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O.P. Dobrova
Paleoethnology Research Center,
Novaya pl. 12, bldg. 5, Moscow, 109012, Russia
E-mail: russa-dolya@mail.ru

The Technology of Manufacturing Glass Beads at Gnezdovo, Smolensk Region

Over 12 thousand glass beads have been excavated from medieval burials at Gnezdovo. Most fall into nine technological groups similar to those in a collection from the earthen ramparts of Staraya Ladoga. At Gnezdovo, however, hitherto unknown types have been found, such as those represented by isolated specimens formed from lumps of molten glass. A few beads appear to have been made in a mold; cross-striated beads had been welded from several pieces. The latter resemble Greek and Roman era specimens from the Northern Pontic region. For the first time in Old Rus, glass beads with a copper pipe are described. This is a rare technique, also practiced in Central Europe. Numerous specimens from Gnezdovo are two-layered; others are made from a pipe, from a rod, a mosaic, or curled. Some experts argued that the use of pipe as a core is motivated by economy of the paste of which beads were made. Pipe cores in cobalt beads might facilitate shaping. Since cobalt-colored beads and bracelets were popular in 800–1100 AD, economy cannot provide a universal explanation. The fact that other materials, such as copper and ceramics, were also used is another proof thereof. Generally, such beads are rare not only in Gnezdovo but elsewhere in Kievan Rus as well.

Keywords: *Glass beads, technology, Old Rus, Gnezdovo.*

Introduction

Reconstruction of the techniques of manufacturing objects belonging to different epochs is one of the avenues of research into ancient technologies. This avenue as applied to glass ornaments was developed by Z.A. Lvova, and, thanks to her studies, it has become an integral part of the systematization of bead collections with various cultural and chronological attributions (1959, 1962, 1968, 1970, 1979, 1980, 1983, 1989).

This article presents the results of the work on systematization of beads from Gnezdovo. Study of items *de visu* offered a possibility to make a series of observations on the technology of manufacturing beads of some types, and to identify techniques that had not been recorded earlier in the materials from Kievan Rus sites*.

Observations on the technology of manufacturing glass beads at Gnezdovo

The majority of glass beads from Gnezdovo were fabricated using two techniques: from a drawn pipe or

*The photographs for this article were taken in the Laboratory of ancient manufacture of the Department of Archaeology of the Lomonosov Moscow State University, using the Zeiss Stemi 2000-C microscope at 6.5x…50x magnification.

by curling (Frenkel, 2007: 79–83). Other techniques are represented by rare items, from several dozens to single specimens.

Beads with metal foil. This is one of the most numerous groups. The technology of their manufacture was studied in detail by M.A. Bezborodov on the basis of finds from the mounds of Northwestern and Northeastern Rus (1959). During the period under consideration, the Old Rus sites contained beads with metal foil, made using two main methods: from a drawn pipe or in the twisting technique (groups 8 and 4 according to the classification by Lvova (1968: 73–90)). Both techniques have been recorded in the artifacts from Gnezdovo; however, twisted beads with metal foil are represented by single specimens, and in the settlement's assemblage they are fully absent.

The greatest number of defective items were found among glass beads made from a drawn pipe and decorated with metal foil (8 %). The same was recorded in the materials from Staraya Ladoga, where the defect ratio was much higher (21.97 %) (Lvova, 1970: 95). The most common defect in Gnezdovo is occlusion of the canal, as is the case with beads from Staraya Ladoga (Ibid.: 101–102). In some cases, this is accompanied by an absence of metal foil (Fig. 1, *2*, *3*, *8*). Specimens in which the canal is not occluded, but the foil layer cannot be identified, are extremely rare.

Analysis of beads of this type has led researchers to the conclusion that the outer glass layer, which covers metal foil (cantarell), could have been applied by two methods (Bezborodov, 1959: 229–230). Most frequently, this involves blowing off and subsequent fusion with a core-pipe. Another method contemplated drawing a wider pipe, which was slipped over a foil-covered pipe, after which the item was heated up and shaped appropriately. Among the beads made by this method, specimens with detached cantarell are encountered (Fig. 1, *5*).

During the analysis of beads with metal foil, Bezborodov noticed the presence of ruptures in it, and pointed to the fact that decoration could consist not only of one-piece foil but also of fragments of it (Ibid.: 232). Gnezdovo beads show uniform foil surface in most cases, even if ruptures are visible. However, there are specimens where the foil looks different in color. This may be due to a different composition of the metal, or to its thickness (Fig. 1, *6*).

Notably, decoration of beads contains longitudinally-oriented bands, which are markedly different in their appearance (Fig. 1, *4*, *7*). In places, foil looks intact, but sometimes it is entirely covered by tears and ruptures. A possible explanation has been found in the collection's materials. The cantarell and foil of one bead are fully detached from the core. As a result it can be seen that a ribbed pipe, with a cross-section in the form of rosette, was used as a core (Fig. 1, *1*). In our opinion, this can explain the presence of ruptures in a number of cases: falling on a rib, foil started spreading out, which led to tears and ruptures in it. In concave areas between ribs, the foil obviously preserved its thickness, while the cantarell layer became thicker. Therefore it may seem that metal foils of various types were used.

Beads from lumps of molten glass. These are rare in the collection. Two specimens are rounded with parallel

Fig. 1. Beads with metal foil.

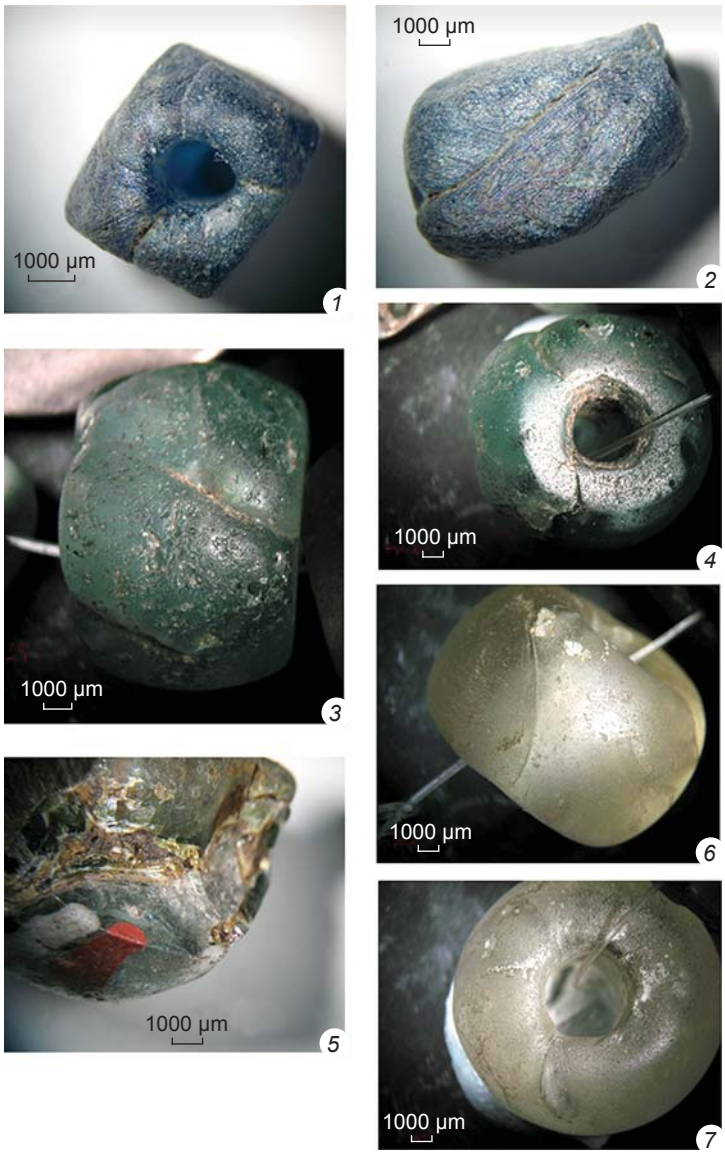

Fig. 2. Beads from lumps of molten glass.

ends, and are made of sea-green and colorless glass (Fig. 2, *3*, *4*, *6*, *7*). The third bead is prismatic, subsquare in cross-section, and made of blue glass (Fig. 2, *1*, *2*). The base of the fourth specimen is made of light turquoise glass and ornamented with applied glass threads of white and liver-red color (Fig. 2, *5*). On the bodies of the beads, connecting joints are visible. The beads made with this technique were manufactured in non-integrated workshops, which did not melt glass but instead used either half-finished products, or reprocessed glass that could be produced by softening broken glass. Notably, two beads are part of the necklace originating from mound C-198/Avd.-1976. This complex, judging by the burial-rite and some details of the grave goods, contains Scandinavian women's attire.

Apart from the specimens described above, we know of beads molded from pieces of bulk glass and decorated with applied concentric smooth eyelets. One specimen originates from the central fortified settlement of Gnezdovo. A rounded bead with parallel ends is made of colorless glass and decorated with three smooth concentric eyelets in the form of liver-red drops, with blue opaque glass applied thereon. We found a bead made with a similar manufacturing technique in the Nerevsky excavation area of Veliky Novgorod (State Historical Museum. Inv. 1965. No. 1853). It is made of a transparent glass with a yellowish tone, and has a rounded shape and smooth concentric yellow-red eyelets.

Beads presumably made in a mold*. Rare monochromatic specimens suggest that these were made by shaping molten glass into a mold. Beads made with this technique occur in the materials of the Nerevsky excavation area of Veliky Novgorod. The Gnezdovo and Novgorod specimens are made of white opal, pink, green, lilac opaque, or green transparent glass. The beads have a quasi-spherical, or, more rarely, ellipsoidal shape (Fig. 3, *6–9*). They originate both from the ancient settlement and the fortified settlement. A distinct connecting joint on the body surface is recorded for the majority of such beads (Fig. 3, *6*). In the Nerevsky collection, some specimens have such a joint oriented along the hole's axis, while others show this joint oriented transversely. Two Gnezdovo beads are identical, and obviously were made by the same craftsman. A spherical bead of white opal glass is slightly unusual (Fig. 3, *7*, *8*). Its connecting joint is barely seen; however, concentric circles of bubbles are easily discernible in the bead's body, which allows us to assign this specimen to the same technique. Most probably, such beads are related to the habitation at the Gnezdovo settlement in the Early Modern or Modern Period.

Cross-striated beads. This group is numerically small, but diversified in terms of its composition. Polychrome cross-striated beads were made of sequentially welded lengths of glass rods, butted (Fig. 3, *1*, *3–5*) or overlapped (Fig. 3, *2*). The resulting glass plate was wrapped around a tool, and its ends were butted together. As a result of such operation, connecting joints can be traced on the bodies of some specimens.

*The author expresses her appreciation to E.K. Stolyarova for advice on these items.

Following this, the beads were rolled smooth. They have a smooth surface, and an ellipsoidal, biconical, spherical, or rounded shape. Certain specimens from the Gnezdovo collection find analogs among the antique beads from the Northern Pontic region that were described by E.M. Alekseeva. For example, an ellipsoidal bead made of welded white, blue, and yellow glass strips is reminiscent of type 176 according to the classification by Alekseeva (1978: Pl. 27, *55*), while another bead made of lilac opal and white glass strips corresponds to type 147 (Ibid.: Pl. 27, *15*, *23–25*). Obviously, the bead-manufacturing technique known since Antiquity persisted during the period of the Old Rus state's formation. Beads made according to such production-process are encountered at sites within the 1st millennium AD.

Noteworthy is one specimen (Fig. 4, *5*, *7*) that is very different from the classic mosaic beads. Its blank was made of lilac glass. Threads of yellow, red, and white opaque glass were applied on one of its surfaces. Then, the rod was divided into several lengths, which were welded to each other. After this, the bead was given the shape of an octahedral prism (1.2 cm in diameter and at least 1.4 cm high).

Two-layered beads. These are usually found among the items made of a drawn pipe. We have already mentioned such beads above. Their cores are usually made of glass, the color and transparency of which are different from those of their outer layers. The following are the most representative in the period under consideration: yellow two-layered beads and lemon-shaped beads with longitudinal striation, as well as lemon-shaped beads and pipe-shaped beads decorated with metal foil. Interpretation of the use of such cores is debatable. B.A. Galibin assumes that they were used to save the colorant (2001: 31), and this opinion is also shared by O.S. Rumyantseva (2005: 133). We do not think that this explanation is universal. In a number of cases, it can be observed that high-quality yellowish or colorless glass, and not only low-quality slightly-turbid whitish or dirty white glass, was used as a core. The materials of Gnezdovo supplement this picture. The use of glass pipes as cores is recorded for beads made with other techniques, namely, for mosaic red mottled beads (Fig. 4, *2*), more rarely for twisted ones (Fig. 4, *6*), and for those made of glass rods (Fig. 4, *4*). In one case, the core and outer layer of a yellow lemon-shaped bead proved to be identical (Fig. 4, *3*). It can be suggested that, apart from economy of some paste components, pipe cores were used to facilitate shaping of a product. From our point of view, this is evidenced by a faceted rod-based bead (Fig. 4, *4*) and by a twisted bead with a yellow pipe in the hole canal, whose diameter is 3 times less than the bead's diameter. The presence of pipe cores in cobalt beads additionally indicates that these could have had technological functionality. Since cobalt-colored

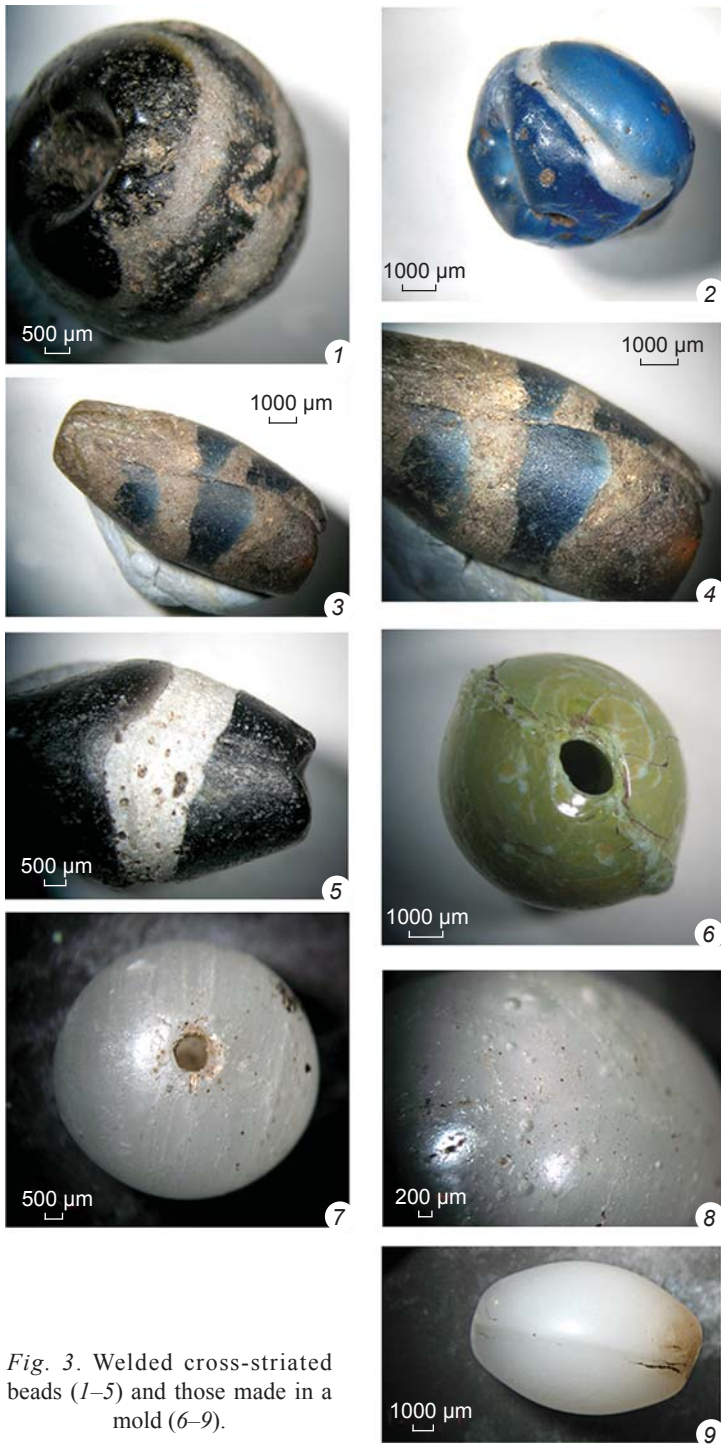

Fig. 3. Welded cross-striated beads (*1–5*) and those made in a mold (*6–9*).

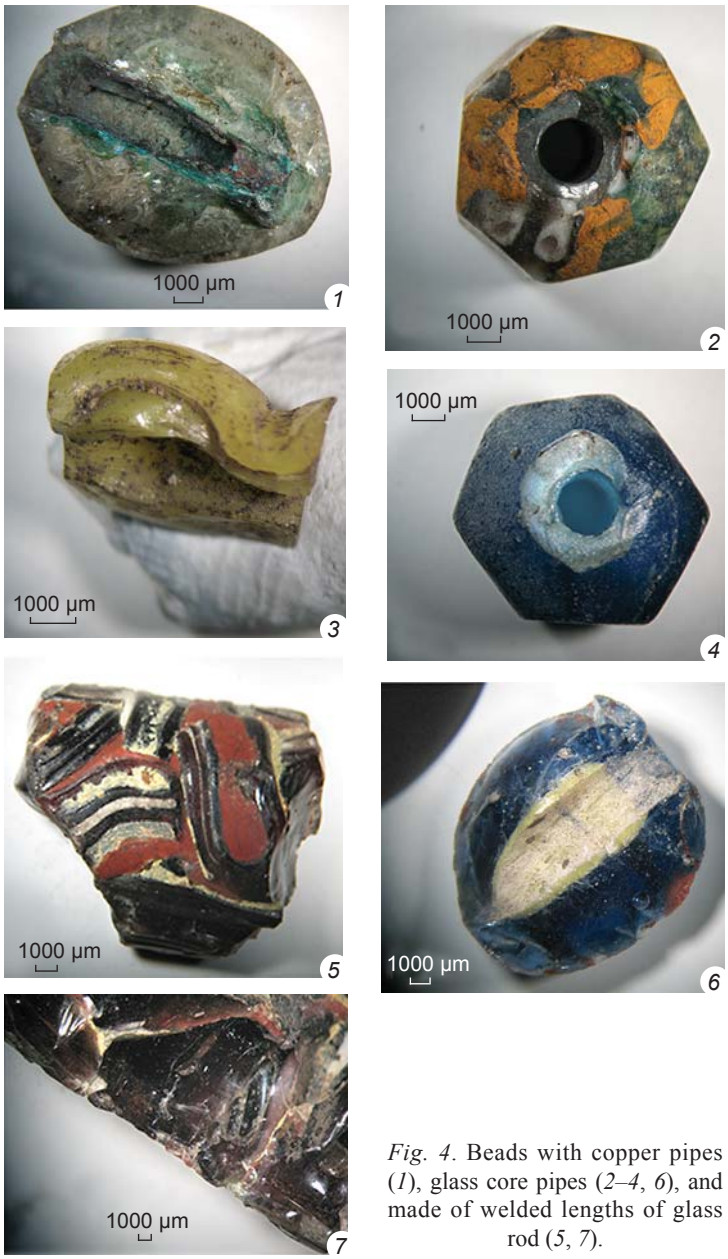

Fig. 4. Beads with copper pipes (*1*), glass core pipes (*2–4*, *6*), and made of welded lengths of glass rod (*5*, *7*).

beads and bracelets were popular in 800–1100 AD, it is highly unlikely that their use was caused by an economy of colorant in glass production.

Apart from the above-mentioned types, there are known beads belonging to the turn of the 1st and 2nd millennia AD that were made with techniques very rare for the archaeological sites of Old Rus. The cores of these beads are made of copper and ceramics (Dobrova, 2017). One specimen with a copper core (Museum of the Department of Archaeology of the Lomonosov Moscow State University, VS-10/1988, No. 87) originates from the ancient eastern settlement of Gnezdovo (Fig. 4, *1*). Analogs of this extremely rare technique are currently known from materials of Central European sites dated to the second half of the 7th to 10th centuries (Frey, Greiff, 2009: 373–374).

Conclusions

So far, the collection of Gnezdovo beads numbers over 12 thousand specimens. These fall mainly into nine technological groups distinguished by Lvova on the basis of materials from the earthen ramparts of Staraya Ladoga, including such rare beads as those made by carving or blowing off (1968). The major part of the collection is attributed to the "classic" Gnezdovo period (the turn of the 9th–10th centuries to beginning of the 11th century). The numerically insignificant curled beads can be dated to the 11th–13th centuries. Our study supplements observations made by Lvova, demonstrates a greater variety of glass bead manufacturing techniques, and also throws light on some technological aspects of the Gnezdovo collection. A few welded cross-striated beads probably tend towards "classic" Gnezdovo; however, the problem of their upper date needs additional consideration and involvement of materials from a wider range of sites, since layers of the 11th century in Gnezdovo are weakly represented. A unique bead with a copper pipe found in the eastern settlement of Gnezdovo has no analogs among Old Russian materials so far, and was probably imported from Central Europe. Another small group from the Gnezdovo collection includes beads made in a mold. These can be preliminarily dated to the 16th–20th centuries. Such beads are absent in the assemblages of the Gnezdovo burial ground, and have been recorded in materials of the central fortified settlement and the central ancient settlement. Possibly, analysis of their glass composition will allow their origin and dating to be refined.

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