YAMNAYA CULTURE HOARD OF METAL OBJECTS, IVANIVKA, LOWER MURAFA: AUTOGENESIS OF ‘DNIESTER COPPER/BRONZE METALLURGY’

ABSTRACT

In 2015 near the village of Ivonivka, Mohyliv-Podilskyi Region, Vinnytsia Oblast, a hoard of copper objects was found by chance by the River Murafa. The majority of objects belonging to the hoard were fashioned out of a rather pure copper with a combination of admixtures, which can be named ‘the Ivonivka group’.

Key words: hoard, yamnaya culture, Middle Dniester Area

Up to only some years ago among the research results of barrow complexes along the Middle Dniester – Kamenka/Ocniţa and Yampil barrow cemetery complexes there was a lack of data related to metal objects from the Yamnaya culture (YC) and decline phase of Eneolithic culture [Manzura, Klochko, Savva 1992; Koško, Potupczyk, Razumow (Eds) 2014; Koško (Ed.) 2015; Klochko et al. 2015]. In this context, the discovery of a hoard of metal goods near the village of Ivonivka in the upper course of the Murafa, has significantly changed our conception of the beginnings of copper metallurgy and early phases of its development in this northern part of the Black Sea Region.

In 2015 near the village of Ivonivka, Mohyliv-Podilskyi Region, Vinnytsia Oblast, a hoard of copper objects was found by chance by the River Murafa [Klochko, Kozymenko 2016: 2.1.16]. The circumstances related to the discovery of the hoard, precise localisation and its connection to the settlement or encamp-
sent, remain unknown. The discovery though, on the western border of the Yampil barrow cemetery complex is in a particular way associated with it [Potupczyk, Razumow 2014: Fig. 1.2: 1].

1. DESCRIPTION OF THE IVONIVKA HOARD

The hoard contained: 1. shaft-hole axe, length 11.2 cm, blade width 5.4 cm, butt width 2.8 cm, butt diameter 2.1 and 2.2 cm; 2. bit, length 10.1 cm, diameter 1.0 cm; 3. adze, length 7.6 cm, blade width 3.6 cm, thickness 0.6 cm; 4. adze, length 7.4 cm, blade width 3.2 cm, thickness 0.4 cm (Fig. 1).

A spectral analysis of objects from the hoard was conducted by T.Yu. Goshko at the laboratory of the Institute of Archaeology, NAN Ukraine (Tab. 1).
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Spectral analysis of objects conducted by T.Yu. Goshko at the laboratory, Institute of Archaeology, NAN Ukraine.
The majority of objects belonging to the hoard were fashioned out of a rather pure copper with a combination of admixtures, which can be named ‘the Ivonivka group’ (Tab. 1: An. nr. 1328 – 1331), whereby one of the adzes was made out of an arsenic metal alloy from the arsenic group, whose contents is greater than 1% (see below for the chronology of arsenic bronzes appearing in the region).

The shaft-hole axe from the Ivonivka Hoard was cast in a ‘close’ two-part mould (Fig. 1: 1), of a rather advanced technology. This ought to be related to a later chronology, to that of a ‘late pit grave’ phase, which in the middle drainage basin of the Dniester is dated to 2650-2500 BC [Yampil dating of the decline YC – Goslar et al. 2015: 281-282]. In respect to this axe, in my opinion, the description ‘Ivonivka type’ is the best fit, belonging to the decline YC.

The objects from the Ivonivka Hoard (Fig. 1: 2) are one of a kind; it is the first discovery of such a find of a metal tool from the early Bronze Age in the northeastern Black Sea Region. The artefacts from the hoard (Fig. 1: 3, 4) have a similar form to that of Eneolithic ‘Usatovo’ and ‘Maykop’ flat axe-adzes in the Anatolia tradition, though differing significantly in their smaller dimensions, though among ‘Maykop’ samples there also occur similarly small products (Fig. 12: 4-6; 7).

It is possible to suggest that the ‘Ivonivka Hoard’ reflects the craftwork of a master carpenter, which ought to be dated to the late phase of the YC. It is particularly interesting to find analogies of this with the wooden cart from site 6 in Pysarivka near Yampil [Harat, Potupczyk, Razumow 2014: 142-145] in respect to its possible constructors and place of workshop.

2. THE IVONIVKA HOARD IN THE CONTEXT OF RESEARCH ON THE OLDEST METALLURGY IN THE EASTERN CARPATHIANS, PODOLIA AND VOLHYNIA.

The other signs of metallurgy in the eastern Carpathians, Podolia and Volhynia continue to find little study. The research of N.V. Ryndina on the metallurgy of this region [Ryndina 1971, 1980, 1998] despite everything have left the exploitation of local deposits by the most chronologically distant of regional metallurgists an unresolved question.

Our research, conducted together with geologists and metallurgists have somewhat broadened our concept of copper ores in the region and their exploitation in the period of the Tripolye culture [Klochko et al. 2000; Kloczko et al. 2003].

Yu.N. Maleev [1976] wrote on the local metallurgy in the decline Bronze Age – on the basis of materials from the Myshkovychi site, Gava-Holihrad culture as did Goshko [2011] – the basis of spectral and metalographic research of objects from the cemetery complex in Hordiyivka (Gordievka).
The above research field gained further perspective in the Carpathian – Volhynia “Willow Leaf” study at the Metallurgy Centre of the ‘Circum-Pontic metallurgical province’ [Klochko, Klochko 2013: 54-55].
The most recent attempt to use information gained at commercial Internet auctions related to new complexes of the Cucuteni-Tripolye culture, discovered through the use of metal detectors on the Dniester drainage basin and eastern Carpathians undertaken by V. Dergachev [2016], demonstrated the significant potential of this research direction in the context of a total disintegration of relic preservation in post-Soviet Eastern Europe.

The above-mentioned article brings to research practice in particular complexes and objects from a huge collection, studied, investigated and recently published by us [Klochko, Kozymenko 2016], which to a significant degree change our concept of the metallurgy of prehistoric communities in the Eastern Carpathians and Podolia.

2.1. CONTEXT OF THE OLDEST, ENEOLITHIC METALLURGY IN THE MIDDLE DNIESTER DRAINAGE BASIN AND PODOLIA.

First and foremost, four new complexes subject to research have been introduced, discovered both in the area of the (a) Yampil barrow cemetery complex and (b) in neighbouring regions, situated more to the west of Chernivtsi Oblast, Khmelnytsk Oblast and Ternopil Oblast.

a. The hoard from the Yampil barrow cemetery complex: Velyka Kisnytsia Yampil Region, Vinnytsia Oblast.

In 2015 a hoard of copper objects was found near the village of Velyka Kisnytsia, at the Tripolye culture settlement, dated to period B [Klochko, Kozymenko 2016: 1.2.48]. The ‘Velyka Kisnytsia Hoard’ contained: 1. A multi-coil bracelet (?) from a rod with a diameter of 0.3 cm, diameter 15 cm, length 5.2 cm (a second, similar bracelet, damaged by a plough, was not included in the collection); 2. Disc, ornamented punch, diameter 7.8 cm, height of cone 1.3 cm; 3. Disc, ornamented punch, diameter 8.5 cm, height of cone 1.4 cm; 4. Disc, ornamented punch, diameter 7.8 cm, height of cone 1, 1 cm; 5. Disc, ornamented punch, diameter 14 cm, height of cone 2.6 cm; 6. Pendant, measuring in length 4.8 cm; 7. Pendant measuring in length 3.5 cm; 8. Double-twined piped beads measuring in length from 3.7 to 4.4 cm, thickness from 1.5 to 2.0 cm; 9. Round beads with a diameter of 0.6 cm. (Fig. 2).

Of particular note are the discs found in the hoard, ornamented by means of indentation in the form of anthropomorphic figures (?), Similar to Eneolithic goods from the Dunaj Region (Fig. 3).

The ‘Velyka Kisnytsia Hoard’ is the oldest hoard of copper objects from the Tripolye culture, among those found in Ukraine. On the basis of chronological analysis of ceramic ware from the settlement (conducted by M.Y. Videiko) it can
be dated to the BI phase of this culture. Objects from the hoard possess analogies to those from Romania, the Hăbășești settlement and Brad Cucuteni culture, phases A2-B1 [Mareș 2012] (Fig. 4).

The copper in the ‘Velyka Kisnytsia Hoard’, on the basis of micro-admixtures content, can be divided into two basic groups: An. 1362 – 1364 and An. 1359 – 1361. The latter is similar to the metal from the ‘Ivonivka Hoard’ (Tab. 1). The similarity of micro-admixtures content in copper from hoards of such diverse chronology points to the one and the same, clearly local, source of raw materials.
Fig. 5. The Kelmentsi Hoard. Kelmentsi Region, Chernivtsi Oblast [after Klochko, Kozymenko 2016]. See Tab. 1: 2 – analysis number 1358, 3 – analysis number 1355, 4 – analysis number 1357, 5 – analysis number 1356

Fig. 6. Letychiv Hoard. Letychiv Region, Khmelnytskyi Oblast [after Klochko, Kozymenko 2016]
Clearly, these are Dniester copper-bearing sandstones, whose exploitation by Tri-polye culture metallurgists has already been recorded [Klochko, et al. 2000; Kloczko, et al. 2003] on the basis of materials in the Upper Dniester drainage basin.

**b. Hoards from the Dniester drainage basin, found beyond the Yampil barrow cemetery complex:**

(ba) hoard of ornaments, Kelmentsi Region, Chernivtsi Oblast, represents the local crafts of several types of ornaments from the decline Tripolye culture, from local raw materials; (bb) assemblage, discovered Letychiv Region, Khmelnytskyi Oblast most likely related to the work of ornamentation is of miners, perhaps also

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**Fig. 7.** The hoard from the Loshniv site, Terebovlia Region, Tarnopil Oblast [after Klochko, Kozymenko 2016]. See Tab. 1: 1 – analysis number 1332, 2 – analysis number 1327.
miners of ore; (bc) assemblage from the village of Loshniv, Terebovlia Region, Tarnopil Oblast, as the first find of arms and work tools belonging to the Gordinești group, late Tripolye culture.

**ba.** In 2015, Kelmentsi Region, Chernivtsi Oblast, a hoard was found (Fig. 5) [Klochko, Kozymenko 2016: 1.2.49] at the Tripolye culture settlement.

The ‘Kelmenski Hoard’ found in a vessel from the CI stage of the Tripolye culture, contained: 1. Vessels; 2. Spiral twined beads; 3. Chisel (length 10 cm; thickness 1 cm; blade width 1.6 cm); 4. Rings; 5. Funnel beaker pendants (Fig. 5). This is the first hoard of a Tripolye master craftsman – of copper ornaments. Metal, from which the goods were made, part of this hoard, is homogenous (Tab. 1: An. 1355 – 1358) and another sample, analogous to the raw material of products from the settlement of Hlybochok [Klochko, et al. 2000; Kloczko, et al. 2003].

**bb.** Indirect proof of local copper extraction in the Eneolithic is the hoard, discovered in 2005 Letychiv Region, Khmelnytskyi Oblast [Klochko 2001: Drawing 5] (Fig. 6).

The ‘Letychiv Hoard’ contains four objects: a unique, massive shaft-hole axe-mattock with a long pipe sleeve, measuring in length 15 cm; a miniature axe-adze, measuring in length 11 cm (sceptre head) and two pendants in the form of axe-adze models, measuring in length 5.2 and 3.4 cm (Nicholas elements). In general, these finds as a whole remind us not a hoard, but the grave furnishings of an ore miner (axe-mattock models in the form of a sceptre and pendants can be understood as examples of the secularisation of work tools belonging to ore miners and their work).
bc. In 2016 a hoard was discovered near the village of Loshniv, Terebovlia Region, Tarnopil Oblast (Fig. 7) [Klochko, Kozyumenko 2016: 1.3.49].

The hoard from the Loshniv site contains: a Mediterranean dagger (Usatovo), length 20.4 cm, thickness 0.5 cm, handle width 5.2 cm (an. nr 1332) and adze (flat shaft-hole axe) Small-Asian (Usatovo, or also Maykop), length 13.6 cm, thickness 0.5 cm, blade width 5.6 cm (an. nr 1327) (Fig. 7, Tab. 1). Both objects were fashioned out of arsenic bronze. Such an assemblage of objects (dagger and shaft-hole axe) is characteristic for ‘Princely’ burials of the Usatovo (group), late Tripolye culture [Klochko 2001: 43-49, Fig. Tab. 1, 9; Klochko 2006: 34-37, Drawing 9, 11]. Similar, flat axe-adzes are also known in Maykop culture in the northern Caucasus [Chernykh 1966] (Fig. 8). Usatovo products fashioned out of arsenic bronze, Anatolia type, are considered to be the oldest products fashioned out of bronze in the northern Black Sea area [Ryndina, Konkova 1982]. The hoard from the Loshniv site, which in all probability belongs to the Gordanestu group, late Tripolye culture, demonstrates that arsenic bronzes of the Anatolia type are becoming widespread from the second half of the 4th mill. BC in the entire Dniester drainage basin as far as its northern course.

2.2. THE CONTEXT OF ‘EARLY BRONZE’ METALLURGY ON THE MIDDLE DNIESTER DRAINAGE BASIN AND PODOLIA.

The ‘Ivonivka Hoard’ – the first such find in Ukraine and the second after the ‘Vilcele or Baniabic/Bányabük Hoards’, discovered in Romania, Cluj, Transylvania-
Fig. 10. The barrow near the village of Pidliissia, Brovary Region, Kiev Oblast, Ukraine, burial 1/2 (1); Silver Temple rings (2); shallow navy blue-pestle (3); copper shaft-hole axe (4). [after Bratchenko, Klochko, Soltys 2000]
YC hoards. The ‘Vilcele Hoard’ contained 32 objects – only axes – whereas the
‘Ivonivka Hoard’ boasts an entire set of tools for fashioning wood: shaft-hole axe,
two adzes and a bit, being the first such hoard of a master-carpenter of the YC.

Despite the fact that the axes from the ‘Vilcele Hoard’ are rather differentiated
in respect to their form and technology of production (some were cast in open-cast
moulds, while others – enclosed two-part moulds, whereby in the latter the respec-
tive axe forms of rather differentiated form and technology of production were
linked) (Fig. 9). All of these are traditionally recorded as the one type by Vulpe
[1970], as Baniabic/Bányabükk, considered to be the oldest type of axe with an
opening for a shaft hole, in the Carpathian Basin (shaft-hole axes in the Carpathian
Basin) [Dani 2013].

In this context, there has been recent mention on the fact that the evolution
of shaft-hole axes began in the northern Black Sea area as early as the Eneolithic
from axes of the Sokolov type, which subsequently link axes of the ‘Pidlissia and
Baniabic/Bányabükk type’ [Klochko, Klochko 2013: 54-55].

In earlier literature, based on a new find of an analogous axe, cast in an open
mould form, in a YC early pit burial (deceased placed in a supine position with legs

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Fig. 11. Metal objects: 1 – ingot of ‘raw copper’ from the Humentsi site, Kamianets Region,
Khmelnitskyi Oblast [after Klochko, Kozymenko 2016]; 2 – bronze tiles from the inhumation,
Prydnistryanske I/4 [after Klochko, et al. 2015]. See Tab. 1: 1 – analysis number 1042
Fig. 12. Casting mould from Zherdenivki, Haisyn Region, Vinnytsia Oblast (1); casting mould from Pysarivka, Starokostiantyniv Region, Khmelnytskyi Oblast (2) [after Klochko, Kozyumenko 2016]
contracted at the knees), Pidlissia site, Brovary Region, Kiev Oblast, [Bratchenko, Klochko, Soltys 2000] (Fig. 10: 4), I propose such axes be known as the “Pidlissia variant” of the ‘Baniabic/Bányabükk type’ [Klochko 2001: 78-83; Klochko 2006: 65-66]. Further, bearing in mind the significant differences in the technology of production, it would be more correct to speak of the ‘Pidlissia type’, which belongs to the early phase of the YC – dated in the Middle Dniester drainage basin to 2800 – 2350 BC [Klochko 1999: 195].

To this early period of the Bronze Age the ingot of ‘raw’ copper from the Humentsi site is also dated, Kamianets-Podilskyi Region, Khmelnytskyi Oblast, (Fig. 11: 1). Its dimensions are: 12x13x3 cm and correspond to medium-sized so-called ‘caste bowls of the early Bronze Age in Europe [Bátora 2006: p. 29; Plates 16, 7]. The metal out of which the ingot is made, is copper of a particularly characteristic (Dniester) composition of micro-admixtures (Tab. 1: an. nr 1042). This testifies to the smelting of copper from a local material in a given region.

The tradition of processing arsenic bronze during the decline Tripolye culture (Usatovo arsenic bronzes and those from the site of the ‘Loshniv Hoard’) is also continued in the Dniester Region during the early Bronze Age. This is testified to not only by the adze from the ‘Ivonivka Hoard’ (Fig. 1, 3; an. nr 1329), but also ‘guards’ serving as reinforceers in the wooden handle of the stone mace from the inhumation grave of the Catacomb culture, Prydnistryanske 1, I/4 near Yampil (Fig. 11: 2, Tab. 1: an nr. 1145) [Klochko, et al., 2015: 188-189, Fig. 7], also made out of arsenic bronze. The metal from which these ‘guards’ are made is entirely analogous to that of the adzes from the ‘Ivonivka Hoard’, which points to the one and the same source of raw material.

2.3. CONTEXT OF THE CONTINUATION OF METALLURGY TRADITIONS IN THE LATE AND DECLINE BRONZE AGE.

The subject of local metallurgy and its processing in the late Bronze Age has been discussed by Maleev [1976] and Goshko [2011]. New finds of bronze casting forms for Lusation sleeved hammer-axes, related to the early phase of the Chernoles culture [Klochko 2016a; 2016b] from the villages of Zherdenivka, Haisyn Region, Vinnitsia Oblast (Fig. 12: 1) and Pysarivka, Starokostiantyniv Region, Khmelnytskyi Oblast (Fig. 12: 2) [Klochko, Kozymenko 2016: 4.2.4.2; 4.2.4.3] are broadening the base of information on prehistoric metallurgy in the Dniester drainage basin. There is no doubt that the metallurgy of this region in the Late Bronze Age requires a separate study; nonetheless it is possible to note that also in this period the above-mentioned materials testified to a further exploitation of local copper ores.
The exploitation of Dniester copper bearing sandstone was commenced by Tripolye craftsmen already by the BI phase at the latest. As a result, as in the case of exploiting Volhynia copper, the metallurgy of the middle and late Tripolye culture develops in similar fashion in eastern regions of the Funeral Beaker Culture and Lublin-Volhynia Painted Ceramic ware culture.

The new materials presented (Fig. 13) show that the earlier presented and subjected to study, *Carpathian Volhynia Early Bronze Age centre of Metallurgy of the Corded Ware culture* [Klochko, Klochko 2013] took shape in the Dniester drainage basin on the basis of Tripolye culture metallurgy, whereas in the Early Bronze Age
its south-east part (foremost in the region of the Yampil Barrow Cemetery Complex) was exploited by autochthons of the Yamnaya and Catacomb cultures.

Moreover, in the Middle and Late Bronze Age, local metallurgy continued to be developed by the cultures of Babino, Komarov, Noua, Gava-Holihrad and Chernoles. Importantly, Dniester copper was also exploited during the Iron Age and the Middle Ages.

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