



ArcheoSciences

Revue d'archéométrie

33 | 2009

Authentication and analysis of goldwork

The technique of gold inlaid decoration in the 5th-4th centuries BC: silver and iron finds from the early Sarmatian barrows of Filippovka, Southern Urals

La technique de décoration par inclusion d'or aux v^e-IV^e siècles av. J.-C. : les trouvailles en argent et fer des tumulus de la période Sarmate ancienne de Filippovka au sud de l'Oural

Marina Shemakhanskaya, Mikhail Treister et Leonid Yablonsky



Édition électronique

URL : <http://journals.openedition.org/archeosciences/2223>

DOI : 10.4000/archeosciences.2223

ISBN : 978-2-7535-1598-7

ISSN : 2104-3728

Éditeur

Presses universitaires de Rennes

Édition imprimée

Date de publication : 31 décembre 2009

Pagination : 211-220

ISBN : 978-2-7535-1181-1

ISSN : 1960-1360

Référence électronique

Marina Shemakhanskaya, Mikhail Treister et Leonid Yablonsky, « The technique of gold inlaid decoration in the 5th-4th centuries BC: silver and iron finds from the early Sarmatian barrows of Filippovka, Southern Urals », *ArcheoSciences* [En ligne], 33 | 2009, mis en ligne le 01 mars 2011, consulté le 30 avril 2019. URL : <http://journals.openedition.org/archeosciences/2223> ; DOI : 10.4000/archeosciences.2223

The technique of gold inlaid decoration in the 5th-4th centuries BC: silver and iron finds from the early Sarmatian barrows of Filippovka, Southern Urals

*La technique de décoration par inclusion d'or aux V^e-IV^e siècles av. J.-C. :
les trouvailles en argent et fer des tumulus de la période Sarmate ancienne
de Filippovka au sud de l'Oural*

Marina SHEMAKHANSKAYA*, Mikhail TREISTER** and Leonid YABLONSKY***

Abstract: The present paper addresses silver and iron objects (iron sword awl, silver quiver hooks, and an iron knife with a silver handle) decorated with inlaid gold strips and plates. The artefacts were excavated recently in the barrows near the village of Filippovka, in the Southern Urals, and were dated to the 5th-4th centuries BC. Typological and stylistic analyses are complemented with the study of technological features of the objects. Analysis under the Analytical Scanning Electron Microscope (SEM), carried out during the restoration of the objects, revealed the specific features of Urals gold. Most of the objects analysed represent local forms of the early Sarmatian culture. This technique of gold inlaid decoration was spread by the nomads of the Eurasian steppes from the Altai Mountains in the east to Central Kazakhstan and the Southern Urals in the west during a period between the 7th and the 4th centuries BC; furthermore, the technique is also attested in Achaemenid metalwork. A unique silver black patinated handle of a knife, shaped in the form of a stag, was inspired by the 'Achaemenid international style', but the peculiarities of style and the inlaid technique do not exclude the possibility that it could have been manufactured in a provincial Achaemenid workshop for a Sarmatian customer.

Résumé : *L'article traite les objets en fer et argent (épée et alène en fer, agrafes de carquois en argent et couteau avec poignée en argent) décorés de bandes et de feuilles d'or, trouvés récemment dans les tumulus proches de la ville de Filippovka, dans le sud de l'Oural, et datant des V^e-IV^e siècles av. J.-C. Les analyses stylistiques et typologiques sont complétées par l'étude des détails techniques des objets. Les observations réalisées sous microscope électronique à balayage (MEB) pendant leur restauration ont révélé les caractéristiques de l'or de l'Oural. La majorité des objets analysés appartiennent aux formes locales de la culture Sarmate ancienne. La technique de décoration par inclusion d'or, observée dans le travail du métal des Achéménides, a été diffusée pendant le VI^e-IV^e siècle av. J.-C. par les nomades des steppes Eurasiennes, à partir des monts Altaï vers l'est jusqu'au Kazakhstan central et vers l'ouest jusqu'au sud de l'Oural. Une poignée de couteau, pièce unique en forme de cerf patiné à l'argent noir, a été inspirée par le style Achéménide international, mais les particularités du style et de la technique d'inclusion n'excluent pas la possibilité d'une fabrication dans un atelier Achéménide provincial destinée à un Sarmate.*

Keywords: Early Sarmatian culture, gold inlaid decoration, iron, silver, Southern Urals.

Mots-clés : *Culture Sarmate, inclusion d'or, décoration du fer, argent, Oural du sud.*

* State Institute for Conservation – Gastello St., 44, 107014 Moscow, Russia. (71aniram@gmail.com)

** Institute of Near Eastern Archaeology, Free University of Berlin – Weisßenburgstr. 59, 53175 Bonn, Germany. (mikhailtreister@yahoo.de)

*** Institute of Archaeology, Russian Academy of Sciences – Dmitriya Ul'yanova St., 19, 117036 Moscow, Russia. (leonid.yablonsky@mtu-net.ru)

1. INTRODUCTION

The recent excavations (2004–2008) of the barrows near the village of Filippovka, in the Southern Urals, carried out by the Institute of Archaeology, Russian Academy of Sciences, brought to light remarkable burial and ritual complexes belonging to the early Sarmatian culture (5th–4th centuries BC) (Yablonsky and Meshcheryakov, 2007; Catalogue Orenburg 2008). This paper focuses on a series of silver and iron objects with gold inlays, originating from the Filippovka barrows nos. 4 and 15, currently on display in the Orenburg Museum of local lore.

2. METHODS

Typological and stylistic analyses of archaeological objects were performed. The gold inlays of the iron and silver objects from Filippovka were studied under the microscope during restoration works. The gold inlaid decoration of the sword was studied with the SEM coupled with an energy-dispersive X-ray spectrometer.

3. RESULTS (M. Shemakhanskaya, M. Treister and L. Yablonsky)

Barrow no. 4, one of the two largest, centrally located, and most probably princely barrows, included numerous burials of horses, a sacrifice place, and burial pits, four of which are dated to the early Sarmatian period (Yablonsky and Meshcheryakov, 2007). The objects under discussion were found in burials nos. 2, 3 and 5.

An iron sword from burial no. 2 has a butterfly-shaped cross-piece decorated with engraved compositions, including a scene of hunting and immolation of deer. Its base is formed with two iron bars, with cast silver gold inlaid reliefs fixed on them. On the blade, there are inlays showing animals and the sacrifice of a stag by the warriors (Catalogue Orenburg 2008: no. 39) (Fig. 1). Various types of gold wires and narrow plates were hammered in the hollows carved on the iron blade (Fig. 1[2]) and on the pommel (Fig. 1[3]). The profiles of the hollows may be seen, mirror-reflected, on the rear side of the inlays. The hollows on the blade and on the pommel are made with different instruments. Two other objects originate from the same burial: a small iron awl with a pendant attached to its finial and a blade with gold inlays forming a spiral pattern, executed in the same way as the inlays on the blade of the sword (Catalogue Orenburg 2008: no. 40) (Fig. 3, [1-2]), and a cast silver quiver hook,

with thin gold inlays of various shapes (Fig. 4), showing a predator devouring a griffin.

A quiver hook of cast silver from burial 3 shows a composition with a griffin and a panther. The details are accentuated with gold inlays of thin sheet gold, hammered in the hollows (Catalogue Orenburg 2008: no. 9) (Fig. 5, [1-3]).

Numerous burials were investigated in barrow no. 15, located in the north-eastern part of the cemetery. Burial 1 yielded remains of a battle-axe, with its head in the form of a bear, inlaid with gold wires (Fig. 3, [3]) (Balakhvantsev and Yablonsky 2007: 147, Fig. 1, 7). In burial 3, a silver quiver hook showing a feline predator and a head of a bird of prey, inlaid with gold (Catalogue Orenburg, 2008: no. 84) (Fig. 5, [4-5]), was found. Stylistically and technologically, this artefact it is similar to the find from burial 3 of the barrow no. 4 (Fig. 5, [1-3]), although it varies in details and the workmanship is more crude.

An iron knife with a cast silver handle in the form of a stag with antlers, decorated with inlays of gold (Col. pl., a-c) (Catalogue Orenburg, 2008: no. 42), found in the central burial 5 of the barrow no. 4, attracted our special attention. The handle was cast after the wax model of silver, with admixture of copper (2-5%) over the blade of the knife. The material used for the inlays shows ca. 84% gold, 14% silver, and small admixtures of copper. The surface is covered by silver sulphide (silver chlorides, characteristic for archaeological silver, are completely absent) of almost black colour. This aspect is unusual for archaeological silver objects, and indicates that it was probably done intentionally, to contrast with the gold inlays. Gold inlays in the form of circles, curls, strips and triangles decorate the head (Col. pl., b) and the body (Col. pl., a) of the stag, which is rendered in a low relief. Nine parallel inlays, slightly waved and narrowing towards the finial, deviated originally from the bottom of the handle towards the head of the stag – three of them are lost, leaving open the hollows of the inlays (Col. pl., c).

The objects from Filippovka under discussion here have various shapes and functions, and the inlaid gold strips and plates were used to stress elements of animal bodies, or to create ornamental or figural compositions. On the majority of objects, these strips and plates were inserted in the hollows cut in their bodies (as on the sword or quiver hooks). In iron objects, they were hammered inside the hollows. In the silver hook shown in Figure 4, the gold inlays have even edges, and only minor signs of hammering are present. In some cases, the inlays are somewhat smaller than the hollows, and they were most probably glued in – in antiquity, natural resins were used for gluing gold foils (Hockey *et al.*, 1992: 281-291; Oddy, 1990: 29-33). The bottoms of the hollows on the basis of the silver knife handle are flat and



Figure 1: Iron sword with silver cross-guard and gold inlays. Filippovka, barrow no. 4/2006, burial 2. (1): general view; (2-4): undersides of the gold inlays showing marks of the tools used to create the groove in which it was set – (2), (3): on the blade; (4): on the pommel; (5): detail of the inlay decoration on the blade.

Figure 1 : Épée en fer hachurée à l'argent et avec des inclusions d'or. Filippovka, tumulus no. 4/2006, sépulture 2. 1 – vue générale; 2-4 – dessous des inclusions d'or montrant les marques des outils utilisés pour la production de la rainure (2-3 – sur la lame; 4 – sur le pommeau); 5 – détail de la décoration en inclusion de la lame.

even, the walls are vertical, and there are no marks of cutting instruments. This leads us to the assumption that they were made by the insertion of thin gold plates in the wax model, which were later inlaid in the hollows, and fixed with an amalgam of mercury – the presence of the latter is confirmed by the microprobe analysis of the edge of the inlay, showing gold, silver and mercury. The use of mercury for fixing gold foils to the surface of silver objects is attested in ancient metalwork (Vittori, 1979: 35-39).

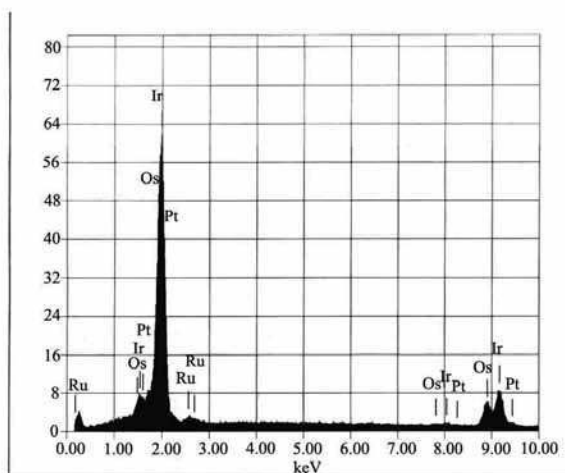
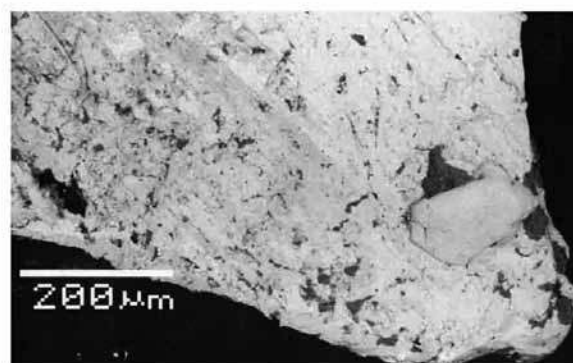
4. THE ANALYTICAL STUDY OF GOLD (M. S. Shemakhanskaya)

During the restoration of the inlaid decoration of the sword, in all the parts analysed by various techniques applied to the gold surface, small hard bright inclusions of indefinite shapes and various dimensions could be observed? But what does 'light' mean in this context. The SEM study of the gold inlays, carried out at the Institute of Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry, Russian Academy of Sciences (IGEM RAS), revealed that these inclusions contain platinum group elements: osmium, iridium, ruthenium and platinum (Fig. 2, [1-2]). The correlation of these elements in different inclusions of the same object varies. Such inclusions, in various quantities, are attested in the gold inlays of all examined objects, except for the two silver hooks from burials 3 in the barrows nos. 4 and 15 (Fig. 5).

Similar inclusions were revealed during the study of other gold objects found in contemporary nomad burials in the Southern Urals; one particular example is that of a gold animal style bracelet found in the barrow no. 3 at Kichigino (Zaikov *et al.*, 2008b: 47). The presence of osmium, iridium, ruthenium and platinum in the gold inlays (Fig. 2) is generally comparable with the composition of granules of alluvial gold from the Miass and Kochkar mining regions, located 500-600 km north-east of Filippovka (Yushkin 1990: 46-48; Kobiashev and Nikandrov, 2007: 223; Zaikov *et al.*, 2008a: 404; Zaikov *et al.*, 2008b: 47, 49). Although methods of refining gold from inclusions were known in antiquity (Craddock, 2000: 200-211), it is evident that the gold used for the inlays of the sword from Filippovka was not refined.

5. DISCUSSION (M. Treister)

Most of the objects under discussion represent local forms, characteristic of the early Sarmatian culture of the



Element (keV)	mass%	Error%	At%	Compound mass%
Ru L	2,558	1,57	0,24	2,93
Os M	1,914	28,42	0,21	28,29
Ir M	1,977	57,61	0,24	56,74
Pt M	2,048	12,41	0,46	12,04
Total		100		100

2

Figure 2: Results of the analytical study of the gold inlays of the sword (see Fig. 1). (1): inclusion of a platinum group metal in the gold inlay of the sword under SEM; (2): the Roentgen spectrum of the platinum group metals obtained with SEM; the parameters of the spectrum are given at the bottom.

Figure 2 : Résultats de l'étude analytique au MEB des inclusions d'or de l'épée (voir Fig. 1). 1. inclusion de platinoïdes sur la feuille de l'épée ; 2. spectre à rayons X de l'inclusion de platinoïdes, en bas les paramètres d'acquisition.

Southern Urals. Thus, the quiver hooks analysed here, representing compositions of griffins and predators, find parallels among the bronze finds from the barrows of the Southern Urals, Mountainous Altai, Tuva, and Eastern Kazakhstan (Korol'kova, 2006: pls. 60, 1-6; 61, 13-14; 63, 1. 3). At



Figure 3: (a): Iron awl with gold inlays. Filippovka, barrow no. 4/2006, burial 2; (b): detail of the gold inlay of the awl; (c): detail of an iron battle-axe. Filippovka, barrow no. 15/2004, burial no. 1; gold inlays shown as lighter grey/white.

Figure 3 : 1. Alène en fer avec des inclusions d'or. Filippovka, tumulus no. 4/2006, sépulture 2; 2. détail de l'inclusion d'or ; 3. détail de la hache de guerre en fer. Filippovka, tumulus no. 15/2004, sépulture no. 1 ; inclusions d'or en gris clair/blanc.

the same time, the style of execution of a panther's head, especially on the hook from burial 3 in the barrow no. 4 (Fig. 5, [2]) reminds us of that of the gold torc from burial 2 of the same barrow (Catalogue Orenburg, 2008: no. 1). In contrast, the 'running wave' pattern decorating the beak of the griffin is a decorative element unusual for Sarmatian objects, but widespread in the Greek world. The decoration of the sword may be compared with those present on the swords from the Filippovka barrow no. 1 (Aruz *et al.*, 2000: nos. 5-6; Catalogue Orenburg 2008: 98, no. 39), and with those from the princely Saka burial in the Issyk barrow in

Kazakhstan (Akishev, 1978: 105, pl. 24, right; Popescu *et al.*, 1998: 187, no. 331), while the general category to which these swords belong may be traced back to the 7th century BC sword and dagger (Čugunov *et al.*, 2006: 118, no. 8, pls. 19-20; 133, no. 28, pls. 63, 65) from the Arzhan-2 barrow in the Altai Mountains. Also, the decoration style of the small iron awl, in the form of elaborate S-shaped spirals (Fig. 3) is characteristic for numerous gold objects from Filippovka, including golden overlays of wooden vessels (Aruz *et al.*, 2000: nos. 25, 27-28, 69).

The knife handle (Col. pl., a-c) finds a close parallel in a hippopotamus ivory handle of a knife (Sevinç *et al.*, 1998: 312, Figs. 8-9; 320, no. 17) found in a tumulus at Dedetepe in north-western Turkey, dating to ca. 480-460 BC. Its Achaemenid inspiration is further confirmed by the outlined beard leading to the ears, and especially by a typical representation of the animal's hindquarters in relief, as seen on some of the Achaemenid *rhyta*, or on the majority of silver amphora-*rhyta* (Amandry, 1959: 38-56; Pfrommer, 1990: 191-209; Calmeyer, 1993: 152-153, pls. 43-44; Boardman, 2000: 188-189, 246, note 129), including the recent find from burial 4 of the Filippovka barrow no. 4 (Yablonsky and Meshcheryakov, 2007: 57, Fig. 3, Col. pl. 1; Yablonsky, 2007: 88, 93, Fig. 7; Catalogue Orenburg 2008: no. 5; Balakhvantsev and Yablonsky, 2008: 30, 34, Fig. 5, 1; Treister, 2008: 158-160, Fig. 6). We can also find similar treatments of animal bodies in gold Achaemenid jewellery, in particular on the bracelets (Yablonsky and Meshcheryakov, 2007: 57-58, Fig. 4, Col. pl. 2; Yablonsky, 2007: 89, 95, Fig. 9; Catalogue Orenburg, 2008: no. 14) and on the torc from the same barrow in Filippovka (Yablonsky and Meshcheryakov, 2007: 58, Fig. 5, Col. pl. 1; Catalogue Orenburg, 2008: no. 2). At the same time, the treatment of separate elements of the representation (the eyes, wings, joints, shoulder blades, etc.) on the knife handle from Filippovka diverges from the canons characteristic for art of the Achaemenid style. While on the Achaemenid *rhyta*/amphora-*rhyta* and jewellery, as well as on the ivory knife handle from the Dedetepe tumulus, we come across the canonical depiction of the eye, framed with relief rims and with an accentuated lacrimal sac (Rehm, 1992: 257), on the knife handle from Filippovka, the stag's eye is round, slightly convex, and framed with a cut and a wide gold strip. The wings of the animals on the Achaemenid silver vessels always show carefully treated detailed feathering (Rehm, 1992: 256-257, 263-264); in contrast, in the case of the object under consideration here, the modelling of the wing is very coarse, and the feathering is shown by strips of the same width as those making up the outline of the wing. In Achaemenid jewellery and toreutics, the joints are usually

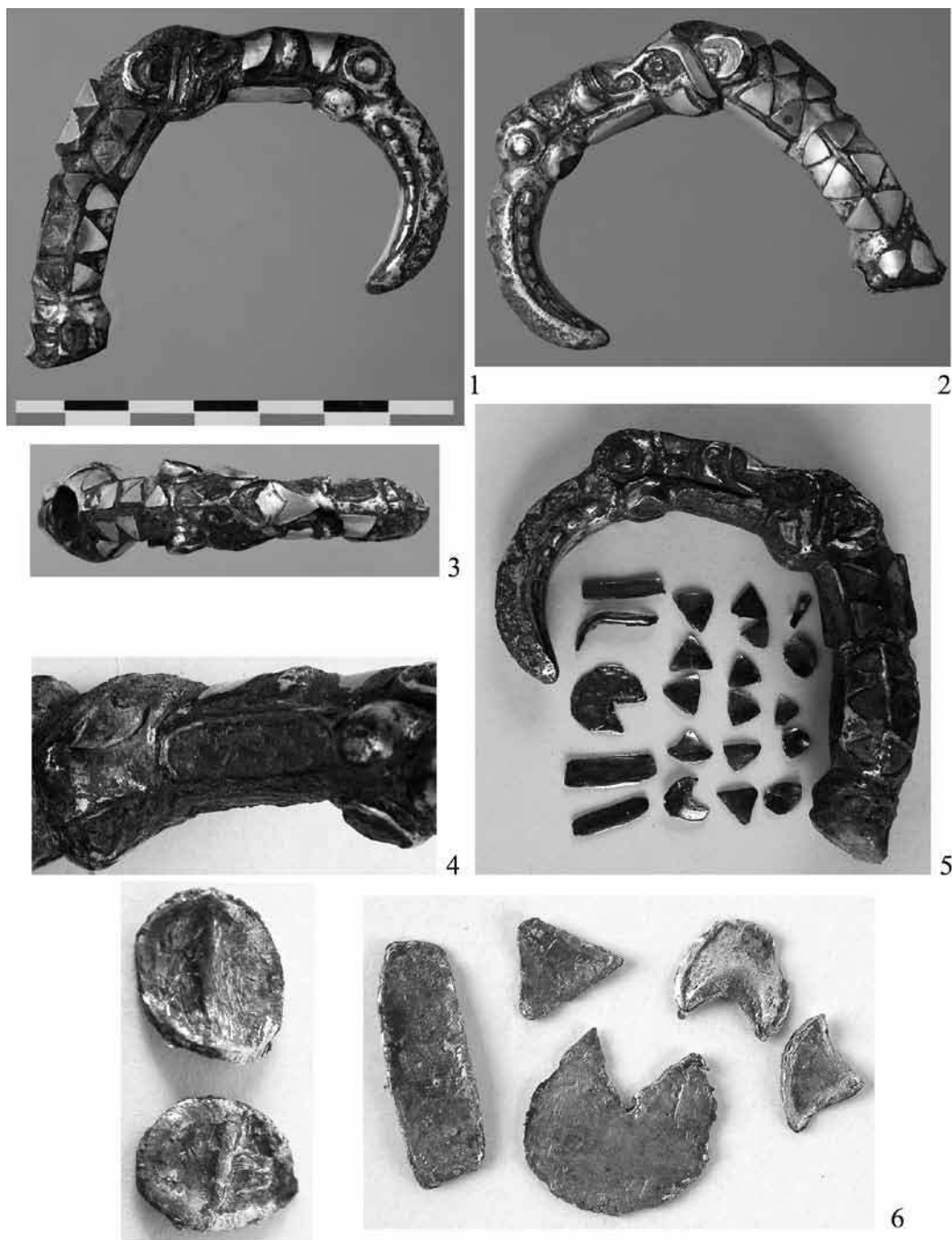


Figure 4: Silver quiver hook with gold inlays. Filippovka, barrow no. 4/2006, burial 2. (a), (b): side views; (c): view from above; (d): detail – the hollow for the gold inlay; (e): side view with gold inlays fallen out; (f): gold inlays.

Figure 4 : Agrafe de carquois en argent avec inclusions d'or. Filippovka, tumulus no. 4/2006, sépulture 2. 1 ; 2. vues de côté; 3. vues d'en haut; 4. détail de l'orifice pour l'inclusion de l'or; 5. vue de côté avec des inclusions d'or tombées; 6. inclusions d'or.

worked in detail, and there are canonical ways of rendering the shoulder blades, consisting of two oval, or one circular and one drop-shaped, elements (Rehm, 1992: 254-255, 262-263). Once again, this is not the case for the knife handle from Filippovka.

The technique of decorating silver objects with gold inlays is attested in Achaemenid metalwork already since the 6th century BC (Moorey, 1988: 231-246), in particular for the silver

bowls and a *rhyton*, the outer surface of which was decorated with the friezes of gold matrix-hammered appliqué showing a Persian king, warriors, birds, or stepped pyramids. A silver vessel, decorated with concentric incised lines, and inlaid with gold wire, originates from cache 1 of the barrow no. 1 in Filippovka (Aruz *et al.*, 2000: no. 19). A horse-harness strap-divider in the form of a griffin head, of unknown provenance, currently on display in the British Museum, requires special

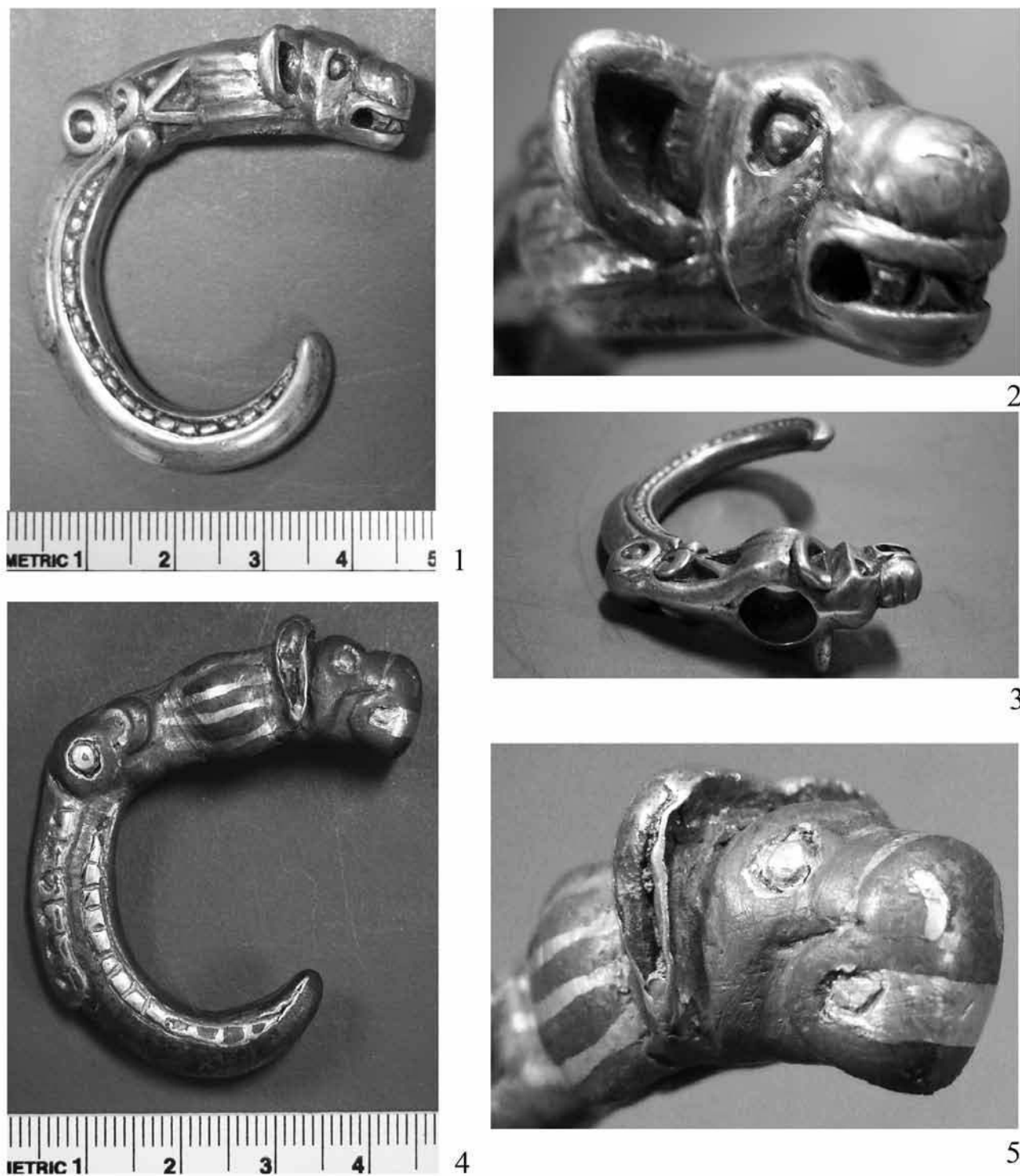


Figure 5: Silver quiver hooks with gold inlays. (1)-(3): Filippovka, barrow no. 4/2006, burial 3 (1, 3: general view; 2: detail – head of a panther); (4), (5): Filippovka, barrow no. 15/2004, burial 3 (4: side view; 5: detail – head of a panther); gold inlays shown as lighter grey.
 Figure 5 : Agrafe de carquois en argent avec inclusions d'or. 1-3. Filippovka, tumulus no. 4/2006, sépulture 3 (1, 3. vue générale; 2. détail : tête de panthère); 4-5. Filippovka, tumulus no. 15/2004, sépulture 3 (4. vue de côté; 5. détail : tête de panthère); inclusions d'or en gris clair.



Col. pl. 1: (1)-(3): (See colour plate) Silver knife handle with gold inlays, Filippovka, barrow no. 4/2006, burial 5; (4): gold work on the blade of the sword (see Fig. 1); (5): gold inlays in the silver quiver hook (see Fig. 5, 1-3).

Col. pl. 1 : (Voir planche couleur) 1-3: Poignée de couteau en argent avec inclusions d'or, Filippovka, tumulus no. 4/2006, sépulture 5; 4 : travail de l'or sur la lame de l'épée (voir Fig. 1); 5: inclusions d'or de l'agrafe du carquois en argent (voir Fig. 5, 1-3).

attention, as its details are rendered with gold inlays. The object is a cast piece of copper-gold alloy, and it has been deliberately given a dark patina in antiquity in order to enhance the surface contrast with the inlay (Curtis and Tallis, 2005: no. 389). This, we suggest, was also the case with the knife handle from Filippovka. No technical investigation of the Achaemenid silver vessels with gold inlays has been published to date. In the bowl from the British Museum, ANE 134740 (Moorey, 1988: 233-234, no. 1, pl. Ia; Seipel, 1996: no. 60; Curtis and Tallis, 2005: no. 111), the hollows were cut for the inlays, and they were hammered into the undercut edges; no mercury was found on the gold inlays by XRF.

Although the silver figures of animals forming a circle, which were used primarily as Achaemenid vessel handles, are often additionally inlaid with gold, the decoration of the knife handle from Filippovka differs from these in the shape of the gold inlays. The treatment of the details of the stag body on the handle of the silver knife (Col. pl., a) also differs from the images of stags in the inlaid decorations on the sword (Fig. 1[5]; Col. pl., d), from the gold overlays of wooden vessels (Aruz *et al.*, 2000: nos. 25-28, 30, 34), and from wooden sculptures of stags overlaid with gold (Aruz *et al.*, 2000: nos. 1-4, 20-22, 84-92) originating from Filippovka, with their highly stylized decorations of elaborate spirals. The style is much more similar, although not identical, to the more realistic images which we encounter in the art of the Pazyryk culture of the Altai, dating to the 4th-3rd centuries BC, for example, that of the wooden carved plates of horse-harness from the barrow no. 11 of the Berel cemetery in Eastern Kazakhstan (Samašev *et al.*, 2002: 269, Fig. 26), and of the silver belt plaques from the Pazyryk barrow no. 2 (Rudenko, 1953: 124, pl. XXVII, 1-2; Polos'mak and Barkova, 2005: 49, Fig. 2.22, d).

6. CONCLUSION

(M. S. Shemakhanskaya and M. Treister)

The use of the technique of decorating iron and bronze objects with gold inlays by the nomads of Eurasia already in the 7th century BC is attested by the decoration of a battle axe (Čugunov *et al.*, 2006: 121, no. 13, pl. 26) and arrowheads (Čugunov *et al.*, 2006: 123-124, no. 16, pls. 31-32) from the princely Arzhan-2 barrow in Southern Siberia (Armbruster, 2007: 99). This technique remained in use in the period between the 6th and the 4th century BC, as indicated by the finds of: a gold-inlaid iron knife handle in the Shibe barrow in Southern Siberia (Popescu *et al.*, 2001: no. 201), a gold-inlaid iron pin in the barrow no. 22 of the cemetery Doga-Bary in Tuva (Čugunov, 1998:

302, Fig. 16, 3), and the plaques in the barrow no. 3 of the Tasmola-V necropolis in Central Kazakhstan (Popescu *et al.*, 1998: nos. 145-150). The locations of the finds span the vast belt stretching from the Altai Mountains in the east to the Southern Urals in the west.

The handle of the knife from Filippovka (Col. pl., a-c) cannot be discussed as an example of 'international Achaemenid style', although it was inspired by such an item, most probably dating to the first half of the 5th century BC. We do not know who created this knife handle. It is worth noting that the technique of making hollows for the inlays already in the wax model is different from the technique of cutting hollows, used for the decorations of the hooks and the cross-guard of the sword. Also remarkable is the method used for fixing the inlays in the hollows. The peculiarities related to its style and to the inlaid technique itself do not exclude the possibility that the knife was manufactured in a provincial Achaemenid workshop and that the respective craftsmen considered the tastes of a Sarmatian customer.

The characteristic features of Urals gold were first attested in the course of our study in numerous objects from nomad burials. This allows a correlation of the metal of these items with the sources of gold. The geographical and chronological distribution of objects with such features requires further studies.

Acknowledgements

The present study was carried out with the financial support of the German Science Foundation (Grant no. BO 1599/6-1) and the Russian Foundation for Humanities (Grant no. 09-01-00070ald). The authors are grateful to Dr. Andrew V. Mokhov and Dr. Pavel M. Kartashov (IGEM RAS, Moscow) for the analyses of the objects discussed, and to Dr. Susan La Niece for the information on the bowl ANE 134740 from the British Museum.

References

- AKISHEV, A.K., 1978. *Issyk Mound. The Art of Saka in Kazakstan*. Moscow: Isskustvo Publications.
- AMANDRY, P., 1959. Toreutique achéménide. *Antike Kunst* 2: 38-56.
- ARMBRUSTER, B., 2007. Die Goldschmiedetechnik von Arzhan 2, in H. Parzinger (ed.), *Im Zeichen des Goldenen Greifen. Königsgräber der Skythen*. München, Berlin, London, New York, Prestel, 95-99.
- ARUZ, J., FARKAS, A., ALEKSEEV, A. and KOROL'KOVA, E.F. (eds.), 2000. *The Golden Deer of Eurasia. Scythian and Sarmatian Treasures from the Russian Steppes*. New York, The Metropolitan Museum of Art and Yale University Press.

- BALAKHVANTSEV, A.S. and YABLONSKY, L.T., 2007. Akhemenidskaya emal' iz Filippovki (problema khronologii pamyatnika). *Rossiiskaya archaeologiya* 1: 143-149.
- BALAKHVANTSEV, A.S. and YABLONSKY, L.T., 2008. Serebrannaa amfora iz Filippovki, in L.T. Yablonsky (ed.), *Rannie kochevniki Volgo-Ural'skogo regiona. Materialy mezhdunarodno nauchno konferentsii "Rannie kochevniki uzhnogo Priural'ya v svete noveishikh arkheologicheskikh otkryti", 21-25 aprelya 2008.* Orenburg, Orenburg State Pedagogical University, 29-38.
- BOARDMAN, J., 2000. *Persia and the West.* London, Thames and Hudson.
- CALMEYER, P., 1993. Die Gefäße auf den Gabenbringer-Reliefs in Persepolis. *Archäologische Mitteilungen aus Iran* 26: 147-160.
- CATALOGUE ORENBURG, 2008. *Sokrovishcha sarmatskikh vozhdaj (Materialy raskopok Filippovskikh kurganov).* Orenburg, Dimur.
- CRADDOCK, P.T., 2000. Reconstruction of the Salt Cementation Process at the Sardis Refinery, in A. Ramage, P.T. Craddock (eds.), *King Croesus' Gold.* London, The British Museum Press, 200-211.
- CURTIS, J. and TALLIS, N. (eds.), 2005. *Forgotten Empire. The World of ancient Persia.* London, The British Museum Press.
- ČUGUNOV, K.V., 1998. Der skythenzeitliche Kulturwandel in Tuva. *Eurasia Antiqua* 4: 273-308.
- ČUGUNOV, K.V., PARZINGER, H. and NAGLER, A., 2006. *Der Goldschatz von Aržan. Ein Fürstengrab der Skythenzeit in der südsibirischen Steppe.* Munich, Schirmer/Mosel.
- HOCKEY, M., JOHNSTON, A., LA NIECE, S., MIDDLETON, A., SWADDLING, J., 1992. An Illyrian Helmet in the British Museum. *The Annual of the British School at Athens* 87: 281-291.
- KOBIASHEV, YU.S. and NIKANDROV, S.N., 2007. *Mineraly Urala (mineral'nye vidy i raznovidnosti).* Ekaterinburg: Quadrat.
- KOROL'KOVA, E.F., 2006. *Zverinyi stil' Evrazii. Iskusstvo plemen nizhnego Povolzh'ya Yuzhnogo Priural'ya v skifskuyu epokhu (VII-IV vv. do n.e.).* St. Petersburg, Peterburgskoe vostokovedenie.
- MOOREY, P.R.S., 1988. The Technique of Gold-figure Decoration on Achaemenid Silver Vessels and its Antecedents. *Iranica Antiqua* 23: 231-246.
- ODDY, W.A., 1990. Gilding – an Outline of the Technological History of the Plating of Gold on to Silver or Copper in the Old World. *Endeavour* 15(1): 29-33.
- PFROMMER, M., 1990. Ein achämenidisches Amphorenrhyton mit ägyptischem Dekor. *Archäologische Mitteilungen aus Iran* 23: 191-209.
- POLOŠMAK, N.V. and BARKOVA, L.L., 2005. *Kostyum i tekstil' azyryksev Altaya (IV-III vv. do n.e.).* Novosibirsk, Infolio.
- POPESCU, G.A., ANTONINI, C.S. and BAIPAKOV, K. (eds.), 1998. *L'uomo d'oro. La cultura delle steppe del Kazakhstan dall'età del bronzo alle grandi migrazioni.* Venice, Electa.
- POPESCU, G.A., ALEKSEEV, A. and PIOTROVSKIJ, J. (eds.), 2001. *Siberia. Gli uomini dei fiumi ghiacciati.* Milan, Electa.
- REHM, E., 1992. *Der Schmuck der Achämeniden.* Münster: Ugarit-Verlag.
- RUDENKO, S.I., 1953. *Kul'tura naseleniya gornogo Altaya v skifskoe vremya.* Moscow and Leningrad, Publishing House of the Academy of Science of the USSR.
- SAMAŠEV, Z.S., BAZARBAEVA, G.A and ŽUMABEKOVA, G.S., 2002. Die goldhütenden Greife des Herodot und die archäologische Kultur der frühen Nomaden im kazachischen Altai. *Eurasia Antiqua* 8: 237-276.
- SEIPEL, W. (ed.), 1996. *Weihrauch und Seide. Alte Kulturen an der Seidenstrasse.* Kunsthistorisches Museum Wien. Vienna, Skira.
- SEVINÇ, N., ROSE, C.B., STRAHAN, D. and TEKKÖK-BİÇKEN, B., 1998. The Dedetepe Tumulus. *Studia Troica* 8: 305-327.
- TREISTER, M.YU., 2008. Proizvedeniya torevtiki akhemenidskogo stilya i na "akhmenidskuyu temu" v sarmatskikh pogrebeniyakh Prokhorovskogo Filippovskogo kurgannykh mogil'nikov v Yuzhnom Priural'e, in L.T. Yablonsky (ed.), *Rannie kochevniki Volgo-Ural'skogo regiona. Materialy mezhdunarodno nauchno konferentsii "Rannie kochevniki uzhnogo Priural'ya v svete noveishikh arkheologicheskikh otkryti", 21-25 aprelya 2008.* Orenburg, Orenburg State Pedagogical University, 145-170.
- VITTORI, O., 1979. Pliny the Elder on Gilding. *Gold Bulletin* 12(1): 35-39.
- YABLONSKY, L.T., 2007. Excavations of a "Royal" Barrow-Grave in the Southern Ural. *Folia Archaeologica* LIII: 85-100.
- YABLONSKY, L.T. (ed.), 2008. *Rannie kochevniki Volgo-Ural'skogo regiona. Materialy mezhdunarodno nauchno konferentsii "Rannie kochevniki uzhnogo Priural'ya v svete noveishikh arkheologicheskikh otkryti", 21-25 aprelya 2008.* Orenburg, Orenburg State Pedagogical University.
- YABLONSKY, L.T. and MESHCHERYAKOV, D.V., 2007. Raskopki „tsarskogo“ kurgana v Filippovke (predvaritel'noe soobchenie). *Rossiiskaya Archaeologiya* 2: 55-62.
- YUSHKIN, I.P. (ed.), 1990. *Mineralogiya Urala. Elementy.* Sverdlovsk, Ural Department of the Academy of Sciences of the USSR.
- ZAIKOV, V.V., YUMINOV, A.M., KOTLYAROV, V.A., TAIROV, A.D., EPIMAKHOV, A.V. and ZDANOVICH, D.G., 2008a. Mikrovklyucheniya mineralov v metallakh i shlakakh kak indikator mineral'no-syr'evoi bazy drevnikh obshchestv, in A.B. Derevyanko, N.A. Makarov (eds.), *Trudy II(VXIII) Vserossiiskogo arkheologicheskogo s'ezda v Suzdale, V. I.* Russian Academy of Sciences, Institute of Archaeology, 403-405.
- ZAIKOV, V.V., TAIROV, A.D., YUMINOV, A.M., CHURIN, E.I. and KOTLYAROV, V.A., 2008b. Sostav zolotykh izdelii iz kurganov Yuzhnogo Urala, in L.T. Yablonsky (ed.), *Rannie kochevniki Volgo-Ural'skogo regiona. Materialy mezhdunarodno nauchno konferentsii "Rannie kochevniki uzhnogo Priural'ya v svete noveishikh arkheologicheskikh otkryti", 21-25 aprelya 2008.* Orenburg, Orenburg State Pedagogical University, 46-49.