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SALT AND GOLD: PROVADIA-SOLNITSATA AND THE VARNA CHALCOLITHIC CEMETERY

In the early 1970s, the world's prehistoric establishment was amazed by the sensational news of the discovery of the Late Chalcolithic cemetery on the lake Varna shore, very close to the western Black Sea coast (fig. 1). The reason for this great interest in this event was not only the discovery of the cemetery itself but also thousands of exquisitely made gold artefacts and other prestigious items made of copper, minerals, stone, flint, obsidian and Mediterranean mollusks, as well as hundreds of pottery vessels found inside (Ivanov 1991). Until then, and actually up to date, the Old World has not witnessed such a concentration of wealth from the second half of the 5th millennium BC. From 1972 to 1991, Ivan Ivanov excavated more than 300 burials, about 80% of which are formal inhumations in a crouched or extended supine position. Most of them contain common grave goods for that period and, as an exception, small gold artefacts. However, a small part of these graves have considerably more gold and copper items. Of particular interest is a male grave with a large amount of gold ornaments and copper tools, with two ceramic vessels painted in gold, a bow with arrows and a sceptre. Undoubtedly, a higher representative of the social hierarchy, possibly a tribal chief and priest, was placed in that grave. The remaining ca. 20% of the graves are cenotaphs, i.e. pits containing grave goods but lacking skeletal remains. The cenotaphs vary in type and wealth and obviously reflect rites related to people of different ranks. Especially interesting in this group of graves

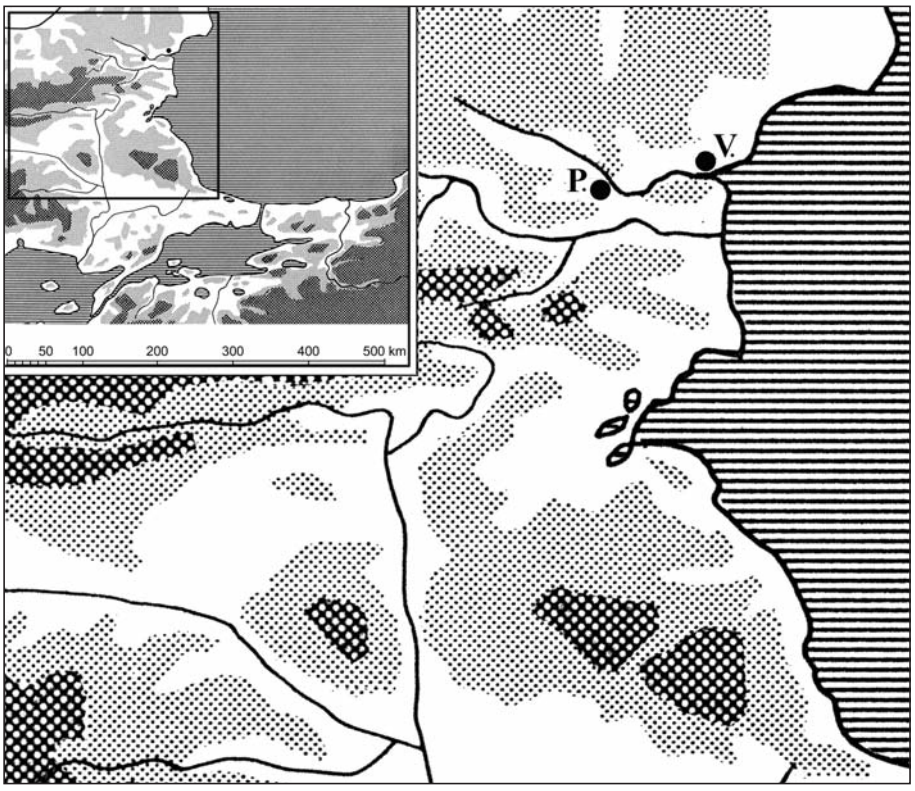

Fig. 1 Map showing the position of Provadia-Solnitsata (P.) and the Varna Chalcolithic cemetery (V.) in the West Pontic area. – (E. Anastasova).

are the three clay masks with gold artefacts on them, modeled on the bottom of the grave-pit. In other cases, grave goods repeat the character and arrangement of real graves. In the third group of cenotaphs, status symbols were put in a bag and buried. The Varna cemetery is the subject of many different interpretations. However, their authors firmly believe that the cemetery was left behind by a highly organized hierarchical community (e.g. Nikolov 1991).

There are many possible aspects of investigating the Varna cemetery which contain or could provide information on Late Chalcolithic society. In this brief description, I will primarily dwell on the reasons for the occurrence of such a cemetery which was unusual for that period and included a considerable number of ritual pits with a high concentration of various types of grave goods made of different materials, as well as on the reasons for the very appearance of that cemetery near lake Varna.

Right after the excavation of the first several tens of graves, a number of scholars suggested ideas concerning the origin of some groups of items from the exceptionally rich grave goods. An assumption was made that part of the gold in the cemetery originated from distant regions in Northeast Anatolia or the Caucasus (Hartmann 1978). The main way of accumulating such wealth must have been either the maritime trade of copper items produced near lake Varna from Aibunar (East Thracian) ore (Todorova 1978, 141f.) or the trade of salt produced from seawater with the regional inland (Radunceva 1986, 18). The existence of a Late Chalcolithic maritime trade centre is also assumed by other authors (Frey 1991).

Research on Chalcolithic culture during the last two decades makes it possible to correct the hypotheses already made. It is very probable that a metallurgical centre actually developed near lake Varna, although during the Late Chalcolithic there were no exploitable deposits of the respective metal ores in the region north of the Balkan Mountains to the Danube delta and to the Carpathians in the north. This is probably the reason why this metallurgical centre was neither built for the trade with the region to the north (including the north of the Danube delta), as was thought, nor was it meant for the trade in another direction. In fact, it existed to meet the demands of the lake-near community (cf. Dimitrov 2007), i.e. the copper and gold artefacts manufactured in this centre were intended for local users only. On the other hand, the salt production by open-air solar evaporation of the then low-salt water on lake Varna or even farther away on the sea would have been highly ineffective and labour-consuming. If such production would have been the basis for the wealth of the Varna cemetery, it would have been much more effective if performed under far better physico-geographical conditions (concerning climate and relief) in the south along the Black Sea coast (cf. the location of the Pomorie salt pans). There is no evidence of a salt production by open-air solar evaporation of seawater along the coast to the north of Cape Emine, though.

It is clear that the earlier assumptions about the reasons for the accumulation of wealth in the Varna cemetery have not been confirmed by later research.

THE WEALTH OF VARNA

There are two possibilities for accumulating prestigious items in the lake Varna area during the Late Chalcolithic: 1. the availability of various local raw materials for their on-site manufacturing or 2. the import of materials for the on-site manufacturing as well as (irrespective of the type of local manufacturing) finished products. However, it should be remembered that one irrevocable characteristic of an item considered to be prestigious is its distant resp. »foreign« origin (of the item itself or its material).

Some items included in the grave goods are obviously local and made of local raw materials. These are ceramic vessels, bone and horn/antler items, and a part of the stone and flint artefacts. The remaining items can be assumed to having originated from regions more or less distant from lake Varna.

Flint artefacts

A total of 240 flint artefacts (Manolakakis 2005, 210) have been found in the grave pits, more than half of which were the result of a specialized production performed by professionals in the area of today's Razgrad, about 100 km northwest of lake Varna. This applies mainly to the 44 cm long blades which are symbols of highly prestigious burials. These artefacts were received as a result of trade (»purchase«; id. 2002, 15f.).

Obsidian blade

There is only one uncovered obsidian blade in the Varna cemetery. According to the physico-chemical analysis it originates from the island Melos in the Southern Aegean (Manolakakis 2002, 5. 15).

Chalcedony (carnelian and agate) beads

Over 500 beads have been found in the cemetery, which is the maximum concentration of such items from Late Prehistory of the Eastern Balkans. They are products of a highly specialized production. The raw material probably came mainly from Anatolia, although certain samples may be associated with the Eastern Rhodope Mountains (Kostov 2007, 66-77). However, it remains unclear whether the beads were made on-site near lake Varna or imported as finished products.

Artefacts (ornaments) made of mollusk shells (*Spondylus*, *Glycymeris* and *Dentalium*)

More than 1100 articles made of *Spondylus* and *Glycymeris* (hundreds of beads, diadem elements, several hundreds of bracelets, etc.) and over 20,000 beads made of *Dentalium* have been found in the grave pits (Ivanov 1991, 130). The raw material of which the prestigious items were probably manufactured originated from the northern coast of the Aegean (Ivanova 2008, 232f. and literature cited there); by trade they were spread over the Eastern Balkans. During the Late Chalcolithic, their presence was particularly strong in today's Northeast Bulgaria and Dobruja, the Varna cemetery being the place of their highest concentration.

Copper tools and ornaments

165 copper articles have been found in the Varna cemetery. Until now, 123 have been studied and subdivided into three groups: 75 heavy tools, 34 small tools and 14 ornaments (Dimitrov 2007, 46). As already mentioned, there are no copper ore deposits between the Balkan Mountains and the Danube; it is clear that the ore, or rather the metal, was imported to the lake Varna area from a greater distance. The lead isotope analyses of most copper items from the Varna cemetery show a comparatively clear polycentric picture of the metal sources. The raw material predominantly (about 55%) came from the West Pontian copper ore region (northeastern parts of the Strandzha Mountain, 120-150 km away). About 39% came from the East Thracian copper ore deposit (eastern parts of the Sredna Gora Mountains, 250-270 km away), and the remaining 6% from other deposits probably in present-day West Bulgaria, 400-500 km away (ibid. 46-52).

The origin of over 2,000 malachite necklace beads from the Varna cemetery should also be sought in the copper ore deposits mentioned above.
In the wider area of lake Varna, there are several more famous Late Chalcolithic copper assemblages: Tell Golyamo Delchevo and its cemetery, the Devnya cemetery, a destroyed cemetery in the Kokodiva locality, a destroyed grave near Varna as well as numerous stray finds. Lead isotope analyses testify to an origin of the copper ore similar to that of the Varna cemetery (Dimitrov 2007, 52-58).

Gold items

About 3,000 gold ornaments for body and clothing, sceptre and bow plating, as well as other small items with a total weight of 6.5 kg have been found in the Varna cemetery. These gold items caused the sensation which has maintained the strong professional interest in the cemetery for more than three decades (cf. Fol / Lichardus 1988). Nevertheless, the gold finds have not been studied enough, so that the question of the origin of the gold remains largely unanswered. The only investigations in this direction were carried out in the mid-1970s. Some of the gold finds from the first tens of graves were studied (Hartmann 1978). Two types of gold have been identified: the first one (BP) shows some admixture of platinum, the second one (B) none. There is an admixture of silver in both types. Whereas type BP, of which about half of the investigated gold items have been made, is encountered only in the area near the Black Sea, type B is widespread all along the Lower Danube. The origin of the BP type is sought in Northeast Anatolia or in the Caucasus, the origin of type B in the Balkans or the Strandzha Mountain. Taking into account some archaeological evidence and observations from recent years, I would include the Eastern Rhodope Mountains as a possible area of origin of the second type.
Almost all groups of items considered here (according to their respective material) from the Late Chalcolithic Varna cemetery have their predecessors in the Middle Chalcolithic Varna II cemetery (three excavated graves) also located near the lake Varna shore (Ivanov 1978). Besides, items made of serpentinite (probably from the Eastern Rhodope Mountains) and nephrite (probably of a non-Balkan origin) have been found in the latter (Kostov 2007, 52-59).
This brief consideration of several groups of grave goods in the Late Chalcolithic Varna cemetery testifies to the non-local origin of their raw material. Some groups of artefacts were probably produced at another place, near the raw material source – the long blades, the obsidian blade, the chalcedony beads, the ornaments of mollusk shells, items of rare stone varieties. It is obvious that the greater part of the copper tools and ornaments, as well as the gold items, were made on-site, but from imported raw materials. For now, only the delivery of the prestigious long blades and some other flint artefacts can be associated with the territory north of lake Varna – in particular with the Razgrad area. All other trade connections point to active interrelations with the region to the south: from the Kamchia valley and the Eastern Balkan Mountains to the Strandzha Mountain, Sakar Mountain and the Eastern Rhodope Mountains. I also assume that there have been sporadic contacts with regions of the Central Balkans and Northern Anatolia, although these may have been mediated relations. I hypothesize the use of sea vessels, but the seaway could have hardly played an essential role in the economic prosperity of the lake-near community during the Middle and Late Chalcolithic.
It is beyond any doubt that the wealth of the Varna cemetery, including a (for that period) huge number of prestigious items, was gained through regular trading operations imposed by the regionalized division of labor related to the natural conditions. Moreover, the extraction of the raw material mentioned above requires a high level of specialization which is possible only within production groups living and working in the area where the material is mined (for copper ore mining in particular see Dimitrov 2007, 63).

MAN AND SALT

It is clear so far what raw materials or prestigious finished products were imported by the lake-near community during the Middle and especially the Late Chalcolithic. The main question that arises when studying all trade relations is: what was this import of large amounts of raw materials and high-priced items traded for? The import and local production of a large quantity of prestigious items means that the community near lake Varna not only managed – as research has shown – to provide their food for the whole year by farming, cattle-breeding, fishing and hunting, but also to put aside a sufficient surplus for trading. There are no grounds to believe that this was possible based on agricultural production only, for which the conditions south of the Balkan Mountains were better. And the region between the Eastern Balkan Mountains and the Danube is poor in raw materials relevant for the production by the Chalcolithic communities in Thrace and the neighboring regions.

The only raw material which is vitally important for man and animals and which is available in the area near lake Varna – and not available in Thrace and the neighboring regions – is salt. Salt was the only »strategic« raw material during the Neolithic and Early Chalcolithic, and (together with copper) during the Late and Final Chalcolithic. Hence, salt was not only a prerequisite for an active and successful trade but also played the role of a general equivalent (i.e. the first »money«) during later prehistory (on the role of salt in society, including trade relations in pre- and protohistory, see Saile 2000).

Modern studies show that the minimum amount of salt needed for maintaining the life of a grown-up man on the verge of biological death in a state of immobility is 4 g per day. With twice as much, he would be able to live rather normally, but without physical stress. It is assumed that for a »normal« physical activity he needs 2 g of salt per 10 kg of his body weight, i.e. usually between 12 and 18 g a day. Under extreme physical stress, this norm is much higher. A chronic, even minimum deficiency of salt causes serious fertility troubles up to sterility, retarded development and complex damages to the human organism. A moderate deficiency of salt leads to a state of permanent fatigue, anorexia, retching and vomiting, physical exertion becoming impossible. Under a high deficiency of salt, the symptoms mentioned increase and finally cause the death of the organism.

Since the physiology of animals is similar to that of man, they also need the respective amount of sodium chloride corresponding to their weight. Providing the necessary amount of salt to domestic animals is the task of those who breed them because it affects their fertility, weight (meat for food!) and the quantity of milk produced. Animals used for work require a much higher daily dose.

The problem of a planned provision of salt both for man and domestic animals did not exist in human history for a long time: Palaeolithic hunters ate the meat of wild animals, thus getting their necessary daily salt dose, and the animals themselves found salt in natural sources such as salt springs, salt stones, halophytes, etc. A problem arose during the transition to production economy, i.e. the transition to a Neolithic culture type about 12,000-14,000 years ago in Southwest Asia. People became producers of cereals and began to raise domestic animals. The hunting of wild animals highly decreased, and the problem of providing the vital supply of salt occurred. During the Neolithic, salt became the only »strategic« raw material without which the new type of economy would not have functioned.

To the highly important functions of salt for this period we should add its use for food preservation – a compulsory element in the everyday life of the early agricultural society. The preservation of food reserves for the regular year-round maintenance of the settled way of life was part of the new system of relations with the natural environment. Besides, salt was also needed for various domestic production activities – primarily those related to the processing and use of cattle hide.

Fig. 2 The tell Provadia-Solnitsata (obl. Varna) and the Thracian tumulus on it. – (Photo V. Nikolov).

As a strategic raw material during later prehistory, salt became a strong economic basis of the community that produced it and also an important factor for the development of trade contacts, respectively: hence, salt became the motive of social and cultural processes.

THE WEALTH OF PROVADIA

The only location of rock salt in the Eastern Balkans which was suitable for exploitation during later prehistory was the so-called Mirovo salt deposit near Provadia, obl. Varna/BG. The huge salt body is shaped like a truncated cone, its upper surface having the shape of an oval of 450 × 850 m. From the overlying salt mirror at a depth of 9-20 m, salt solutions flowed out which had a salt concentration approximating the maximum value of about 312 g/l.

The excavation at the archaeological site of Provadia-Solnitsata started in 2005 (**fig. 2**). Until recently this was the name of the prehistoric tell site upon which – and with part of its deposit – a Thracian tumulus was erected much later. The excavation of the prehistoric layers (Later Neolithic and Chalcolithic) went on for five seasons and yielded fascinating results, including findings related to the salt topic discussed above (Nikolov 2005; 2008a; Nikolov / Petrova / Bačvarov 2009). In 2008, a huge Chalcolithic salt production complex was found immediately next to the tell, thus supporting the assumptions on the role of the prehistoric Provadia-Solnitsata salt production centre during the Neolithic and Chalcolithic.

The tell which (before being partially destroyed by the builders of the Thracian tumulus) had a 6 m thick cultural deposit and a diameter of 105 m, as well as the Chalcolithic production complex close to it, are

Fig. 3 Provadia-Solnitsata: the base of a dome oven used for brine boiling, Late Neolithic, Karanovo II-IV period (5400-5200 BC). – (Photo V. Nikolov).

situated upon the huge truncated cone of the salt rock deposit from which the salt springs gush out. In the later Neolithic Karanovo III-IV culture which covered all of Thrace beween 5400 and 5200 BC, a group of its bearers crossed the Balkan Mountains, settled around these salt springs near present-day Provadia and began producing salt.

Salt production during the later Neolithic was carried out by boiling brine from the springs in thin-walled ceramic bowls especially made for this purpose which were placed in solid dome ovens. The ovens whose production capacity is approx. 10 tons of salt per year were located in buildings within the settlement. It has been proved that boiling brine in ceramic bowls is the earliest application of a salt production technology recorded in Europe, and Provadia-Solnitsata is the most ancient salt production centre on the Old Continent discovered so far.

In 2005-2007, the remains of the later Neolithic two-storey building which occupied an area of 55-60 m^2 were excavated. On the floor of the lower level, a large domed installation made of clay was found which was meant for boiling brine (Nikolov 2008b). It is four-sided with bulging walls and rounded corners (fig. 3); its dimensions along the two axes are 1.70 × 1.50 m. It consists of a solid dome and a thick inner floor, but without the thinner or thicker base raised above the room floor which was typical of the home ovens. In this case the role of the accumulating body was transferred exclusively to the solid dome which implies a different use of the installation compared to that of the home ovens. The dome is a solid clay structure. The walls at the base are 25 cm thick and thin out upward to 13-14 cm. Judging from the dome walls preserved in their original form, its maximum height on the inside was about 50 cm, on the outside about 60 cm. The installation had two entrance holes, in the eastern and southern side of the dome. The eastern hole is 26 cm wide; the second entrance to the installation was much larger, probably 60 cm wide,

but is poorly preserved. The presence of two holes in the dome of a later Neolithic oven is unusual. The most probable reason for the occurrence of the smaller side hole was the technological need for maintaining a definite temperature during the brine boiling process and the salt crystallization as well as for providing a draught to carry away the vapor, which was realizable only through a regulated access of air to the installation. The ceramic bowls with brine were inserted through the large hole and taken out with the salt in them at the end of the cycle. The floor of the installation occupying the entire space underneath the dome of 1.35 m^2 is made of beaten clay.

The ceramic vessels for the production of pure salt by brine boiling represent a specific pottery type that was found first in Europe in later prehistory. They are deep thin-walled bowls (Stojanova 2008). The surface of the vessels is roughly smoothed and as a result of their use now covered with a thick whitish accretion. Their thin walls are the reason why they were uncovered in a fragmentary state. The thickness varies between 3-4 mm and 5-6 mm, increasing up to 10mm at the mouth. The thinness and high porosity of the vessels facilitated the brine evaporation. The bowls are wide open, with a deep biconical body whose most bulging part is located in its upper third part. The bottom diameter is 11-18 cm; the mouth is 32-56 cm in diameter, rounded and slightly thickened on the inside.

The inverted rim of the mouth prevented the outflow of brine when the full vessel was inserted in the oven, as well as in the case of undesired boiling during the evaporation process. The maximum temperature during boiling was not allowed to exceed 105°C – the boiling point of brine with a sodium chloride concentration of about 312 g/l (the natural concentration of brine from the springs near Provadia). Taking into account the size of the space underneath the dome of the excavated oven as well as the capacity of the bowls filled up to the level of their maximum diameter (6-36 l), it can be assumed that – with an optimal arrangement by combining bowls of different diameters and heights – at one feeding of the installation it was possible to evaporate about 90 l of brine. Therefore, with the relevant sodium chloride concentration of the brine and the realization of one cycle per day (theoretically, at least two and probably three cycles are possible), 26-28 kg of purified salt could be obtained, which corresponds to an annual output of up to 10 tons of only one oven. Assuming a variant with a preliminary »thickening« of the brine exposed to the sun (during the warmer months), the quantity produced even could have been much higher.

Brine boiling in furnaces was practiced during the whole later Neolithic, i.e. up to the beginning of the 5th millennium BC, but no evidence has been provided so far for an early Chalcolithic production (no such layer has been established in the excavated area of Provadia-Solnitsata).

Life on the tell continued during the Middle Chalcolithic (Hamangia IV culture), i.e. between 4650 and 4500 BC. It was during this period that a large salt production complex emerged near the settlement which operated throughout the Late Chalcolithic (Varna culture), i.e. at least during the third quarter of the 5th millennium BC. The reason was the obvious need for an increased salt production which was realized by modifying the technological process. During the Middle Chalcolithic, if not earlier, the dome ovens were replaced by larger open installations: wide pits in which a new type of ceramic vessels, very deep and thick-walled tubs of a much larger volume than that of the later Neolithic bowls, were arranged close to each other. Brine boiling was performed by an open fire on the pit bottom in the spaces between the mouth rims tangent to each other.

The Chalcolithic production complex has been partially uncovered. For now its area seems to have a size of at least 5 ha, but it is probably much larger in fact. It is located immediately north-northeast of the tell.

The central and eastern parts of one of the production pits (feature 1), subsequently transformed into a storage area for remains from the salt production in other similar installations, have been excavated. The length of the investigated part is about 10.50 m along the north-south axis, its maximum width 5 m. The pit's maximum depth is 1.75 m. It is irregular, almost oval in shape, narrowing in its northern part. In the south-

Fig. 4 Provadia-Solnitsata: the Chalcolithic production complex. Profile of the backfill of a production pit for brine boiling, Late Chalcolithic, Varna period (4500-4200 BC). – (Photo V. Nikolov).

eastern part of the installation, a »chute« of an almost southeast-northwest orientation has been found, its uncovered part being 3.80 m wide and 5.20 m long. This was probably the access to feature 1.

The pit is completely filled with mainly large sherds of very deep and wide thick-walled tubs and a great amount of white wood ash (figs 4-6). The mouth diameter of the tubs varies from 30-70 cm, the bottom diameter from 18-20 cm, and their depth probably from 50-80 cm. The wall thickness varies between 1.5 cm and 2.5 cm. The outer surface is rusticated, and underneath the mouth pairs of large conical buttons have been modeled. The inner surface is smoothed. The ceramic sherds show a secondary firing. Only few thin-wall sherds have been uncovered in the pit, permitting to date the installation back to the beginning of the Late Chalcolithic in this region (Varna culture).

The change within the salt production technology is obvious; the ovens of the later Neolithic were replaced by much more productive installations. The deep pottery tubs were probably arranged on the pit bottom in a way that their mouths touched and the peripheral vessels touched the walls of the pit. Bearing in mind their height and inverted conical shape, often with a considerable advantage of the mouth diameter compared to that of the bottom, large spaces widening downwards were left between the vessels underneath the level of their mouths. These spaces were probably filled with firewood. During the boiling process, the fire heated mainly the upper part of the brine in the tubs; during the evaporation, the brine

Fig. 5 Provadia-Solnitsata: the Chalcolithic production complex. Excavation of a production pit for brine boiling, Late Chalcolithic, Varna period (4500-4200 BC). – (Photo V. Nikolov).

Fig. 6 Provadia-Solnitsata: the Chalcolithic production complex. Sherds of ceramic tubs for brine boiling from the backfill of a production pit, Late Chalcolithic, Varna period (4500-4200 BC). – (Photo V. Nikolov).

level dropped, and so did the level of the fire burning outside. With the fire going out, the temperature dropped, thus creating conditions for the crystallization of the salt. Hard conical salt bodies remained in the tubs made for a transport over long distances.

The Chalcolithic salt producers near present-day Provadia invented a for that time perfect technology for obtaining a high salt output much faster which can certainly be considered as »industrial«. The change in the salt production technology bringing about a highly increasing production capacity of the »plant« near present-day Provadia during the Middle and Late Chalcolithic strongly supports the suggested relationship between the salt production in the area and, respectively, salt trade and the wealth of prestigious items exceptional for that period, in the »gold« Varna cemetery located in that area.

The later Neolithic salt producers most probably met their own »salt needs« using the spring brine itself, while they exported pure salt to the south of the Balkan range. In the Middle and Late Chalcolithic, salt was obviously produced in amounts that can be considered as industrial for that time. Salt became the general equivalent (playing the role of »money«) in the large-scale trade with the neighbouring regions, but predominantly to the south of the Balkan Mountains. However, the wealth accumulated by the salt producers had to be protected; during the Middle Chalcolithic the settlement on the tell was strengthened by a fortification system that included a fortification wall and a deep moat in front. The fortification wall was actually a palisade of high oak trunks, with a thick clay coat on both sides. There were at least two diametrically positioned entrances, each flanked by two large stone bastions. A powerful earthquake destroyed the bastions, but high and thick walls of smaller (broken) stones were built behind their remains.

The prehistoric salt production centre of Provadia-Solnitsata ceased operating at the end of the Chalcolithic; because of a drastic climate change, the communities within a huge area west of the Black Sea transformed their lifestyle from farming into nomadism. One possible reason for the end of the salt production at Provadia-Solnitsata is related to the drought that caused the brine springs to dry up. If the springs somehow survived (though producing a very low discharge), the nomadized population of the region probably visited them periodically with their herds, thus directly meeting their need for salt for both people and animals.

CONCLUSIONS

The exceptionally rich field evidence from Provadia-Solnitsata should be considered within the context of the Middle and Late Chalcolithic in the western Black Sea area. Some of its many different aspects are mentioned here.

Trade and trade routes

The salt trade was the main reason for the specific development of the Late Chalcolithic communities in the area of Provadia-Solnitsata and lake Varna. There are two possible routes of the salt export and the import of equivalent goods. The first one could have run along the Provadia river passing the salt-producing centre at Provadia-Solnitsata. According to various sources, the river was navigable for small boats in the 19th century from the salt-producing centre (and even upstream from there) down to its estuary in lake Varna which opens the way to the Black Sea. Thus, the salt from Provadia-Solnitsata could have been transported along the coast far to the south. The second route could have crossed the Balkan range via the low Aytos pass whose northern end was situated near the salt-producing centre: from its southern end, there are numerous ways to Thrace and its neighbouring mountainous regions.

Production facilities, pottery, firewood

Unlike in the Late Neolithic, the production of a significant amount of salt for trade in the Chalcolithic suggests the existence of remarkably larger production facilities and a significantly greater amount of firewood. For the time being it is difficult to quantify the labour required for digging and maintaining the enormous production pits, their number being as yet indeterminable, but it surely added up to a great amount of time and physical efforts. It would be even more impressive to know the number of the large thick-walled pottery tubs produced and used in the salt production process. The volume of sherds of such vessels having been revealed during the excavation of about two thirds of the aforementioned production pit is about 20 m^3, i.e. the backfill of only one feature contains about 30 m^3 of sherds! The minimum number of large production tubs calculated on the basis of the number of diagnostic sherds from the pit amounts to over 400! Bearing in mind the complexity of the entire ceramic production process in later prehistory, the production of such a number of tubs involves a large amount of specialized work. In later times, the necessity of huge amounts of firewood has been evidenced by the deforestation of large areas around the centres producing salt by evaporating brine; the same undoubtedly applies to the case of Provadia-Solnitsata.

The felling of trees, the transportation over shorter or longer (several kilometres) distances and wood chopping with prehistoric tools is the third group of labour-intensive preparatory activities for the production of solid salt from brine in the discussed Chalcolithic production complex.

Production process

On the one hand, the suggested salt production technique required the continued efforts of at least several workers for each pit, on the other hand, their work must have been highly specialized. It is not possible to estimate how many specialized teams worked simultaneously, but the number of specialized workers was in no case small. It should be generally assumed that the salt production in the large pits required significant social efforts.

Settlement and fortification

The operation of the production complex is related to the Middle Chalcolithic settlement on the tell. Since its beginning, it was surrounded by a massive fortification consisting of a ditch, a palisade and stone bastions. This settlement most probably also existed throughout the Late Chalcolithic. Its construction and maintenance seem to have been necessitated by the need to protect the solid salt stored behind its walls. Without going into specific details and calculations, it is evident that the amount of work for the construction of these facilities and their fixing after a strong earthquake has been tremendous.

Social organization and social structure

These considerations give reason to reflect on the existence of a complex social structure of the community engaged in the »industrial-sized« salt production at Provadia-Solnitsata during the Middle and Late Chalcolithic. These activities obviously involved the work of much more people than those living in the settlement by the production complex: a well-functioning organization of the labour-intensive production processes involving many people was required. Moreover, all production activities and the salt trade demanded a highly specialized work which was only possible within a larger group able to initiate and

develop innovative activities other than those of the marginal production of any farming community. The discussed community certainly also covered a large area around lake Varna. An exceptional evidence of the complex social structure of this community is the Varna Late Chalcolithic cemetery belonging to it. It seems that despite its complex hierarchical social organization, the lake community still stuck to an egalitarian social model dominated by the principle of prestige, and that only external reasons predetermined the decline of this civilization and did not allow its transition to an elite social structure and early state society.

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Zusammenfassung / Abstract / Résumé

Salz und Gold: Provadia-Solnitsata und die chalkolithische Nekropole von Varna

Die knappe Analyse einiger Gruppen von Gegenständen unter den Grabbeigaben in der chalkolithischen Nekropole von Varna am Ufer des Varnasees (Nordostbulgarien) nahe der westlichen Schwarzmeerküste zeugt vom fremden Ursprung des Rohstoffs, aus dem sie angefertigt worden sind. Ein Teil der Artefakte wurde allem Anschein nach anderswo erzeugt. Ein Großteil der kupfernen Werkzeuge und »Schmuckstücke« sowie der goldenen Gegenstände wurde zwar vor Ort, aber aus eingeführtem Rohstoff hergestellt. Es steht außer Zweifel, dass man den in der Nekropole von Varna gefundenen Reichtum durch regulären Handel erworben hat. Der einzige Rohstoff, der für Menschen

und Tiere lebenswichtig und in der Region um den Varnasee vorhanden war, in Thrakien und den Nachbarregionen jedoch nicht vorkam, war Salz. Salz war daher nicht nur eine Voraussetzung für den aktiven und erfolgreichen Handel, sondern es spielte während der späten Vorgeschichte die Rolle eines allgemeinen Gegenwerts. Die einzigen Steinsalzlagerstätten im Osten der Balkanhalbinsel, die auch in der jüngeren Vorgeschichte ausgebeutet werden konnten, befanden sich in der Nähe von Provadia. Aus dem darauf liegenden Salzspiegel flossen Sole mit einer Salzkonzentration heraus, die der maximalen nahe kam. Die chalkolithischen Salzgewinner entwickelten ein perfektes Verfahren für eine für die damalige Zeit viel schnellere und ergiebige Salzgewinnung durch Salzwasserverdunstung. Die veränderte Salzgewinnungstechnologie, die eine rasante Steigerung der Produktionskapazität der »Fabrik« unweit der heutigen Stadt Provadia während des mittleren und späteren Chalkolithikums ermöglichte, unterstreicht den angenommenen Zusammenhang zwischen der dort erfolgenden Salzgewinnung bzw. dem Salzhandel und dem für die damaligen Verhältnisse erstaunlichen Reichtum an Prestigegütern, die man in der in derselben Gegend befindlichen spätchalkolithischen »goldenen« Nekropole von Varna finden konnte.

Salt and gold: Provadia-Solnitsata and the Varna Chalcolithic cemetery

The short considerations on several grave good types from the Late Chalcolithic Varna cemetery on the shore of lake Varna, Northeast Bulgaria, on the western Black Sea coast testify to a non-local origin of their raw material. Some artefact types were probably produced elsewhere. Most of the copper tools and »personal ornaments« as well as most of the gold items were made locally, but of imported raw material. There is no doubt that the »wealth« of the population buried in the Varna cemetery was achieved through regular trade. The only raw material of vital importance for man and animals and available in the area near lake Varna – and not in Thrace and the neighbouring regions – was salt. Therefore, salt was not only a prerequisite for an active and successful trade but definitely played the role of a general equivalent during later prehistory. The only rock salt deposit in the Eastern Balkans which was suitable for exploitation during later prehistory was the one at Provadia. Brine of almost the highest possible salt concentration streamed out of the overlying salt mirror. The Chalcolithic salt producers discovered a perfect brine-boiling technique for a much faster and (for that time) high salt extraction. The change in the salt production technology resulting in a highly increased production capacity of the »plant« near present-day Provadia during the Middle and Late Chalcolithic suggests a relationship between salt production and trade on the one hand and the plentitude of prestigious goods exceptional for that period at the Late Chalcolithic »gold« Varna cemetery nearby on the other hand.

Le sel et l'or: Provadia-Solnitsata et la nécropole chalcolithique de Varna

Une analyse succincte d'ensembles mobiliers funéraires de la nécropole chalcolithique de Varna, située sur les rives du lac de Varna (Nord-Est de la Bulgarie) près de la côte occidentale de la Mer Noire, montre une provenance exogène de la matière première qui les composent. Une partie des artefacts ont apparemment été produits ailleurs. La plus grande partie des outils en cuivre et des »bijoux« ont bien été réalisés sur place, mais avec des matières premières importées. Il ne fait aucun doute que la richesse de la nécropole de Varna est en relation avec un commerce régulier. La seule richesse naturelle existant dans la région de Varna mais absente de Thrace et des régions environnantes est le sel. Pour la fin de la Protohistoire, le sel ne représentait donc pas seulement la base d'un commerce actif et prospère mais aussi un étalon. Les seuls gisements de sel gemme accessibles à la fin de la Protohistoire dans la région de l'Est des Balkans se situent à Provadia. De l'eau salée (saumure) avec de très fortes concentrations en sel est présente dans cette région. Les chalcolithiques qui exploitaient ce sel avaient développé un procédé permettant d'optimiser, pour la période, cette production de sel en chauffant la saumure, afin de produire davantage de sel plus rapidement. Cette nouvelle technique d'obtention du sel a permis une augmentation rapide de la capacité de production dont la »fabrique« se situe près de l'actuelle ville de Provadia pour le Chalcolithique moyen et final. Cette évolution dans les techniques de production du sel et le commerce qui en découle sont à mettre en rapport avec la surprenante richesse en biens de prestige pour cette période, qui se retrouve dans les sites de la région comme la nécropole chalcolithique finale »dorée« de Varna. *L. B.*

Сол и злато: Провадия-Солницата и Варненския халколитен некропол

Краткият анализ на няколко групи предмети от гробния инвентар на къснохалколитния Варненски некропол на брега на Варненското езеро, Североизточна България, на западния бряг на Черно море свидетелства за неместен произход на суровината за тяхната изработка. Някои групи артефакти най-вероятно са произведени на друго място. Голяма част от медните сечива и »украшения«, както и златните предмети са изработвани на място, но от вносна суровина. Няма съмнение, че »богатството« на Варненския некропол е придобито чрез регулярни търговски операции. Единствената суровина, която е жизненоважна за човека и животните, и е налична в района около Варненското езеро, а липсва в Тракия и съседните

региони, е солта. Ето защо солта не само е предпоставка за активна и успешна търговия, но без съмнение е играла и ролята на всеобщ еквивалент през късната праистория. Единственото местонахождение на каменна сол на Източните Балкани, подходящо за експлоатация и през късната праисторическа епоха е край Провадия. От намиращото се върху него »солно огледало« са изтичали солени извори с концентрация на сол, близка до максималната. Халколитните производители са намерили перфектен метод за много бърз и значителен за времето си добив на сол чрез изваряване на разсол. Промяната в технологията на добива на сол, водеща до възможности за рязко нарастване на производствения капацитет на »фабриката« край дн. Провадия през средния и късния халколит, дава силна подкрепа на предположената връзка между производството на сол там и съответно търговията с нея, и удивителното за времето си богатство от предмети на престижа в намиращия се в същия район Варненски къснохалколитен »златен« некропол.

Schlüsselwörter / Keywords / Mots clés / Ключови думи

Bulgarien / Chalkolithikum / Salzgewinnung / Fernhandel / Gold
Bulgaria / Chalcolithic / salt-making / long-distance trade / gold
Bulgarie / Chalcolithique / sel / commerce à longue distance / or
България / халколит / солодобиване / търговия на далечно разстояние / злато

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