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Goldsmith Mysteries

Archaeological, pictorial and documentary evidence from the 1st millennium AD in northern Europe

Edited by
Alexandra Pesch and Ruth Blankenfeldt

Papers presented at a workshop organized by the
Centre for Baltic and Scandinavian Archaeology (ZBSA)

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In memoriam Maiken Fecht

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The metal workshop at Skeke in Uppland, Sweden

By Eva Hjärthner-Holdar, Uppsala

Keywords: Building, casting, casting box, metal workshop, hearth to melt metal, Migration Period, tools

Abstract: This is a short presentation of the preliminary results of the excavation of a Migration Period metal workshop, located at a manor at Skeke in Rasbo parish in Uppland, Sweden. Skeke is the first site in Sweden where an actual workshop building has been found and excavated, and can also be reconstructed. It was fully equipped with a hearth to melt metal, a casting box and a charcoal bin as well as implements and tools such as moulds, crucibles, plate-shears, chisels and punches. The results of the excavation and subsequent analyses support the interpretation that this was a permanent workshop used by an artisan and, perhaps, an apprentice.

In 2010, the settlement site at Skeke in Rasbo parish, in the heart of Uppland, was excavated by 'The Contract Archaeology Service and Geoarchaeological Laboratory' of the Swedish National Heritage Board. The excavated area at Skeke is about 25 000 m^2. The site had been occupied for a very long time, from 1200 BC to AD 1000 (Fig. 1a). Publication is still in progress and this is a first presentation of the preliminary results concerning the layout of the workshop and its production during the Migration Period. The context of the workshop is also briefly touched upon.
The manor at Skeke, dated to AD 300–600, was found not far from the manor at Helgö in Ekerö parish and, like Helgö, it had a workshop for the manufacture of precious-metal objects. The workshop was not, however, as large as the one at Helgö and its output was limited, but it is distinctive. The workshop was located in the northern part of the yard of the manor and was in use during the second half of the 5th century. In the Migration Period, the main building, measuring about 21 x 7 m, was terraced. Its foundation consisted of a frame of large cut stones and under the floor was a thick layer of clay. The roof was supported by large posts. The manor also had three other longhouses with both living quarters and barn functions (Fig. 1b). One of these longhouses to the north was possibly the dwelling of the artisan who used the workshop (Hjärthner-Holdar 2011).

The workshop

The workshop at Skeke is unique in one sense, at least for Sweden: it is an actual workshop building, measuring 7 x 4 m (Fig. 2a–b). Not even a site like Helgö has such a clearly identified workshop building (cf. Lamm in this vol.). Due to the position of the Skeke workshop, just above the bedrock and on a slope, a drainage system had been necessary and the ground had been levelled by terracing (Fig. 2c). The terrace was made up of a layer of till mixed with mostly split stones and a top layer of soil that

consisted mainly of older cultural layers from the site. The workshop had been completely or partly burnt down. Burnt pieces of wood were found up against the stone foundation on the northern side of the workshop. These burnt remains indicate that the house had been built of planks, probably in a standing/vertical position. The structure was subsequently interpreted as a timber-framed house on a stone foundation with vertical planks. There were no signs of roof-supporting posts so the roof must have been supported like that of a log cabin. The entrance to the workshop was on one of the shorter sides, as indicated by a gap in the stone foundation, and it faced the road leading to the manor house. The workshop consisted of two rooms. The inner wall was probably constructed in a way that shut out the light from the entrance (Fig. 2b). The workshop was furnished with most of the equipment needed for casting. Unfortunately, it was partly destroyed in the southwest by a new building, which was erected after the workshop had been abandoned. This means that the working area inside the workshop cannot be fully reconstructed (Fig. 2a). With all this in mind, the following is an attempt to interpret life and activity in this workshop.

The layout of the workshop

The working area had a hearth for melting the metal, a designated place for the bellows, a charcoal bin and a workspace with burnt sandy soil on a partly burnt flat stone, which were probably the remains of a casting box. To the northwest of the flat burnt stone, swept into the corner with the remains of the presumed casting box, were large identifiable fragments of moulds. A considerable quantity of smaller mould fragments were also found all over the floor. There were very few identifiable fragments of crucibles, however. A clay structure had been built up against the northern side of the hearth. We have interpreted this as a possible work bench, which perhaps functioned as an area for tools and/or a space for ready-made moulds and crucibles. The size of the workshop would have allowed two persons to work there at the same time (Fig. 3). Some of the production equipment was thus very well preserved, so its construction and possible use are an important part of the identification and interpretation of the workshop.

The hearth to melt metal

The hearth had a horseshoe shape with the opening to the west: the inner diameter was 0.6 m, the outer about 1.05 m. Like the foundation of the manor house, the hearth was made of large cut stones and smaller cracked stones, in this case coated with clay (Fig. 4a). The foundation of the hearth was built up on the floor with the cut stones supplemented by smaller cracked stones at the bottom and on the outside (Fig. 4b–c). It had a preserved height above the floor of up to 0.3 metres. The exterior of the hearth had been covered by a thick coating of clay, which could be seen on the floor as a greyish layer, about 0.3 m wide, containing charcoal splinters (Fig. 4a–b.) The very coarse clay had been selected for its natural temper, to which small pieces of charcoal had been added. According to the ceramic analyses, this clay had good refractory properties. The interior of the hearth had also been coated with the same type of clay: pieces of this severely burnt and melted clay were also found. This hearth for melting the metal resembles those in the workshop area at Hallunda, in the county of Södermanland just south of Stockholm, which are dated to the Late Bronze Age (Jaanusson/Vahlne 1975). The dating of the two sites is confirmed by both radiocarbon dates and the objects found. The resemblance is so striking that the technology for building such a hearth must already have been developed in the Bronze Age. At Helgö the hearths are quite different: they usually consist of two pits, one for the moulds and one for the hearth (Excavations at Helgö 1984, IX, 10ff.). This shows that

the techniques employed at the Skeke and Helgö sites are quite different, although both are dated to the Migration Period. This could perhaps be interpreted as the introduction of a new technique at Helgö. It could also be interpreted as two different but concurrent traditions, although no structures of the Helgö type are as yet known in Bronze Age contexts.

The position of the bellows

The horseshoe shape of the hearth with its opening to the west immediately suggests that the bellows were probably positioned to the west of the hearth (Fig. 2b). As already mentioned, the location of the workshop made a drainage system necessary (Fig. 5a). This drainage layer, about 0.3 m deep with just the floor covering it, was apparently strengthened beneath the position of the bellows. Figure 5a shows that it had the form of an ellipse, rather well suited to small double-acting bellows like those shown on the rune-stones from Näsbyholm (no. 327) and Ramsundsberget (no. 101) in the county of Södermanland to the south of Lake Mälaren (Fig. 5b; SR 1924–36, 306ff., Pl. 165, 166, 71ff., Pl. 48). Another reason for strengthening the structure of the drainage layer at this point was to protect the floor against the pressure exerted when the bellows were in use.

The charcoal bin

The possible position of a charcoal bin was seen in the rectangular black feature, about 0.9 x 0.6 m, located on the floor to the south of the hearth (Figs. 2b; 6). Only very small pieces of charcoal and soot were found on the floor and the feature itself was very confined. This leads to the conclusion that the charcoal was kept in some kind of container. Both the sides and the base of the charcoal bin were possibly made of planks, with spaces between the planks for aeration and to keep the charcoal dry and free of soot – a metallurgist prefers his charcoal to be free of soot and moisture.

The casting box

During the casting process the moulds must somehow be kept warm prior to the actual casting. Evidence of a casting box at Skeke is unfortunately rather vague. The feature that may be the base of the so-called casting box was found in the northwestern part of the workshop, quite close to the location of the bellows, and consisted of a large flat stone covered by sandy soil (Fig. 2a–b). The cultural layers on the site, as on the floor of the workshop, consisted predominantly of clay and silt. The material on top of the flat stone was quite different and very sandy; the stone itself was flat and levelled and measured about 1.0 x 0.8 m. The interpretation is that this stone supported a casting box made of wood and containing warm sand, into which the moulds were placed while preparing for casting.

Implements and tools

The majority of the implements and tools found on the site and in the workshop consisted of moulds and a few very fragmented crucibles. Among the metal tools were punches and chisels, which together with bone-scalpel fragments were mostly scattered in the yard. However, a fragmented pair of plate-shears was found up against the northern wall and a fragmented bone scalpel was found beside the hearth inside the workshop (Fig. 7a–e). As identified from the moulds, the objects made

at the workshop at Skeke included clasp buttons of an early type. They were all Hines type 2, dated to AD 475–525 (Hines 1993, 34). All the moulds were of the two-part kind. Pieces of both parts of the moulds were found, including parts with ingates (Fig. 8 a–d). Most of these mould pieces were so fragmented that it was not possible to identify the type of object they had produced. Analyses of the technical ceramics, moulds and crucibles showed that they were all made of the same type of local clay with very suitable refractory properties. The clay was a natural clay without any admixture. This and the workshop building suggest that it was a permanent workshop with an artisan, and maybe also an apprentice, working more or less full time.

Metal waste and ornaments made of precious metals and copper alloys

One problem with the workshop at Skeke concerns the raw material. Practically no raw material, such as rods and blanks, has been found in or in the vicinity of the workshop. The only waste material was a small piece of melted metal found to the west of the manor house – an alloy of gold, silver and copper, so-called electrum. This combination of 43 % Au, 36 % Ag, 18 % Cu and traces of Zn and Sn gives it a golden lustre. If we consider the clasps, some Swedish ones of this type are gilded, e.g. those worn by the man buried at Borg in Norrala parish in the county of Hälsingland (The County Museum of Gävleborg and Hudiksvalls Museum). This piece of melted metal should, in my opinion, be seen as related to the casting activity at the workshop.
Two further ornaments found on the site could also be interpreted as connected with the casting activity at the workshop. The first is a small coiled ring: the spiral has 2.5 turns and a total length of 405 mm and weighs approximately 84 grams (Fig. 9a–b). It is made of gun metal and gilded with an alloy of gold, silver and copper – but not in the same proportions as the small piece of melted metal mentioned above. The chemical composition of the core is 18–19 % Zn, 2–3 % Sn and a very small amount of silver, the rest is copper. This ring was apparently made of scrap metal: a piece of bronze and a larger piece of brass. The outer layer is an alloy with a chemical composition of 80 % Au, 11 % Ag, and less than 2 % Cu. The level of mercury, Hg, is about 7 %. This means that this object was fire gilded, a procedure that always leaves a certain percentage of Hg in the gold, sometimes up to 16 % (Fig. 9c). The other object is a silver mounting, which lacks a rivet so its use is at present unknown. The ornamentation is in imitation silver wire. The décor was produced by at least three different pattern punches (Fig. 10).

Conclusion

This is the first workshop for casting copper alloys and precious metals to be found in Sweden with a well-defined building and the equipment needed for the different steps in the casting process. It was most likely a permanent workshop, judging from the construction of the building, its equipment and layout, and the local clay used to make both moulds and crucibles. The crucibles could have been of additional significance if an itinerant artisan had brought them with him and they had been made of a different kind of clay from that found locally. When compared with the workshop at Helgö, in Ekerö parish in Uppland, this was a small setup where only a few types of object were produced. Moreover, the workshop at Skeke was probably in use for not longer than one generation, maybe less, given the very limited range of objects that were produced and their dates, namely in the second half of the 5th and the first quarter of the 6th century AD.

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SR = Södermanlands Runinskrifter, häfte 1–4, 1924–1936. KVHAA Kungl. (Stockholm 1924–1936).

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Fig. 1a. General view of the excavated area at Skeke, in Rasbo parish in Uppland, Sweden. The inset map shows the location of Skeke and Helgö in Sweden. The workshop is situated in the northern part of the excavation.

Fig. 1b. Close-up of the excavated area. The arrow in the north points to the workshop before excavation. The horseshoe-shaped feature on the floor of the workshop is the hearth used to melt metal (photo Hawkeye flygfoto/RAÄ UV Mitt.).

Fig. 2a. Vertical photograph of the workshop area at Skeke before excavation. Notice the stone foundation and the hearth (photo RAÄ UV Mitt.).

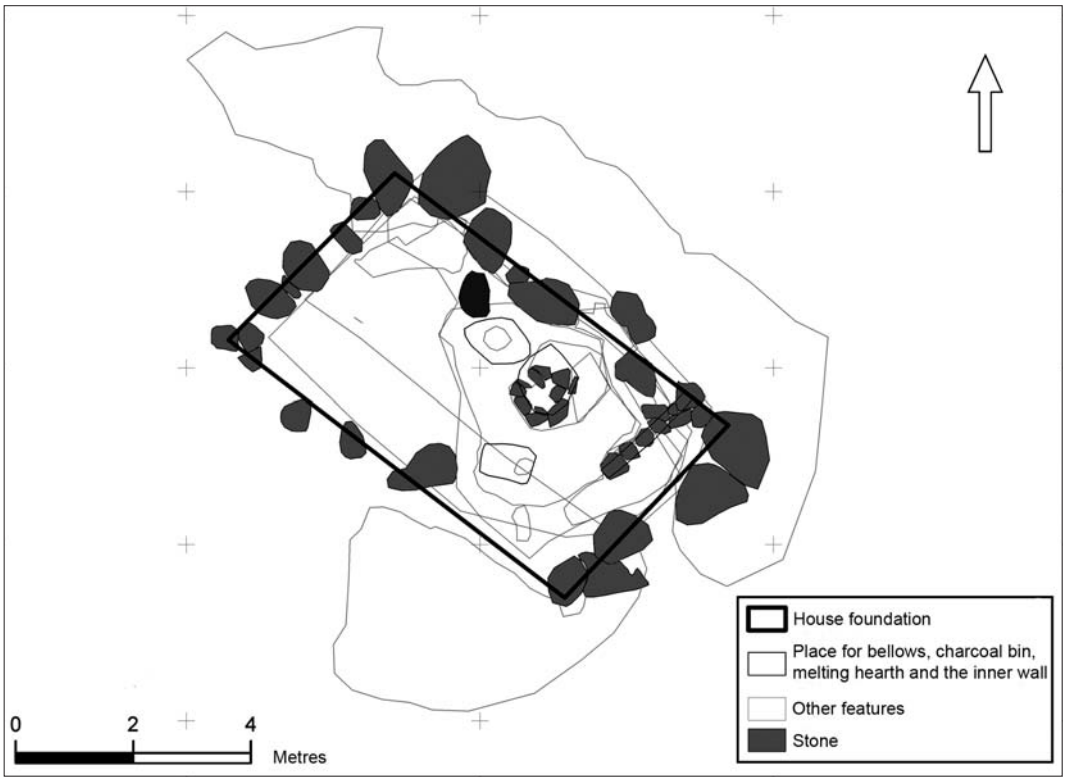


Fig. 2b. Workshop floor plan with the different installations.

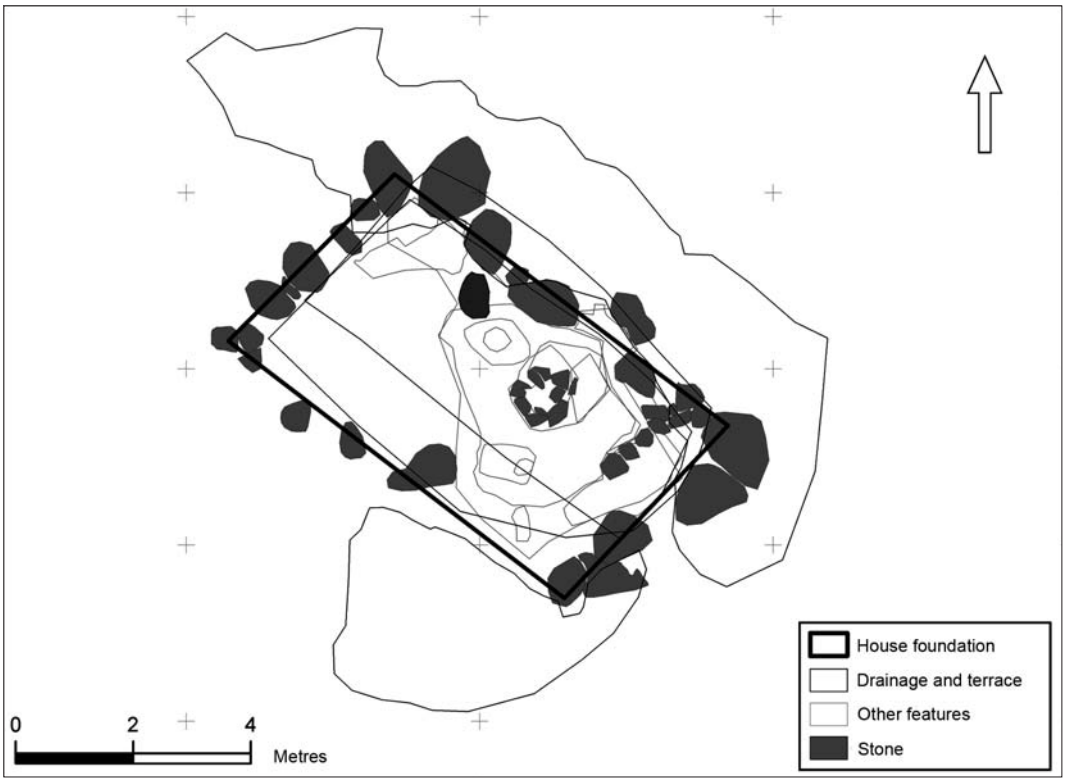


Fig. 2c. Various layers, including the drainage layer.

Fig. 3. The workshop during excavation. In front are the remains of the charcoal bin (partially excavated) and, in the centre, the hearth used to melt metal and the drainage layer beneath the bellow (photo RAÄ UV Mitt.).

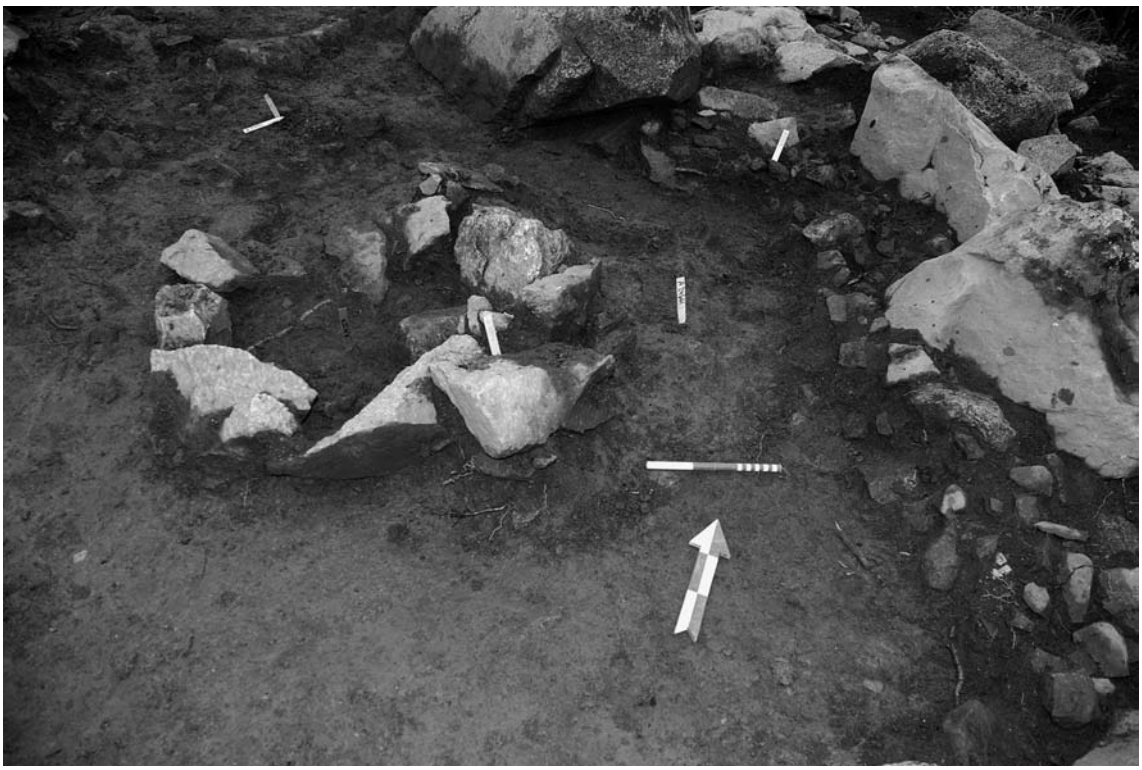


Fig. 4a. The hearth used to melt metal during excavation. Part of the clay layer from the exterior of the hearth can be seen to the east of the hearth (photo RAÄ UV Mitt.).

Fig. 4b. Section through the hearth and floor. To the north, the clay layer that covered the exterior of the hearth can be seen (photo RAÄ UV Mitt).

Fig. 4c. The foundation of the hearth was built up on the floor; the cut stones were supplemented at the bottom and on the outside by smaller cracked stones (photo RAÄ UV Mitt.).

Fig. 5a. Due to the topography, the workshop needed a drainage system. This layer was apparently strengthened beneath the position of the bellows. To the right, the filling and foundation of a later building that partly destroyed the workshop (photo RAÄ UV Mitt).

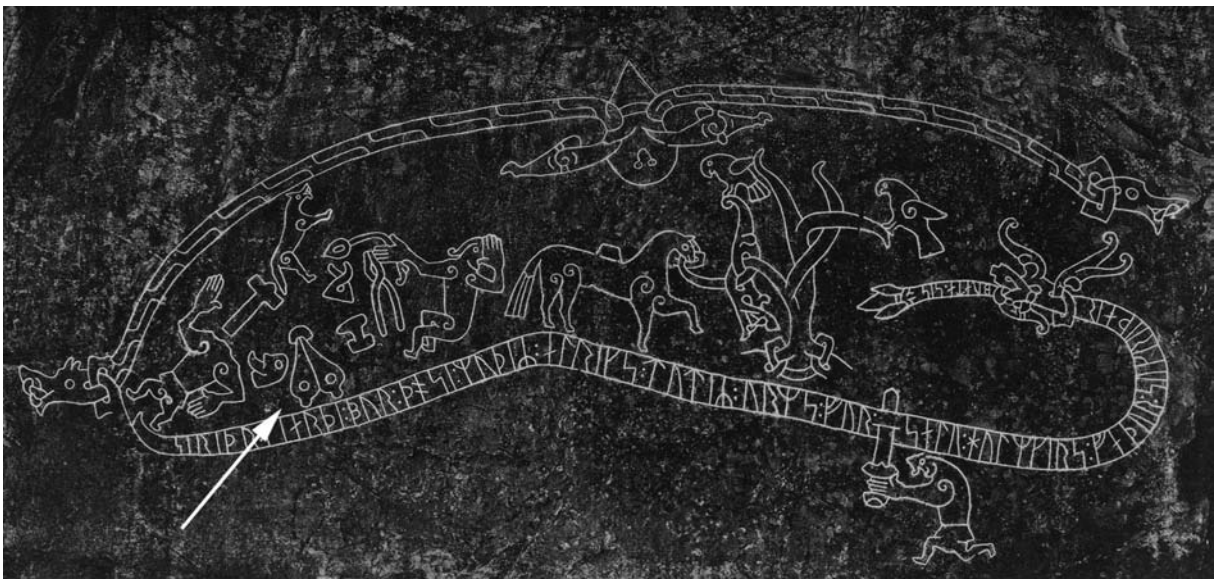
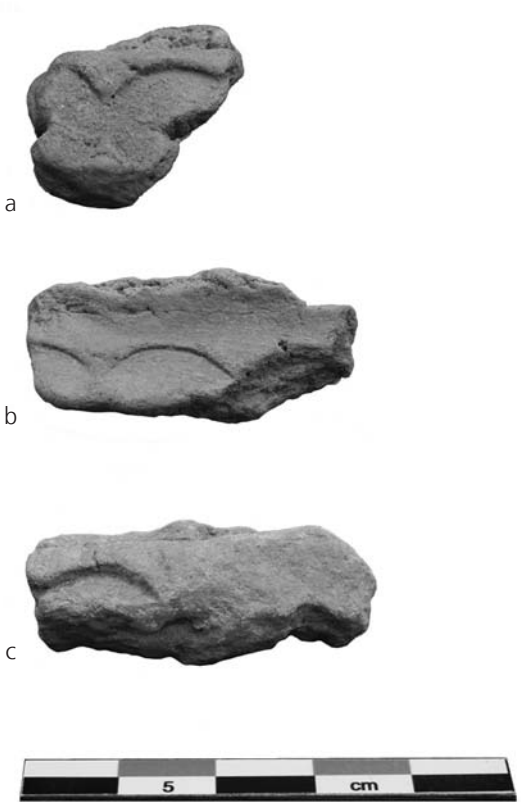


Fig. 5b. The bellows at Skeke probably looked like those on the rune-stones from Näsbyholm (no. 327) and Ramsundsberget (no. 101) in the county of Södermanland to the south of Lake Mälaren (after SR 1924-36, 306ff., Pl. 165, 166, 71ff., Pl. 48).

Fig. 6. The charcoal bin during excavation (photo RAÄ UV Mitt.).

Fig. 7. a An iron object before sampling, it was first thought to be a chisel; b after sampling for metallographic analysis it was revealed to be a punch; c a chisel; d fragmented plate-shears; e the edge of the bone scalpel (photo RAÄ UV GAL).



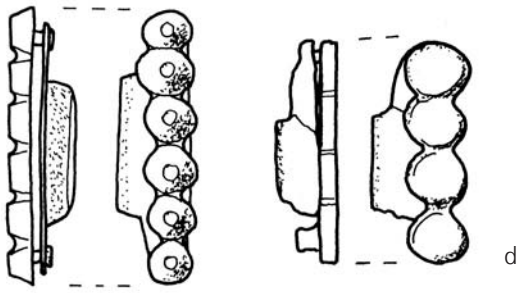


Fig. 8a–d. Moulds for clasp buttons of Hines type 2, dated to AD 475–525: a–c from Skeke (photos a–c RAÄ UV GAL; d after Hines 1993).

Fig. 9a. Coiled ring made of gun metal and fire gilded.

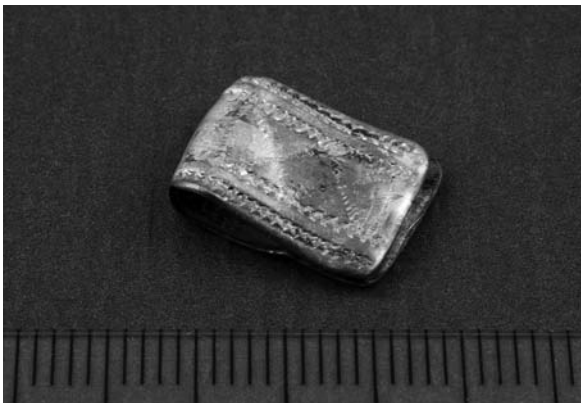
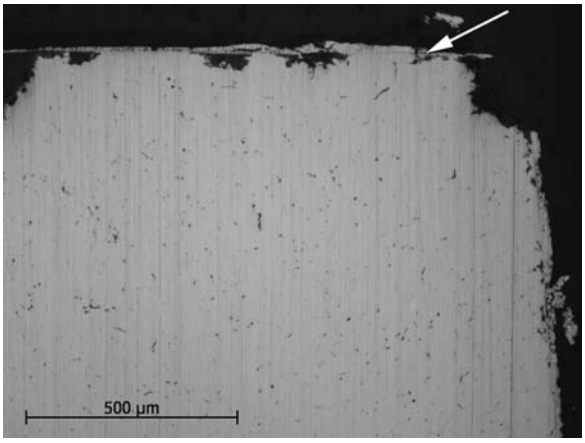


Fig. 10. Silver mounting. The mounting lacks a rivet so the use of this object is at present unknown. The ornamentation is imitation silver wire produced by at least three different punches (photo RAÄ UV GAL).



◀ *Fig. 9b. The chemical composition of the core is 18–19 % Zn, 2–3 % Sn and a very small amount of silver, the rest is copper. The outer layer (arrow) is an alloy of 80 % Au, 11 % Ag, and less than 2 % Cu. Hg, mercury, is about 7 %, proving that this object was fire gilded (photo RAÄ UV GAL).*