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Natasha Eniosova

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A unique 10th century AD gold-plated brooch from south-east Russia: technical and stylistic authentication

*Une broche unique plaquée or du X^e siècle apr. J.-C. provenant du Sud-Est de la Russie :
authentification technique et stylistique*

Natasha ENIOSOVA*

Abstract: The gold-plated brooch with filigree and granulation was recovered by hobby metal-detecting in the vicinity of the city of Bryansk. The aim of this paper is to present some initial results representing the outcome of the archaeological and technological examination of this unique piece of jewellery. The composition of the metal and the method of fabrication were investigated using ED-XRF and microscopic analyses. The technical examination revealed that the brooch belongs to the Scandinavian stylistic and technological circle. However, technically it differs in three significant details from the Northern art tradition of filigree and granulation. First, the upper embossed panel, made of high purity gold, is placed on a solid silver base and fixed with six gold rivets. Usually, it was constructed of a flat based plate and a domed relief upper plate made of the same metal. The second unusual technique whose application was identified on this brooch is the use of a mercury amalgam solder for joining the filigree and granulation to the substrate. The last peculiar detail is the use of geometrical granulation associated with Slavic art. Such elements appear on a number of Gotlandic ornaments from the late Viking Age. The gold brooch was possibly produced in Gotland based on the Scandinavian tradition, but also displays features of Slavic influence in its design.

Résumé : La broche plaquée or décorée de filigranes et de granulation a été trouvée avec un détecteur de métal dans les environs de la ville de Bryansk. Le but de cet article est de présenter les premiers résultats obtenus par examen archéologique et technique de cette pièce unique d'orfèvrerie. La composition du métal et les techniques de fabrication ont été étudiées par ED-FX et au moyen d'analyses microscopiques. L'examen technique révèle que la broche appartient à l'aire de circulation stylistique et technologique Scandinave. Néanmoins, du point de vue technique, trois détails significatifs diffèrent de l'art du filigrane et de la granulation du Nord. Premièrement, le panneau supérieur en repoussé fabriqué en or très pur est placé sur une base en argent massif et fixé à l'aide de six rivets en or. En général, ce panneau était constitué d'une plaque plate et d'une plaque supérieure bombée, en relief, réalisée dans le même métal. La deuxième technique inhabituelle trouvée dans la fabrication de la broche est l'utilisation de l'amalgame de mercure pour souder les filigranes et les granules au substrat. Le dernier détail particulier est l'utilisation de granulation géométrique associée à l'art Slave. Ces éléments apparaissent sur certains ornements de Gotland, de l'Âge des Vikings récente. La broche en or a pu avoir été produite en Gotland, à partir de la tradition Scandinave, mais sous influence Slave en ce qui concerne le motif.

Keywords: Filigree, gold jewellery, granulation, Viking Age.

Mots-clés : Filigrane, orfèvrerie, granulation, Âge Viking.

*Department of Archaeology, Faculty of History – Moscow State University. Lomonosovsky prospect, 27-4, 119992, Moscow, Russia. (eniosova@inbox.ru)

1. INTRODUCTION

The elaborately decorated gold ornament was recovered as part of an alleged hoard by hobby metal-detecting in the vicinity of the city of Bryansk, in the region between the Dnepr and Desna Rivers (Fig. 1). According to the collec-

tor's information, this alleged group consists of the brooch and Byzantine gold coins¹. The provenance of the brooch is not recorded, but it is of the type found throughout the Viking sphere of influence. Brooches are the most common ornaments of the Viking period. Their function was to hold up a shawl, cloak or jacket over the dress (Hägg, 1971).

Figure 1: Location map showing the city of Bryansk in the south-eastern part of Russia. The present city of Bryansk has yielded no traces of settlement dating to the Viking period. According to the chronicle, it was known since the 12th century AD.

Figure 1 : Carte situant la ville de Bryansk dans le sud-est de la Russie. La ville actuelle de Bryansk ne montre pas de traces d'habitation de la période Viking. Selon les chroniques, la ville est connue depuis le XII^e siècle.

1. Constantine VII Porphyrogenitus with Romanus II (945-959).

More than 4,000 brooches have been found in an area spanning from Iceland and Ireland in the West to the Western Siberian plain in the East (Jansson, 1985). Almost 300 genuine Scandinavian brooches originate from the territory of modern Russia, Ukraine and Belorussia, united in the Old Rus' Kingdom in the course of the 10th century AD. A significant percentage of the brooches belonging to the oval, round, trefoil, annular, penannular and equal-armed types are made of copper alloys. Others are made of a gold, silver and lead-tin alloy. Brooches made of gold represent the rarest group of Viking Age jewellery. Twelve gold disc-shaped brooches with filigree and granulation are already known from the Viking World (Eilbracht, 1999; Eniosova, 2007). The aim of this paper is to present some initial results representing the outcome of the archaeological and technological examination of this unique piece of jewellery in light of the distribution and use of gold in Scandinavia and Rus' during the period between the 10th and the mid-11th century AD.

2. METHOD OF EXAMINATION

The first aims of the examination were to determine the composition of the metal of the various components and to find out how they were made². The identification of the nature of the metal was based on ED-XRF analyses, using an ARTAX (BRUKER AXS) instrument and software, fitted with a Mo target and semiconductor detector. Typical analytical conditions were a tube voltage of 50 kV and a current of 700 µA. Each spectrum was recorded for 180 s. The sample regions have been analysed with a 0.2 mm collimator. Quantitative data were obtained for gold, silver, copper and mercury. The calculation of the weight concentration of elements without standards has been carried out by a method of fundamental parameters.

The next stage was to investigate the components of which the brooch was constructed and how they were joined together. Microscopic examination of small-scale details was carried out using a Stemi 2000 stereomicroscope with digital camera and AxioVision (Karl Zeiss) software for a precise measuring of the delicate grains and wires.

3. RESULTS AND DISCUSSION

The equal-armed brooch is 68 mm long and 45 grams in weight. It consists of an embossed upper panel with fili-

gree and granulation and a solid silver back with a silver pin, pin attachment and catch-holder (Fig. 2). The technical examination of the brooch revealed that a relief of the upper panel was made from hammered sheet of gold with a positive die to form the main elements of the relief, with an animal pattern, where a pair of beasts is opposed in the mirror symmetry. The upper sheet was folding over a solid thick (2 mm) silver base. The silver base was cast in the clay bivalves mould made, possibly, by the same die impression. Two notches were cut for the pin attachment and one for the catch-holder in the bottom part of the mould. Both parts were attached with six gold rivets.

Without radiography, we could not reveal what type of surface (smooth or relief) was present under the gold plate. It is unlikely that the silver base of the brooch was used as a positive die for making its gold covering, because the silver-copper alloy (Ag – 80%; Cu – 20 %; HV – 45) is much softer than brass, gunmetal or tin-bronze, and would be easily damaged during its use as a patirix (Scott, 1991; Meeks and Holms, 1985). The pin attachment and catch-holder also show a complicated use of the silver base as a die.

Highly stylized animals are shown in the front-facing part of the brooch, with round eyes and a nose made with a twisted wire (D 0.4 mm) and granules (D 1.2 mm). This particular type of animal ornament corresponds to the Viking Jellinge art style, dating to the 10th century AD (Jansson, 1991). The necks, bodies, head and shoulders were 'drawn' by two-strand bands of beaded wires and filled by the gra-

Figure 2. Front and back of gold equal-armed brooch from the Bryansk area.
Figure 2 : Anvers et revers d'une broche à bras symétriques de la région de Bryansk.

2. The examination was not complete because the brooch originated from a private collection.

nules (D 0.36-1.25 mm). Beaded wires of three different sizes (D 0.7-0.95 mm) were made holding the swages at a right angle. Interlacing bands composed of beaded wire are characteristic of the Scandinavian art of filigree and granulation. This tradition is also characterised by the use of dies with embossed relief and irregular granules. However, the upper panel of the brooch is decorated with triangles of regular granules; the row of the animal teeth on the edge is depicted by triangles made of 3 granules (Fig. 3). Geometric patterns of regular granules, and the subordinate role of the filigree occupying the margins and rear, using beaded wire, are characteristic of Slavic ornaments from the 9th-10th centuries AD (Duczko, 1985).

ED-XRF analyses indicate a high purity of the metal and a relatively low content of silver and copper (Au – 91.3%; Ag – 2.51%; Cu – 2.64%; Hg – 3.55%). The silver base was cast of silver alloyed with copper (Ag – 77.62%; Cu – 22.38%) and possible minute traces of lead and gold. There are no visible traces of solder on the upper plate, but the microprobe analysis shows that the base plate clearly contains more copper than either the tops of grains or the wire. We can thus put forth the hypothesis of a conventional solder alloy – that is, extra copper has been added to a gold alloy in order to reduce its melting temperature. However, a

small quantity of mercury was detected on the surface of the upper sheet (Fig. 4). It could derive from the use of an amalgam solder. Gold-mercury solder recipes have survived in the medieval *Mappae Clavicula* manuscript, possibly dated to the 10th century (Ogden, 1994). Soldering experiments by F. Mishukov in Moscow and A. Minzulin in Kiev clearly demonstrated that the joining of granules of gold alloy to a substrate can be performed using a gold/silver alloy and mercury (1:6). The metallographic examination of the joint area shows an annealed structure, indicating that the solder was not solidified from the molten state. In this case, it would have normally shown a cast structure (Mishukov, 1962; Minzhulin, 1990).

Objects of gold are comparatively rare in Scandinavia, as well as in the Western and Eastern European countries where the Northern influence was considerable. Certain information has been published on the composition of Viking Age gold. The list of compositions includes almost seventy items of gold jewellery, ingots and waiste (foil, wire, globules). Most Viking Age gold ranges in purity from 54% to about 99% gold (Table 1). However, high purity gold (Au > 90%) is much more common for ingots of the period.

We can infer that a wide range of gold alloys was in use in the Viking period, and that there is no evidence of a progressive debasement of the metal during this time. Precious metal was refined or diluted by silver and copper depending on factors such as the availability of gold, or a customer or goldsmith's approach to debasement (Ogden, 1994). Relatively fine gold

Figure 3: (See colour plate) Detail of brooch, showing varied wire profiles and triangles of granules.

Figure 3 : (Voir planche couleur) Détail de la broche, montrant différents profils de fils et de triangles en granulation.

Figure 4: (See colour plate) Spectra of the gold plate showing a notable concentration of mercury in the metallic solder.

Figure 4 : (Voir planche couleur) Spectre X de la plaque en or montrant la présence d'une faible teneur en mercure dans la soudure métallique.

Purity range (%)	Items of jewellery	Items of waist	Ingots
99-100	-	2	3
91-98	11	18	5
80-90	6	7	1
54-79	9	7	-

Table 1: Fineness of Viking period gold objects from Sweden and Great Britain (Oddy and Meyer, 1986); Northern Germany – Hedeby (Pernicka, 2002); Russia – Gnezdovo (Eniosova, 2007).

Tableau 1 : Titre d'objets en or de la période Viking de Suède et du Royaume Uni (Oddy and Meyer, 1986); Allemagne du Nord – Hedeby (Pernicka, 2002); Russie – Gnezdovo (Eniosova, 2007).

was used on occasion, and certainly more frequently than for manufacture of Gotlandic bracteates in the 7th and 8th centuries AD, which are mostly made of gold containing between 45% and 75% Au (Oddy and Meyer, 1986).

4. CONCLUSION

The gold-plated brooch from Russia appears to be without parallels. We can compare its overall shape with a large group of Scandinavian equal-armed brooches made of brass or silver and dated to a period between the late 6th century and the late 10th century AD (Aagård, 1984). Stylistically and technologically, the upper relief panel of the brooch has much more in common with the Scandinavian filigree art dated to the Late Viking Age. Some distant parallels are the rectangular silver brooches from the Erikstorp hoard in Sweden, the gold spur from Röd, Östfold, Norway, and the gold embossed panels with filigree and granulation on the shells of the box-shaped brooches from Gotland (Duczko, 1995; Thunmark-Nylén, 1998). Box-shaped brooches belong to the large group of Gotland ornaments combining the Germanic animal style with Slavic geometric elements. These specimens look entirely Scandinavian; geometric patterns play a subordinate role on these pieces of jewellery, typically occupying the margins. Outside Scandinavia, ornaments bearing Northern and Slavic features have been found in Estonia, Pskov and Kiev, and in the regions of the towns of Novgorod, Smolensk and Vladimir (Duczko, 1983). They should be understood as objects made according to the Scandinavian tradition, but also showing Slavic influence in their design. Considered all together, the evidence seems to suggest the local manufacturing of these obvious hybrids in Gotland. We can thus assume that the luxury gold brooch from Russia was produced by Gotlandic craftsmen. One could also put forth the counter-argument that 'common

Scandinavian' brooches were not used by the islanders. Other types of ornaments have been found in the richly furnished Gotlandic graves. However, judging from the direct manufacturing evidence, Gotlanders could also have produced jewellery for customers from the Scandinavian cultural area outside the island (Jansson, 1995).

Being part of a wealthy Scandinavian woman's dress, a gold-plated brooch travelled far to the East. Despite the considerable remoteness of the Bryansk region from the main trade routes used by the Vikings to reach the Black Sea or the Volga Bulgharia State, this particular area provides evidence for contacts between Scandinavians and the local Slavs in the late 10th-early 11th century AD. Evidence of such contacts comprises genuine Northern weapons and amulets (Shinakov, 1998).

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