoric times. Most of the archaeophytes established during the Bulgarian Neolithic are mainly distributed in the Mediterranean and Near East.

The first evidence for coriander in Bulgarian prehistory is recorded in the Late Neolithic layers of Tell Kapitan Dimitrievo (*Coriandrum sativum*, *fig. 5*). It is a plant, which has its natural distribution in the eastern Mediterranean area. In Bulgaria the coriander is spread only in secondary plant societies developed under anthropogenic influence. Soon after the influ-

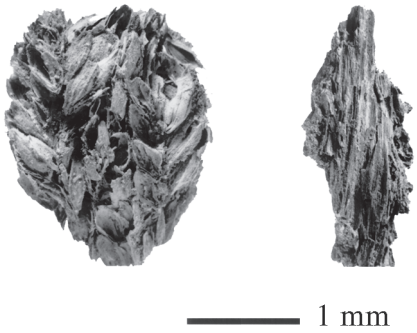


*Fig. 4. Karanovo (Late Neolithic). Left: Emmer wheat (Triticum dicoccum) ears; right: Emmer wheat (Triticum dicoccum) steams*

ence had stopped its savaged form disappears from nature. This means this plant thrives in Bulgaria only through human impact and it was therefore introduced in the region during the Late Neolithic.

## Conclusions

The considered period in the area of modern Bulgaria is studied archaeobotanically relatively fragmentary. It is well investigated in Thrace but almost no information is available from the north-western part of the country. The differences between regions of Bulgaria and the periods seem to be more in the quantitative proportions of the crops, than in the principal composition of the cultivated crops. In some cases these differences reflect the insufficient data rather than real discrepancies.

The main cultivated plants were the hulled wheat (emmer and einkorn), with emmer prevailing. Predominantly they were sown together. The storage in the houses shows that the cereals were kept in an unthreshed state. The weeds indicate a harvest close to the ground. The prevailing sowing time was autumn and the fields had light sandy soil with good nutrition supply.

Sediments suitable for palynological studies, which could give a better idea about the past vegetation development in the lowlands of Bulgaria are still not found. Because of this only the plant macrofossils found in the archaeological layers can be used as a source for information. The studied plant material indicates various uses and change of the vegetation during the considered period. The numerous and plentiful crop storage contexts suggest the clearance of considerable areas for cultivation. Except of cultivated fields around the sites dry grassy areas, lightened forests and shrubs were developed and extended. The agrimony found in the sites could be used as indicator for this. The agrimony is a plant, which grows in grassy locations and meadows and could be transported to the site by grassing animals – sheep, goat etc. Dover, milk vetch, knapweed and dwarf elder. Hazel and cornel are also present in the samples and belong to the natural vegetation. They usually grow in great numbers in the forests lightened by human activities. Their frequency in the studied material could be considered as an indication for some disturbance in the surrounding forests.

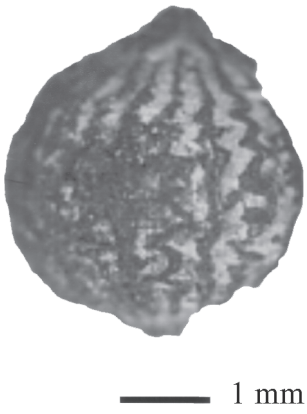


*Fig. 5. Kapitan Dimitrievo (Late Neolithic). Coriander (Coriandrum sativum)*

From the first stages of the Neolithic almost all of the crop plants known already for the entire Neolithic and Chalcolithic period were present. The cultivated plants correspond to the so called "Near Eastern crop assemblage". Many of the recovered weeds have their main natural distribution in the Mediterranean area. The entire plant complex confirms the connection with the Near East and the Mediterranean – the areas from where the Neolithic agriculture probably came to Bulgaria. Especially interesting in this connection are the examples of coriander and chickpea.

## Bibliography

Arnaudov 1936
N. Arnaudov, Über prähistorische und subrezente Pflanzenreste aus Bulgarien. Trudove na bălgarskoto prirodoizpitatelno družestvo 17, 1936, 26-31.

Arnaudov 1938
N. Arnaudov, Rastitelni materiali ot predistoricheskoto selishche pri Karanovo (Novozagorsko). Godishnik na Sofijskiya universitet. Fisiko-matematicheski fakultet 34/3, 1938, 79-99.

Arnaudov 1949
N. Arnaudov, Predistoricheski rastitelni materiali. Prirodo-matematicheski fakultet 45/3, 1949, 87-116.

Atanassova 1995
J. Atanassova, Palynological data of three deep water cores from the Western part of the Black Sea. In: E. Božilova/S. Tonkov (eds.), Advances in Holocene palaeoecology in Bulgaria (Sofia, Moscow 1995) 68-83.

Božilova/Beug 1992
E. Božilova/H.-J. Beug, On the Holocene history of vegetation in SE Bulgaria (Lake Arkutino, Ropotamo region). Vegetation History and Archaeobotany 1, 1992, 19-32.

Božilova/Beug 1994
E. Božilova/H.-J. Beug, Studies on the vegetation history of Lake Varna region, northern Black Sea coastal area of Bulgaria. Vegetation History and Archaeobotany 3, 1994, 143-154.

Božilova/Tonkov 1998
E. Božilova/S. Tonkov, Towards the vegetation and settlemet history of the southern Dobrudzha coastal region, North-Eastern Bulgaria: A pollen diagram from Lake Durankulak. Vegeation History and Archaeobotany 7, 1998, 141-148.

Čakalova/Sarbinska 1986
A. Čakalova/A. Sarbinska. Pflanzenreste aus den neolithischen Siedlung Kremenik bei Sapareva Banja. Studia Praehistorica 8, 1986, 156-160.

Dennell 1978
R. W. Dennell, Early farming in South Bulgaria from the VI$^{th}$ to the III$^{rd}$ millenia B.C. British Archaeological Reports, International Series 45 (Oxford 1978).

Dontcheva 1990
E. Dontcheva, Plant macrorest research of early Neolithic dwelling in Slatina. Studia Praehistorica 10, 1990, 86-90.

Filipova 1985
M. Filipova, Palaeoecological investigation of lake Shabla-Ezeretz in North-Eastern Bulgaria. Ecologia Mediterranea 11, 1985, 147-158.

Filipovich/Stefanova 1998
L. Filipovich/I. Stefanova, Anthropogenic changes in the vegetation of the Balkan range according to data obtained from pollen and macrofossil analyses. Phytologia Balcanica 4, 1998, 37-44.

Hopf 1973
M. Hopf, Frühe Kulturpflanzen aus Bulgarien. Jahrbuch des Römisch-Germanischen Zentralmuseums 20, 1973, 1-47.

Hopf 1988
M. Hopf, Frühneolithische Kulturpflanzen aus Poljanica-Plateau bei Targovishte (Bulgarien). Studia Praehistorica 9, 1988, 34-36.

Hubbard/Housley 2001
R. N. L. B. Hubbard/R. A. Housley, The agriculture in prehistoric Servia. In: C. Ridley/C. Mould/K. A. Wardle (eds.), Servia 1971-73: Rescue excavations at a Neolithic and Early Bronze Age site in Western Macedonia. British School of Archaeology at Athens, Supplementary Volume (Oxford 2001) 330-336.

Huttunen et al. 1992
A. Huttunen/R.-L. Huttunen/Y. Vasary/H. Panovska/E. Božilova, Late glacial and Holocene history of flora and vegetation in the Western Rhodopes Mountains, Bulgaria. Acta Botanica Fennica 144, 1992, 63-80.

Kreuz 1992
A. Kreuz, On-site and off-site data – Interpretative tools for better understanding of Early Neolithic environments. In: H. Kroll/R. Pasternak (eds.), Res archaeobotanicae (Kiel 1992) 117-134.

Jacomet/Kreuz 1999
S. Jacomet/A. Kreuz, Archäobotanik (Stuttgart 1999).

Lazarova/Božilova 2001
M. Lazarova/E. Božilova, Studies on the Holocene history of vegetation in the region of lake Srebarna (North-East Bulgaria). Vegetation History and Archaeobotany 10, 2001, 87-95.

Lisicina/Filipovich 1980
G. Lisicina/L. Filipovich, Paleoetnobotanicheskie nachodki na Balkanskom poluostrove. Studia Praehistorica 4, 1980, 5-90.

Marinova et al. 2002
E. Marinova/E. Tchakalova/D. Stojanova/S. Grozeva/E. Dotcheva, Ergebnisse archäobotanischer Untersuchungen aus dem Neolithikum und Chalcolithikum in Südwestbulgarien. Archaeologia Bulgarica 2002/3, 1-11.

Marinova, forthcoming
E. Marinova, Vergleichende paläoethnobotanische Untersuchung zur Vegetationsgeschichte und zur Entwicklung der prähistorischen Landnutzung in Bulgarien. Dissertationes Botanicae 401 (Stuttgart, forthcoming).

Nikolov 1998
V. Nikolov, Prouchvanya vărchu neolitnata keramika v Trakiya (Sofia 1998).

Nikolov 2002
V. Nikolov, Die wichtigsten Siedlungen der Perioden Karanovo I-IV. In: M. Lichardus-Itten/J. Lichardus/V. Nikolov (eds.), Beiträge zu jungsteinzeitlichen Forschungen in Bulgarien. Saarbrücker Beiträge zur Altertumskunde 74 (Bonn 2002) 85-94.

Panayotov et al. 1992
I. Panayotov/I. Gatsov/T. Popova, "Pompena stanciya" bliz s. Malăk Preslavec – Rannoneoliticheskoi poselenie s intramuralnymi pogrebenyami. Studia Praehistorica 11/12, 1992, 51-61.

Popova 1995
T. Popova, Plant remains from Bulgarian prehistory (7000-2000 BC). In: D. Bailey/I. Panayotov (eds.), Prehistory of Bulgaria. Monographs in World Archaeology 22 (Madison/Wisc. 1995). 193-207.

Stefanova/Božilova 1995
I. Stefanova/E. Božilova, Studies on the Holocene history of vegetation in the northern Pirin Mts. (Southwestern Bulgaria). In: E. Božilova/S. Tonkov (eds.), Advances in Holocene Paleoecology in Bulgaria (Sofia, Moscow 1995) 9-31.

Stoyanov/Kitanov 1963
N. Stojanov/B. Kitanov, Divi polezni rasteniya v Bălgariya (Sofia 1963).

Thanheiser 1997
U. Thanheiser, Botanische Funde. In: S. Hiller/V. Nikolov (eds.), Karanovo I. Die Ausgrabungen im Südsektor 1984-1992 (Salzburg 1997) 429-454.

Tchakalova/Bozhilova 2002
E. Tchakalova/E. Bozhilova, Paleoekologichni i paleoetnobotanichni material ot selishchnata mogila do gr. Rakitovo. Razkopki i prouchvanya 29, 2002, 191-201.

Todorova/Vajsov 1993
H. Todorova/I. Vajsov, Novokamennata epocha v Bălgarija (Sofia 1993).

Willis/Bennett 1994
K. J. Willis/K. D. Bennett, The Neolithic transition – Fact or fiction? Palaeoecological evidence from the Balkans. The Holocene 4/3, 1994, 326-330.

Zohary/Hopf 1994
D. Zohary/M. Hopf, Domestication of plants in the Old World (Oxford 1994).