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## **Ceramics for metal casting from the medieval habitation sites of Aizkraukle**

### Summary

Large-scale excavation was conducted at the site of Aizkraukle (1971–1976) under the direction of archaeologist V.Urtāns. The results of the excavation have been published only in part, so the archaeological material requires further evaluation.

The article presents an analysis of six almost intact as well as fragmentary crucibles, along with several fragments with remains of metal fused to them. Three moulds are described, along with a penannular brooch cast in one of the moulds, and a casting ladle. Most of the analysed artefacts are dated to the 11th–12th century. An exception is a mould created in a clay brick, dated to the 15th century.

One of the most interesting items for study is a unique example of one half of a composite mould and one mould fragment resembling it. It has been established that the moulds were used to cast penannular brooches with polyhedral terminals, a bow of pentagonal cross section and characteristic dimensions, namely a diameter of 59 mm, the bow measuring 6 mm in width and 4.5 mm in thickness (Fig. 1, 2, 4). Penannular brooches of this type, which, in accordance with the classification of Swedish archaeologist Lena Thunmark-Nylén are assigned to type 2a, have been found only in small number in Latvia. They were in use approximately in the 9th–10th century and are considered characteristic of Gotland. The mould together with a brooch cast in it prove that brooches of the type under analysis were made on Aizkraukle hill-fort and remained in use even after the 11th century. One of the moulds from the hill-fort was intended for casting bars (Fig. 18). The other piece, a half mould, functioned as a lid piece for making the loop and back of pendants (Fig. 17). It may be noted that a further seven stone moulds and semi-manufactured pieces have been found at the site.

A unique item among archaeological finds from Latvia is a lidded crucible (Fig. 7). It is horizontally elongated, with a lid covering it; there is a small spout and a little handle for gripping it with tongs. Very interesting is the method of supporting the handle, with a special rather short peg on the inside of the crucible. The crucible was used for casting bronze. Traces of bronze are to be seen on the middle part of the inside of the crucible as well as by the spout. Analysis undertaken at the Restoration Department of the National History Museum of Latvia indicates that the corrosion

products of the multi-component alloy contain large amounts of copper and tin compounds, along with a smaller amounts of zinc, iron and lead compounds. The crucible was made with a closed top in order to reduce exposure of the molten metal to the air. A fragment possibly from another lidded crucible has been found on the site (Fig. 13). The archaeological finds from Latvia include only separate fragments of possibly analogous crucibles, from Asote (Fig. 8, 9) and Tērvete hill-forts. One whole and one fragmentary crucible from the hill-forts are pear-shaped (Fig. 10, 12), and two others are egg-shaped (Fig. 5, 11). One of the pear-shaped crucibles is triangular at the top (Fig. 10), permitting precise pouring of the molten metal into the mould. In most cases the crucibles were rounded at the top. It should be added that in the Late Iron Age in Latvia cylindrical crucibles were most commonly used (Fig. 6).

The bases of crucibles are in many cases fused and deformed because of the great heat, presenting unusual molten forms (Fig. 5, 6: A). The heat affected the colour of the crucibles: the crucibles and fragments of them are in many cases covered in a black, grey, red or green glassy layer. The colour was dependent on the composition of the ash with which the crucible came into contact.

Remains of non-ferrous metals have been found on seven crucibles and crucible fragments: bronze (Fig. 14) and copper (Fig. 15).

The jewellery-making and smithing area was in the central part of the hill-fort. Here, two jewellery smiths' furnaces have been excavated, nos. 69 and 79, each of which has yielded significant finds. Furnace 69 contained a mould for making penannular brooches with polyhedral terminals. In addition to an almost intact crucible, about 2 kg of crucible fragments were found, in many tiny pieces. Jewellery smith's furnace 79 was unearthed in building 19. The building measured 4×5 m. This too produced a series of items characteristic of metal workshops: crucible fragments, bronze droplets, broken bronze ornaments and raw materials. On the early town site a jeweller's building (no. 6), with a furnace (no. 6) has been uncovered, dating from a later period, the 15th century. It contained one clay and one stone mould, as well as a fragment of a green glazed crucible.

The finds constituting a significant range of tools relating to metalworking, along with the rich collection of artefacts, both finely worked and more simply fashioned, from the living sites of Aizkraukle and the nearby cemeteries indicate that Aizkraukle hill-fort along with the adjacent outer bailey and early town site constituted a developed crafts centre.

