

An engraved lead disc from the Brough at Birsay, Orkney

by C L Curle

Amongst the large number of objects from pre-Norse levels at the Brough of Birsay (Cruden 1958; 1965; Radford 1959) is one that seems of sufficient importance to warrant publication in advance of the full report of the site and of the finds by C E Raleigh Radford and the writer of this paper respectively. The object is a lead disc, 50 mm in diameter and 5 mm thick (pl 24a). One side of the disc is engraved with a design of spirals and the other is plain. It was found below a complex of Norse houses which was considered too important to destroy, so that excavation on this part of the site has been necessarily incomplete. The surface of the disc is worn and scratched giving the impression that the engraving of the design had been rather sketchily executed; for this reason it has been accepted as a trial-piece. There is, however, the possible alternative that the disc was made as a pattern for the production of ornamental plaques in metal. As lead is a soft material the damage might well have occurred after the site had been abandoned, since there were at least two occupation levels above the area where it was found, and there was scarcely an object from the earlier levels found unbroken. The disc had been carefully shaped (and the compass seating is still visible in the centre), whereas most trial-pieces consist of carvings on unworked pieces of bone or fragments of slate. A cast in plaster (pl 24b) shows the details clearly and it is noticeable how sharply defined some remain.

Assuming that the disc was indeed a pattern, before considering in what material it was to be made and the method of manufacture, the problem of whether the design is a positive or a negative should be discussed. First it must be said that, whatever the final result was intended to be, engraving is the obvious technique, as it would be exceedingly difficult to build up the fine lines for such a complex pattern by excising the background. When an impression was taken in latex (pl 24d) and the lines that were engraved stood out in relief, the effect, on the writer at least, was of an instantly recognisable, although simplified, version of the familiar trumpet-spiral pattern (fig 1, a, b and c). This suggests that the design on the disc is in the negative, although on some of the many other versions of the same pattern, background and foreground are interchangeable and the design is sometimes reversed.

The disc could have been used in various ways. It could have been used directly as a die to be impressed on a thin sheet of silver, to produce the pattern in the positive. There are two obvious parallels for this. The first is from the Moylough belt shrine from County Wicklow, described by O'Kelly (1965, 170, 171; pl 19a). In fact, it is not a separate disc but a circular medallion forming part of a larger pattern in embossed silver glued to a thin sheet of copper. For a full discussion of the technique see O'Kelly (1965, 184). He considers that the die would

not have had to be of very hard material and mentions brass, wood, or bone as suitable, and one might consider lead as equally so. An impression on kitchen foil taken from the Birsay disc shows how simple this method was to employ (pl 24h). A parallel nearer at hand is the escutcheon from the base of the St Ninian's Isle silver hanging-bowl (pl 24f). Wilson has pointed out (Small *et al* 1973, 145) its closeness in design and its similar technique to the Moylough belt shrine. It is perhaps relevant to mention here that both a mould of a penannular brooch, and fragments of a bronze brooch of the same type which Wilson regards as similar in form to the St Ninian's Isle brooches (Small *et al* 1973, 105) were found at Birsay. The mould was found from an early level, the brooch fragments from the floor of a Norse dwelling.

The disc could have been used as a pattern for a plaque in cast bronze. This, in the writer's view, was its most probable function. There is ample evidence at Birsay of an important and sophisticated bronze industry on the island; small pieces of coloured glass, stone moulds and



FIG 1 a, Birsay disc, negative; b, Birsay disc, positive; c, hanging-bowl mount from Hitchin

the small bronze bars associated with them, many clay crucibles, and above all hundreds of fragments of clay moulds were scattered over a wide area. It is in this context that the disc will now be examined.

The dimensions of the disc as well as the pattern with which it is engraved bring to mind so strongly the large group of enamelled mounts with trumpet-spiral decoration, that it is tempting to associate the Birsay disc with these. When the Birsay design is compared with the classic versions of the pattern as shown on the Spiral Page of the Book of Durrow and the mounts from Hitchin (pl 24g; fig 1, c), the connection seems clear (far more so than with the St Ninian's Isle mount or even the Moylough belt shrine), even although the Birsay example is considerably simplified and some of the details omitted or misinterpreted. At Birsay, for instance, only two out of the three strands forming the spirals have a trumpet ending whilst on the Hitchin disc every strand ends in such a way. This gives the Birsay pattern an empty look and the pelta-like aspect of the design is emphasised (fig 1, b and c). Also of the three-leaved twig, which is such a constant feature of the classic versions, only a single vestigial leaf remains, and the trumpet ends are filled instead with a sharply pointed triangle. However, not all the enamelled mounts followed the usual pattern; an escutcheon from near Oxford, illustrated by Kilbride-Jones (1937, fig 8, 7), shows triangles filling the trumpet ends and the plant motif reduced to a single leaf. But in spite of the stylistic resemblance it is not possible to relate closely the Birsay disc to the hanging-bowl mounts, for all these bronze mounts with the trumpet spiral pattern are in champlevé enamel. The fields of enamel are raised to the level of the reserved areas of bronze, resulting in a smooth surface; whilst a feature of the Birsay disc is the very distinct variation in relief. This is distinguishable on the latex impression, (pl 24d) but shows more clearly on the plaster cast (pl 24b) where, even although the surface of the disc was considerable worn down in places, it can be

seen that the engraving is shallow for the fine lines of the spirals, but deepens progressively as the lines diverge, until when the trumpet ends are reached it turns almost into chip-carving. If the design had been intended for enamelling the lines would surely have been cut vertically and to an even depth, this variation of relief would have had no function and the lines of bronze would have risen irregularly above the fields of enamel. But there seems no reason why the bronze plaque with its elegant design of slim curved lines, as seen on the latex impression (pl 24d), depending for effect not on colour but on the variation in relief, should not have been the final objective.

Mention was made earlier of some examples of the trumpet pattern where the background and foreground had become interchangeable and were occasionally reversed, and the possibility that the Birsay disc could have been used not as a negative, but as a positive, must not be ignored. The writer has been unable to find any parallels in cast bronze on the same scale to illustrate this idea, but the small discs, which appear to be insets, on the back of the Breadalbane Brooch (pl 24c) (Smith 1923, 135, pl XII) may come into this category. These discs have aspects in common with the lead disc: the fat strands of the spirals for example (although they are less tightly coiled than those of Birsay), the low, rather flat, relief with the foreground taking up nearly the whole area of the circle, and the deeply cut background. Although other objects have somewhat similar discs as a part of their decoration, for example, on the bronze belt buckle found at Lagore (Henry 1965, pl 28) and the Tara brooch, they are not separate mounts and are outside the scope of this paper.

If the disc were intended to be a pattern for casting in bronze, the next question to be considered is the technical one of which particular method would have been used. *Cire perdue* has long been accepted as the normal process for such mounts. As the clay enclosing the wax model would have to be broken in taking out the completed object, the fact that there is no evidence for the use of this technique is no proof that it was not used. However, the discovery of one half of a two-piece mould for a hanging-bowl escutcheon at Craig Phadraig in Inverness-shire (Stevenson 1975) has suggested a compelling alternative. The Birsay disc could have been a master pattern from which a mould would have been manufactured by an intermediate stage. A model would be made from the disc in wax which would be a suitable material and seems the obvious choice, and this model would be a replica of the final object. So far the method would have been the same as for *cire perdue*, but, instead of enclosing the wax model in clay, it would be used as a die to be impressed on the clay which would form the mould. There would thus be four stages of production: (1) negative: the engraved lead disc, which was the master pattern; (2) positive: a replica of the final object; (3) a second negative, the clay mould; (4) positive, the bronze object cast from the clay mould. This assumes that the lead disc was a negative; if it were used as a positive the process would be simplified, no intermediate stage would be required, the lead disc itself being the model to be impressed on the clay.

A problem arises: for the actual casting from a two-piece mould made from such a disc as that of Birsay, how was the liquid bronze led into the mould? In the case of the Craig Phadraig mould there would have been no difficulty, for, as it was for the type of escutcheon to which the hook would have been attached directly, at the top of the matrix there is a small semicircular break in the circle into which the nozzle of the pouring gate could enter. But the Birsay disc is a complete circle with an overall pattern, the cutting of part of the engraving so deep and the disc so thin that a mould made from it would have only a shallow matrix. No moulds for ornamental discs have been found at Birsay, but there are a number of moulds for penannular brooches which present a similar problem. All these are for a type of brooch which has an oval medallion with a small circle in the centre, both outlined by a raised rib (fig 3, c and e). This would cause a

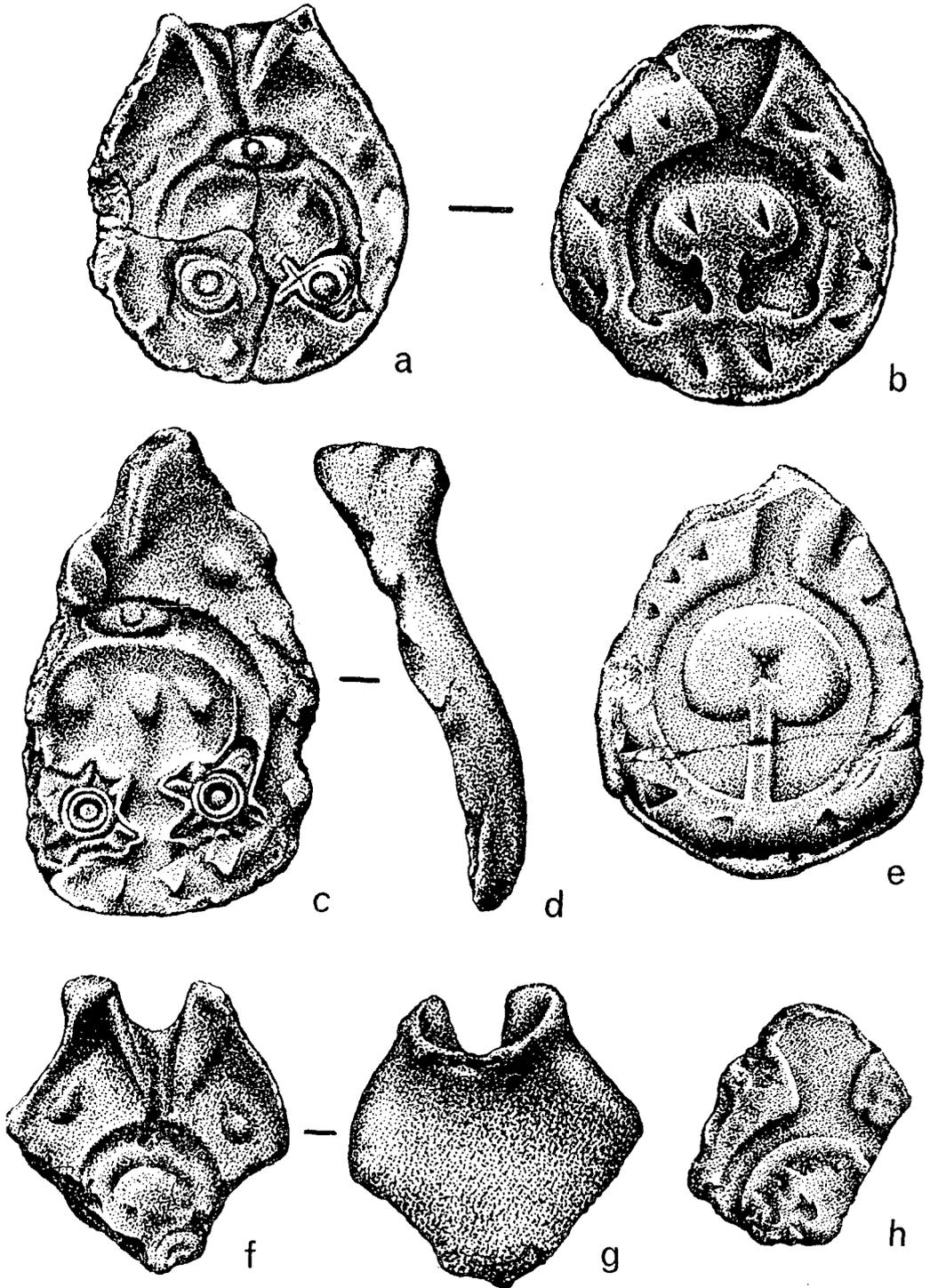


FIG 2 Brooch moulds from Birsay. Front, a, c, and f; back, b, e, and h; d is side view of c. Scale 1 : 1

similar obstruction to the entry of the bronze as was described for the Birsay disc. To visualise the situation it is helpful to remember that in looking at the matrix on a mould, what is seen is the back of the projected object, seen from the inside-out. The writer believes that a solution to this problem can emerge from a study of the structure of these Birsay brooch moulds. They are in the usual tradition of the two-piece mould with a single pouring gate and the method by which they were made does not seem to have been very different from that in use at Traprain Law (Curle and Cree 1916, 124–6), Helgö (Holmquist 1970, 92) or Glauberg (Capelle and Vierck 1971, 54) except that, with the increasing number and efficiency of the ‘keys’, the complete outer jacket of clay that enclosed the whole mould appears to have been replaced by some simpler method of holding the two halves together. At Birsay, however, there are two features connected with the entry of the bronze into the pouring gate which are either innovations or have escaped notice until now. The first concerns the shape of the pouring gate; it is not conical, but shallow and flat at the back, and deeply rounded at the front, so that the top, in plan, is in the form of the letter ‘D’. This is clearly indicated in the drawings of typical Birsay brooch moulds (fig 2). On the back half of each mould it is shown that there is no break between the matrix of the pouring gate and that of the brooch; they merge into one another and are the same depth (fig 2, b, e and h). On the front half of each mould it is clearly shown how deep and rounded is each pouring gate, so that it does not enter the matrix of the brooch on its own side – thus the oval medallion at the top of the hoop is untouched – but it is slanted to lead into the matrix of the back half (fig 2, a, c and f). A drawing of the outside front half of a mould emphasises this roundness and depth at the top of the pouring gate (fig 2, g). Another find from Birsay emphasises these facts; it is the top of a broken bronze brooch with the bronze filling of the pouring gate still attached (fig 3, e) – the illustration indicates its original position. The second feature concerns the actual filling of the mould. It was noticed when the two halves of the only complete mould were fitted together (fig 3, a) and placed in a vertical position that the top was not at right angles, but on a slant; this was evident in the drawing of the side view (fig 2, d) and in the diagram of the broken top of the bronze brooch (fig 3, f). It has previously been assumed that this type of mould was vertical, and it is shown so in a diagram in the article by Capelle and Vierck (1971, 55, fig 6), so this may be just a local variation developed because of the difficulty presented by an object, either a plaque or a penannular brooch, with a deeply cut decoration at the top of the matrix. The reason would seem to be that when the liquid bronze was poured in, it would first drop onto the back of the pouring gate and flow down the smooth surface of the back of the matrix to the bottom, penetrating the interstices of the patterned side as it filled up. The diagram (fig 3, d) shows an imaginary mould for an ornamental plaque produced from such a disc as is the subject of this paper.

CONCLUSION

The writer is well aware of the limitations of this paper. Its object is primarily to make known the Birsay disc, but also to describe a detail of a two-piece mould which may not have been studied before, in the hope that there may be parallels from other sites for one or other. The question of dating, and whether the bronze industry at Birsay continued into the Norse period must be studied in relation to the rest of the finds.

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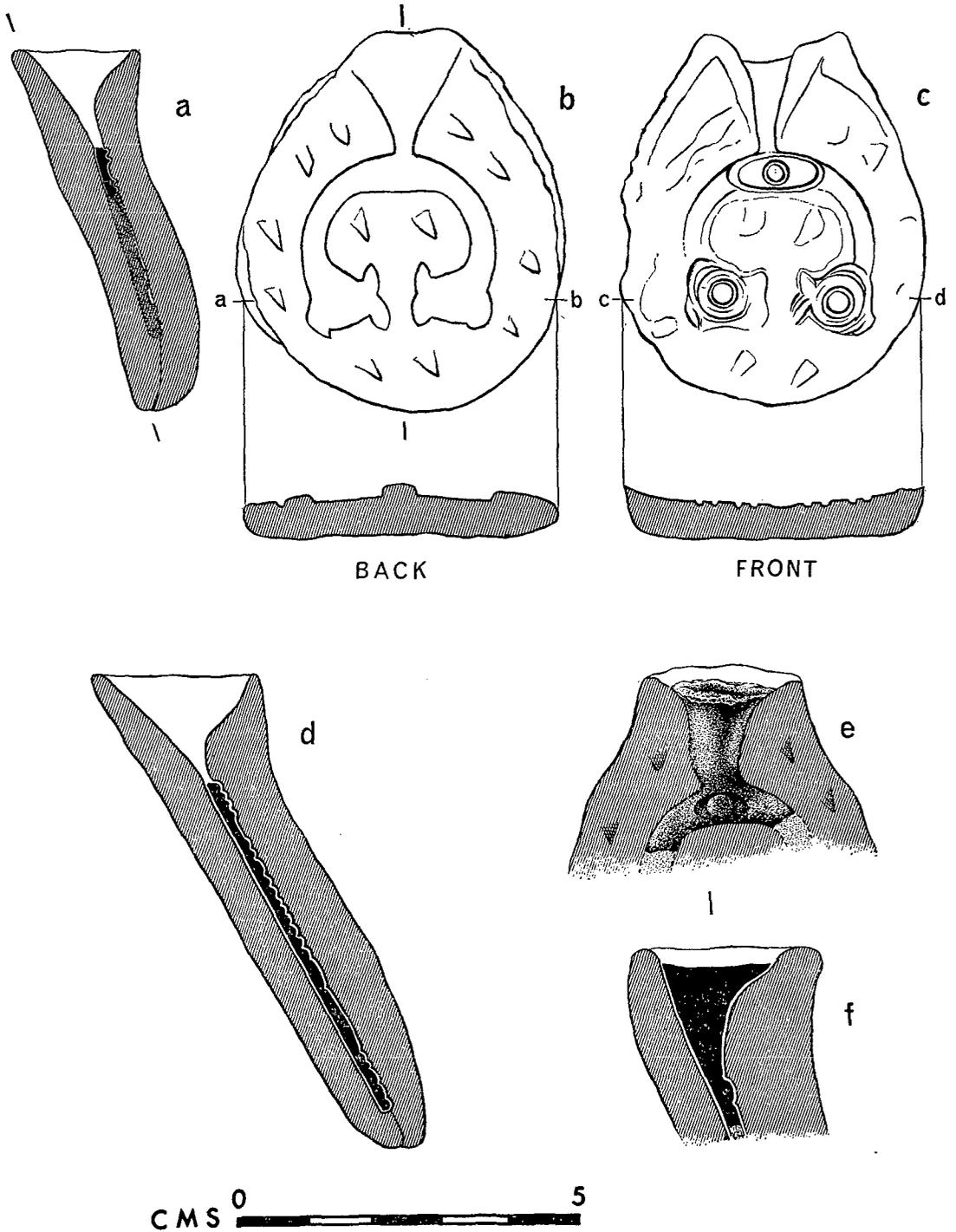


FIG 3 Brooch mould: a, section; b, back; c, front; d, section of imaginary mould for ornamented disc; e, bronze top of brooch with pouring gate; f, section of bronze top of brooch.

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Detailed caption to plate 24:

a, Birsay lead disc (Crown copyright, Department of the Environment); b, plaster cast from Birsay lead disc (photograph Carlton); c, Breadalbane brooch (Crown copyright, British Museum); d, latex impression taken from Birsay lead disc (photograph Tom Scott); e, photograph printed through latex impression (Crown copyright, Department of the Environment); f, silver mount from St Ninian's Isle (Crown copyright, National Museum of Antiquities of Scotland); g, enamelled mount from Hitchin, Herts (Crown copyright, Victoria and Albert Museum); h, impression from Birsay lead disc in silver foil (photograph Carlton).

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See above p 307 for detailed caption