

## DISTRIBUTION AND TYPOLOGY OF GOLD ARTEFACTS FROM THE BRONZE AGE IN THE ALLUVIAL SEDIMENTS IN BULGARIA

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**ABSTRACT.** The article discusses the distribution and typology of Bronze Age gold artefacts found in alluvial sediments in Bulgaria. So far, such objects were found in the sediments of the following rivers: Struma, Ogosta, Iskar, Palakariya, Djerman, Dragovishtitsa, Uineshtitsa, Topolnitsa, Medovska, Dulgidel, Ogosta, Zlatitsa, Luda Yana, Arda, Maritsa, and many of their tributaries. A common trait in the distribution of these gold artefacts is that almost everywhere, where they are observed, there are traces of ancient gold mining. As a whole the objects are very small and the predominant part of them fall in the grain fraction from 1 to 5 mm, while the biggest reach length of 25 mm. According to their construction features, they can be subdivided in two types: simple and complex. The simple alluvial gold artefacts are represented mainly by: beads, lamellas and wires, balls, etc. The complex artefacts are: applications and parts of finery. The widespread distribution of the discussed artefacts in the alluvial sediments of Bulgaria shows that the mining and processing of gold has been already a very widely distributed human activity during the Bronze Age in Bulgaria.

### Introduction

The processes that concern utilization of metal raw materials mark one of the most important steps in the history of mankind and have the role of a turning point in its progress and striving to know bowels of the earth and the natural wealth therein and find ways for their usage. At present, the studies of Bronze Age ore mining and processing of gold in Bulgaria are quite limited. Despite the numerous notes of ancient authors about the extensively developed gold mining in Ancient Thrace and the growing number of recent archaeological evidence for the high capabilities of Thracians for gold processing, the data about this metal in an archaeometallurgical aspect is very scarce. This is the metal that plays fateful role in the development of mankind and the history of gold turns to be history of civilization!

The large scale work and the professional skills involved in the processing of the gold deposits in Bulgaria in ancient times have always provoked the interest of specialists in the fields of geology, mining, archaeology, metallurgy, physics, chemistry, etc. This is because many of these deposits still preserve the traces of mining; metallurgical and water supplying constructions; slag; many piles of sorted placer materials; instruments for crushing, milling, and panning of gold-bearing ore; vessels with processed placer gold; and all of these objects can well serve for reading the history of gold processing in Bulgaria and for specifying the place of gold in the history of the Ancient World. One very strong evidence that is still not enough evaluated by the researchers in respect to large scale activities of mining and processing of gold in ancient times in Bulgaria is the large number of small golden artefacts, which are found in concentrates of heavy minerals,

obtained after processing of alluvial sediments from different parts of Bulgaria (Constantinov, 1949; Bogdanova, 1975; Tsintsov, 1992; Tsintsov, 2000; 2005; Bachmann, Tsintsov, 2003; Tokmakchieva, Daskalov, 2005; Vardev, 2005). A very approximate personal evaluation only for the last 25 years revealed that during various activities in the alluvial depositions in Bulgaria more than 50 thousands gold artefacts (not included in this number are the golden balls, which probably exceed millions in number) have been found. It is a pity that either because of lack of knowledge or due to primary human willingness to own the metal from which these artefacts were produced, today many of them are lost irreversibly. Such a behavior in respect to these artefacts is based on the fact that many years they have had no analogue in the Bulgarian archaeology. Thus, many specialists have been forced to be very careful even skeptical in respect to the cultural-historical significance of such artefacts. Not knowing them has always been creating misgivings among the specialists about their relation to certain historical age, especially in the cases when such period is quite distant in time and relatively poorly known from the point of mining and processing of gold as is the Bronze Age itself.

### Analogy with the Dubene village gold artefacts

This insignificant interest towards the alluvial artefacts started to change very recently, in fact in the second half of 2004, when a unique gold treasure from the Bronze Age has been discovered in a burial mound necropolis near the village of Dubene in Karlovo District (Christov, 2005). A great part of the artefacts in this treasure are entirely identical in morphology and size with the artefacts in the alluvial depositions in Bulgaria. This proves that all finds have been

worked out during one and the same historical period and undoubtedly suggests that during the Bronze Age in Bulgaria, there have been already an intensive widespread distribution of activities connected with mining and processing of gold (Tsintsov, 2005).

### Distribution

The field investigations of the author of the present paper that continued more than 25 years have shown that the alluvial depositions from the main water collecting network of almost the whole of Western Bulgaria displayed the presence of such gold artefacts. These sediments have been processed many times for obtaining of placer gold and certain part of the volume of the sandy fraction is formed at the expense of the residual pulp from the processing of the Paleogene depositions in the respective regions. This is the main reason why these sediments are not so rich in native gold compared to other placers in the corresponding region that have remained untouched during the ancient gold mining.

Different quantities of artefacts with various morphology and dimensions have been found so far in the alluvial sediments of the rivers Struma, Ogosta, Iskar, Palakaria, Djerman, Dragovishtitsa, Uineshtitsa, Topolnitsa, Medovska, Dalgodelska Ogosta, Zlatitsa, Luda Yana, Arda, Maritsa and many of their smaller tributaries (Fig. 1). Their distribution in the depositions is characterized by a common trait, namely, they are found in places, where traces of ancient gold mining have been found in a given region. These traces are most impressive on the territory of the Kyustendil and Montana districts, where, even today, there are still piles of rock pieces or processed pulps with volumes of up to several tens of mill. m<sup>3</sup> that have remained as a result of this activity.

### Typology

The abundance of gold artefacts found so far in the alluvial sediments in Bulgaria offers a great diversity in respect to their morphology and size. As a whole, the objects are very small and the prevailing part fall in the grain size fractions between 1 and 5 mm, while the bigger reach a length of up to 25 mm. In general, they all are characterized by a strict geometrical style expressed in simple and stylized lines and demonstrate peak achievements of the ancient jewellery art. There are no extravagant ornaments and “forgotten” microscopic defects caused by the used instruments and techniques during their preparation. According to their construction features the alluvial gold artefacts can be subdivided in two types – simple and complex. The first type of artefacts is composed of objects that have been worked out from just one element and in the majority of cases they represent separate details from one bigger gold ornament or probably they have been initially made for preparing of complex objects. The artefacts that are from the complex type have been worked out from two or more separate objects and in the predominating part of cases their connecting part has been prepared in such a way that it is impossible to observe it directly with a naked eye. These peculiarities concerning the joining of the constituent alluvial artifacts give reason to the author to suppose that the ancient masters on Bulgarian lands have been quite aware of the principles and possibilities of the powder metallurgy.

Depending on their morphological peculiarities and most probable function, the simple alluvial artefacts are subdivided into beads, lamellas and wires, balls and other. The beads have rounded contour and an opening in the centre that has been probably used to string them and prepare gold finery. Morphologically they are very diverse and are represented by several groups: platy, cylindrical, prismatic, biconical and spherical beads.



Fig. 1. Schematic map of the Bulgarian river system and the alluvial depositions containing gold artefacts

A very small part of the plate beads possess simple ornaments on their periphery that makes them look like cogged wheels. The periphery of the beads in the majority of cases plays the role of a front part. Their size varies in wide ranges and the outer diameter is most often in the range 1 to 3.5 mm rarely reaching 12 mm. It is quite probable that part of the cylindrical and prismatic beads had been designed for preparation of distributors for the different kinds of ornaments and also through them the functional openings had been formed. The plates have mainly rectangular cross section and the small size is in the range from 0.4 to 0.8 mm while the others are several times (4 to 10) bigger. In the prevailing part of cases the third dimension is much bigger than the first two thus giving the plates a band-shaped form. There is rarely observed a golden wire with diameter of the cross section in the range of 0.4 to 0.6 mm. Sometimes the plates and wire are twisted around the long axis, which gives them a greater variance. The plates and wire have served for preparation of rings, band-shaped spiral and springs. The length of the biggest artefacts reaches up to 25 mm. Recent studies have shown that it is very probable that some groups of beads like the plate, cylindrical and prismatic beads have been prepared from plates and wires.

The spheres are the most widespread alluvial gold artefacts and their quantity probably reaches some ten of millions in number. They have the form of almost ideal spheres rarely the form of a droplet and their diameter varies from 6-8  $\mu\text{m}$  up to about 3 mm. They are most probably the result of spread out of melted metal around the metallurgical centre, where the mined gold has been processed. In this case, the possibility that part of the balls has been specially prepared as precursors for working out of other artefacts like flat beads and different constructions made of balls should not be excluded. In the category "other" simple alluvial gold artefacts are grouped, such with a strange form and not so clear purpose – hooks, plates (smooth or with unclear symbols on one side), ornaments, etc. The complex artefacts are grouped as applications or parts of finery. The applications are designed for stitching and buttoning up to soft materials. They have been made of spirals, cylindrical beads, plates, etc. and have rings as attachments in the two opposite ends, which have been used for stitching. Related to this category of artefacts are decoration nails with one- or two-shoulder fastening stems. In this category also fall different constructions of balls skilfully bound together and having almost equal dimensions. The finery parts have elongated form and most probably represent elements of diadems, necklaces, or earrings. Their long stem is worked out from a smooth or twisted wire or from a plate, which ends with a ring at one end. The ornaments around the stems are made of other pieces of wire, or from very finely and stylistically bended plates.

The surface elemental analysis (Philips SEM-515, with energy dispersion X-ray spectral micro-analyzer PV-9100, working at U=25-30 kV and I=0.5 mA, and scanning time of 80-100 s) showed that the alluvial gold artefacts are composed mainly of Au in quantities from 58.81 to 100.0 at.%. These values specify the quality of gold being between 14 and 24 carats, which determines the artefacts as medium to very high hallmark. The elements admixtures in the gold matrix are represented mainly by Ag (up to 41.19 at.%) and very rarely by Cu (up to 1.56 at.%).

## Conclusions

The relation "alluvial gold artefacts from the Bronze Age – anthropogenic placers" proves the existence of gold mining-metallurgical complexes during the Bronze Age in Bulgaria. The artefacts from these complexes represent one impressive heritage, which is charged by a huge informational potential that is worth to be patiently read and correctly discussed. Probably, not all objects have been worked out during one and the same historical period, which additionally indicates that mining and processing of gold on Bulgarian lands have had multi-century traditions and the achieved abilities and skillfulness of the native population have been continuously transferred through many centuries by the members of one relatively restricted society. This society has reached high levels of skillfulness in processing of gold for its historical time, which, however, has been forgotten due to diminishing in number or assimilation of these people. The contemporary discussion and comparison of the artefacts from the alluvial sediments in Bulgaria and those from the burial mound necropolis near the village of Dubene will help in solving of many basic questions connected not only to uncovering of the lifeways, the rituals and the habits of the population that has lived in Bulgaria during the Bronze Age but will help to answer main questions concerned with more precise chronology and periodisation. Up to the present moment such complex studies have not been conducted. However, the existing facts (namely archaeomineralogical and archaeological) in Bulgaria give good basis for performing such studies and finding the activities connected to mining and processing of gold during the Bronze Age in Bulgaria is worth the effort and investment in this field.

## References

- Bachmann, H.-G., Z. Tsintsov. 2003. Placer gold in SW-Bulgaria: past and present. – *Gold Bulletin*, 36, 4, 138-143.
- Bogdanova, R. 1975. Morphological peculiarities and composition of placer gold from the Panagyurishte Region. – *Ore-forming Processes and Mineral Deposits*, 3, 3-8 (in Bulgarian).
- Christov, M. 2005. Necropolis from the Early Bronze Age near Dubene, Karlovo District (preliminary report). – *Archaeology*, 1-4, 127-137 (in Bulgarian).
- Constantinov, M. 1949. The old gold production in the Kraishte. – *Mining Affairs*, 4, 81-84 (in Bulgarian).
- Tsintsov, Z. 1992. Unique finds of golden articles in alluvial placers. – *Compt. Rend. Acad. Bulg. Sci.*, 45, 6, 59-61.
- Tsintsov, Z. L. 2000. Unique finds of golden articles in alluvial placers in Bulgaria. – *Japanese Magazine of Mineralogical and Petrological Sciences*, 29, 2, 52-58 (in Japanese with an English abstract and remarks by Prof. Tadato Mizota).
- Tsintsov, Z. 2005. Gold artefacts from the alluvial sediments of Bulgaria – indicators for gold mining and metallurgy during the Bronze Age – In: *Proc. Anniversary Intern. Scientific Conference "80 Years Bulgarian Geological Society", 17-18, November 2005, Sofia*, 217-220.
- Tokmakchieva, M., T. Daskalov. 2005. Typomorphic features of the placer gold from the Panagyurishte Region. – *Mining Affairs and Geology*, 8, 36-40 (in Bulgarian).
- Vardev, N. 1995. The Kraishte – a gold-bearing region. – *Geology and Mineral Resources*, 5, 3-6 (in Bulgarian).

