

Five Insular enamelled ornaments

Cormac Bourke* and Joanna Close-Brooks†

SUMMARY

This note describes five enamelled objects from Scotland; three are recent discoveries and only two have previously been discussed. All are made of copper alloy and are decorated with enamel. The first dates to the first or second century AD; the other four are of eighth- or ninth-century date and add significantly to the body of such enamelled metalwork from Scotland¹.

VALLAQUIE (Inverness Museum) (illus 2.1)

A broken bronze pin was found in June 1980 by Miss Mary Harman in midden material above an earth house at Vallaquie, North Uist (Harman 1982). The pin was cleaned and examined in the laboratories of the National Museum of Antiquities of Scotland, and has been deposited on loan in Inverness Museum by Miss Harman. The surviving overall length of the pin is 80 mm. The stem is bent and the tip missing, while the head is somewhat corroded. There is a perforated projection at the top of the pin, a shallow socket on the head filled with a yellow-brown decayed deposit which analysis confirmed was yellow enamel, and a much corroded lip-like moulding below this.

The pin is a new example of the small group of early zoomorphic pins distinguished as 'proto-zoomorphic' by Kilbride-Jones (1980, 5–8, fig 1), and as part of her Type E by Mrs Fowler (1964). Five examples in the Scottish group are from Traprain Law, East Lothian; one from Covesea, Moray (Kilbride-Jones 1980, fig 1.6), and one from the Roman fort at Newstead, Roxburgh (*ibid*, fig 1.7; the caption to this figure is in error). There is what seems to be another of these pins from Crosskirk broch, Caithness (Fairhurst 1984, 116–17, no 752). This also has a hollow in the head, probably for enamel, and typical close-set horizontal incisions below the head, though the lip moulding is not visible on the drawing, being perhaps corroded or broken off. All the Scottish group differ from the related but heavier Irish series (Kilbride-Jones 1980, fig 2). The pin from Vallaquie corresponds in size to the smaller and more delicate of the examples from Traprain. The enamel-filled socket on the head compares with pins from Traprain, Newstead (red enamel)² and Crosskirk, while the perforated projection on the head now makes clear the purpose of the broken projections on two zoomorphic pinheads from Traprain (Kilbride-Jones 1980, fig 1. 10, 11).

A date centred on the first and second centuries AD is generally accepted for these pins. The Newstead pin was found on the level of the early building near Block XVII, and so was probably in a late first-century AD context (Curle 1911, 69, 337), while most of the pins from Traprain were in the lowest two levels and may thus date to the first or second century (Burley 1956, 168–9). The pin from Vallaquie, together with the example from Crosskirk, extends the geographical range of the group.

*Dept of Antiquities, Ulster Museum, Belfast

†6 North Head, Milford-on-Sea, Lyminster, Hants



ILLUS 1 1, Vallaquie; 2, St Andrews; 3, Freswick;
4, Cramond; 5, Aberdour

ST ANDREWS (Scottish Urban Archaeological Trust) (illus 2.2, illus 3)

This square mount was found in 1980 in a 19th-century cart-rut in a hollow way linking the harbour with the castle and burgh of St Andrews, Fife³. The findspot was immediately west of the Culdee cemetery and church of St Mary, Kirkhill, where fragments of Pictish crosses and cross-slabs were discovered in 1860 (Allen 1903, 354–60). The beginnings of the Culdee cemetery have been dated to about 700 by C14 analysis (GU 1461; 1462). It is hoped that the report on the 1980 excavations may be published as a monograph by the Society of Antiquaries of Scotland.

The mount is 22 mm square and 3 mm thick⁴ and has a flat, decorated upper surface with bevelled edges. The decoration consists of four T-shaped cells which interlock to define an irregular field occupied by a sunken swastika with a double bend in each arm. The swastika and the T-shaped cells are filled with yellow enamel. The elements of the swastika and the T-shaped cells vary slightly in form and are not rigidly symmetrical. The mount was attached to its background by a round-sectioned lug, now broken, which springs from a four-sided projection at the centre of the reverse. In form the mount compares closely with that from Freswick Links, Caithness (illus 2.3) (see below), on which the enamelled ornament incorporates a subsidiary diagonal swastika.

On the St Andrews mount a swastika and four T-shaped cells form a square in which the stems of the Ts are aligned on four separate points. The pattern occurs in Insular contexts in various media in a limited number of instances, and is defined as No 846/921 in Allen's classification (Allen 1903). Swastika designs have lately been discussed by Brown (1981); in the type under review (that with a double bend in each arm) the Ts can interlock either loosely to define a swastika-shaped area (as on the St Andrews mount) or tightly so that a swastika is defined by their conjunction. The motif appears in the Book of Durrow and the *Collectio Canonum Hibernensis* (Brown 1981, fig 6.4, 7). In sculpture

it occurs at Llantwit Major, Glamorganshire, Carew, Pembrokeshire, and Killamery, Co Kilkenny (Nash-Williams 1950, figs 155, 196; Crawford 1926, pls xix, xx, no 27). The motif is used in metalwork on the foot of the Ardagh, Co Limerick, chalice, where it forms a running pattern defined in glass by a sunken grid, and on the paten from Derrynaflan, Co Tipperary (Ryan 1983a, pl p 127; 1983b, pl 56). It appears on the escutcheons of the bowl from Løland, Vigmostad, Vest-Agder, Norway, where T-shaped areas of red enamel define a yellow enamel swastika, itself continuous with a frame which delimits the decorated field (Brown 1981, fig 6.8). On the pail from Oseberg, Slagen, Vestfold, Norway, this arrangement is repeated but the relative positions of the two colours are reversed (*ibid*, fig 6.9). In millefiori from Monkwearmouth, Tyne and Wear, two opposed pairs of Ts in different colours create the same basic pattern (*ibid*, fig 6, 1–3). In all of these instances either the swastika or the T-shaped areas can be read as the dominant motif.

Brown has identified the swastika in late Roman metalwork, in the quoit-brooch style of southern England and in Frankish cloisonné jewellery. He suggests that the motif stamped on pottery in the sixth and seventh centuries gave rise to its use in other media in East Anglia and Northumbria, and that it became common thereafter in Insular art. Further, the use of rectilinear cells for enamel is traced to 'swastika-inspired designs' (*ibid*).

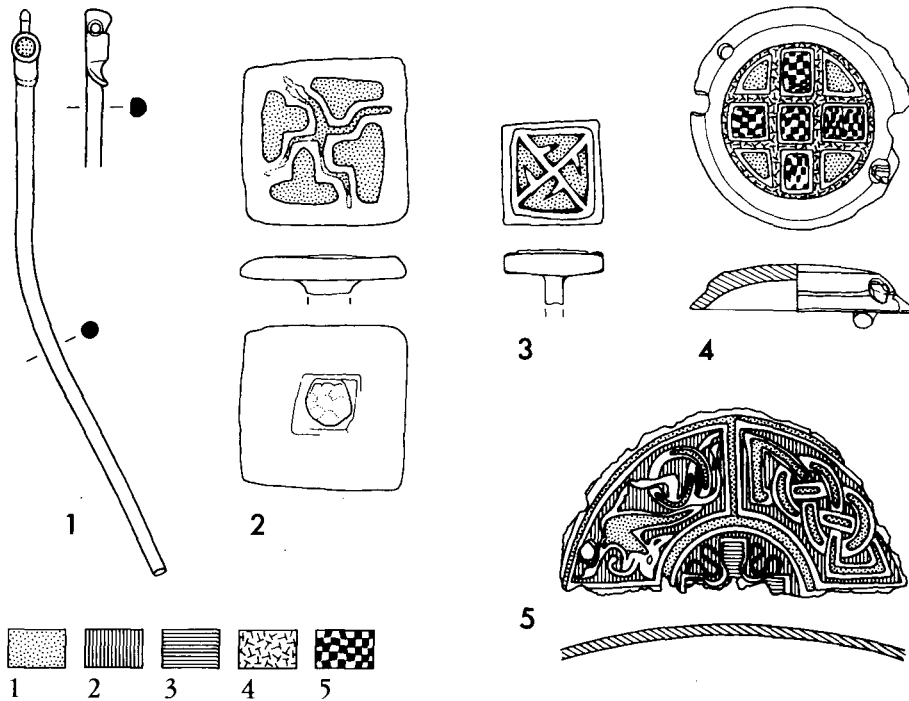
Whatever its origin, and whether the use of T-shaped cells or the creation of a swastika pattern was uppermost in the mind of the designer, the motif on the St Andrews mount is in keeping with Insular usage. While the instances cited above date from the seventh to the 11th centuries, the currency of the motif in *enamelled metalwork* lies in the eighth and ninth centuries, the period suggested by the context of the Oseberg bucket (Wamers 1985, 103). It is to this period that the St Andrews mount should be assigned.

FRESWICK (RMS FC 256) (illus 2.3, illus 3; Batey 1982, fig 3.8)

This square stud was found before 1948 'at the inner end of the passage of a reputed brooch' on Freswick Links, Caithness⁵. The stud has a flat, decorated upper surface and was attached to its background by a square-sectioned lug, now broken, at the centre of the reverse. The stud measures 13.8 mm by 13.6 mm and is 3.4 mm thick; the lug survives to a length of 4 mm. The decoration consists of four asymmetrical V-shaped cells filled with yellow enamel and separated by grooves forming a diagonal cross. The cross is continuous with a groove which follows the edge of the mount and frames the decorated field. Although not identified by XRF (see appendix), minute traces of red enamel were noted (by CB) under magnification in the internal angles of the V-shaped cells and in the framing groove. Together with the diagonal cross they were presumably once filled with this material. The internal angle of each V-shaped cell forms a spur from the diagonal cross, creating a subsidiary swastika. The V-shaped cells can also be read as a pair of disjointed and interlocking Zs.

V-shaped areas of yellow enamel form part of a more complex pattern on the escutcheons of a hanging bowl from Hopperstad, Vik, Sogn og Fjordane, Norway (Petersen 1940, 103, fig 109), and occur on the 'buckle' of the Moylough, Co Sligo, belt-shrine (O'Kelly 1965, pl 13b). Enamelled cells of similar shape appear on mounts from Birka, Uppland, Sweden, and Tärland, Naerbø, Rogaland, Norway (Wamers 1985, nos 148, 102) (illus 4). However, there appears to be no parallel in Insular metalwork for the use of four V-shaped cells to fill a *square* field as on the Freswick mount. It is noted that V- and L-shaped cells are analogous forms which are not always objectively distinguishable.

With the exception of the Hopperstad bowl, none of the comparative material cited is derived from an archaeological context. The bowl comes from a 10th-century burial (Wamers 1985, no 64) and is probably of eighth- or ninth-century date. The other material can be dated stylistically to the eighth or ninth century and this date should apply also to the Freswick mount. This is likewise the date of a group of circular, enamelled mounts of Insular make, some of which are provided with a central



ILLUS 2 Enamelled objects: 1, Vallaquie; 2, St Andrews; 3, Freswick; 4, Cramond; 5, Aberdour (scale 1:1). Colour key: 1, yellow; 2, off-white, originally red; 3, blue; 4, green (? originally red); 5, millefiori (white and dark blue/black)

lug on the reverse (Graham-Campbell 1986). These appear to have been harness-fittings, and the mounts from Freswick and St Andrews, which are similarly provided, may have served a similar function.

CRAMOND (RMS FC 302) (illus 2.4, illus 3)

This circular mount was discovered in the 1970s as a chance find in the churchyard which overlies the Roman fort at Cramond, Midlothian (*Proc Soc Antiq Scot*, 104 (1971–2), 316). The mount has a convex upper surface and concave reverse; it is 29.5 mm in diameter, 2 mm thick and 6 mm in overall elevation. The upper surface is a circular field decorated with millefiori and champlevé enamel and framed by a plain, raised border, outside which is a rebated rim with an irregular edge. The decoration is well preserved and consists of an equal-armed cross made up of five rectangular panels of millefiori and four triangular areas of yellow enamel. The yellow enamel and the millefiori occupy recesses in the surface of the mount which are separated by bands of decayed enamel, now greenish but probably originally red. The bands are continuous with a ring of the same material which delimits the decorated field.

The millefiori panels show a white and dark blue or black chequer pattern. One panel is divided by a joint-plane into two parts made up of component units of different sizes. This reveals that the panel consists either of a single off-cut from two rods fused together before cutting, or of two off-cuts fused during mounting. The inner half of another panel is slightly distorted, again suggesting that the panel is composed of two parts of which one was damaged in the mounting process.

The rebated flange is pierced by two diametrically opposed pairs of holes. The outer edge of one hole has been lost on each side and all four encroach slightly on the raised border. One hole is



ILLUS 3 Enamelled objects (clockwise from top left): Aberdour, Cramond, Freswick, St Andrews (scale 1:1). Photograph courtesy of the Trustees of the National Museums of Scotland

[facing p. 230]

occupied by a copper-alloy rivet which is bent flat on the reverse and survives to a length of 5·7 mm. The flange was presumably concealed beneath a metal frame which fastened the mount to its background. The holes, if primary, provided a further means of attachment. That the mount was additionally secured to its background by soldering is suggested by the presence of a white metal (?lead solder) on the reverse.

Equal-armed crosses composed of four rectangles or squares arranged about a central square are rare in Insular metalwork. One example made up of four rectangles of blue enamel with a central square of yellow enamel occurs on an oblong plaque from Helgö, Uppland, Sweden (Wamers 1985, no 143c). A second, filled with enamel perhaps originally red, is set within a field of yellow enamel on a hinge-plate from a tomb-shaped shrine, recently discovered at Kalmergård, Store Fuglede, Holbæk, Denmark. A third, made up of squares of yellow enamel and with green enamel in the angles, occupies a roundel on a comparable hinge-plate from Ireland (Mahr 1932, pl 50.3). The cross which subdivides a mount reused on a weight from Kilmainham/Islandbridge, Co Dublin, is also comparable (Graham-Campbell 1980, no 308.8). Closely related are two equal-armed crosses potent on a terminal from Ireland and that on the crosier from Prosperous, Co Kildare (Bourke 1987, pl I, d, c). On the terminal the expansions of the crosses are filled with blue and white chequered millefiori outlined in red enamel, and yellow enamel fills the angles. On the crosier only the blue enamel in the expansions remains. The crosses on the two pieces occupy circular fields and each is juxtaposed with a large domed stud of blue glass. The fields on the terminal are convex like the decorated surface of the Cramond mount.

An equal-armed cross of five units can be read in any square millefiori chequer pattern of nine squares, although the central unit will differ in colour from the other four. The cross is more prominent where the pattern is roughly circular, and/or where the central unit is uniquely coloured, as on the large hanging bowl from Sutton Hoo (Bruce-Mitford 1983, pl 16). On an appliqué cross from Co Antrim a nine-unit chequer pattern is made up of squares of millefiori and recesses for enamel (Harbison 1978, pl x.1). Each square of millefiori in this case is itself a nine-unit chequer made up of nine-unit chequers and areas of plain glass.

It is possible, finally, to compare the Cramond piece with the mount from Tårland, Rogaland (Wamers 1985, no 102) (illus 4), already referred to; in this case the body of the mount outside a central circular field is similarly divided into quadrants by radial millefiori panels.



ILLUS 4 Mount from Tårland, Naerbø, Rogaland (after Rygh)

The Cramond mount therefore compares with a small body of Insular enamelled metalwork. A ninth-century date has been suggested for the Prosperous crosier (Bourke 1987, 168), with which the Ashmolean terminal must be contemporary. A date in the range 750–850 has been proposed for the

Co Antrim cross (Harbison 1978, 33). The Kalmergården and unlocalized hinge-plates compare with those on early reliquaries, including that from Monymusk, Aberdeenshire, which may be of eighth-century date (Wilson 1973, 131), and a date in the eighth or ninth century can be argued for the mount from Kilmainham/Islandbridge (see below). The date of Sutton Hoo indicates the currency of the five-unit equal-armed cross in the seventh century.

The weight of the evidence suggests an eighth- or ninth-century date for the Cramond mount. While it is not possible to identify its original context, the piece clearly derives from a composite object of Insular make, and probably from an ecclesiastical milieu.

ABERDOUR (RMS FC 298) (illus 2.5, illus 3)

This broken semicircular mount, which was presumably once circular, was discovered during Ministry of Works excavations at Aberdour Castle, Fife, in the 1950s. It bears enamelled ornament on one convex surface and has a plain, concave reverse. The disposition of the ornament and the shape of the piece suggests that roughly half of the original has survived. Thus the ornament consisted of a central circular field containing an equal-armed cross with hollowed angles, surrounded by a broad ring divided into quadrants by radial lines. The radii linked two narrow concentric rings, one delimiting the ornament at the perimeter, the other dividing the quadrants from the central field. The surviving evidence indicates that the radii and concentric rings were filled with yellow enamel. Red enamel, now decolourized to off-white, surrounded the equal-armed cross and forms the background in the two quadrants that remain. An omega-shaped loop of silver wire 'floats' in the red enamel in each surviving canton of the cross. The cross itself contains areas of blue enamel, apparently locally discoloured by redeposited copper. The mount is 2 mm thick and has maximum dimensions of 45.5 and 24.6 mm, approximating respectively to its diameter and radius when complete.

One of the quadrants contains a pair of interlocking, asymmetrical twisted loops. The other contains a running quadruped, in profile, facing right, with forelegs stretching forward and back. The hindquarters are coiled and the hindlegs splayed, the body passing between them to overlie the nearside leg. The head is held high and the tongue hangs from the open mouth in an internal roll. The ear is pointed and perhaps hooked and projects prominently from the back of the head. The tail overlaps the body and hangs limply to touch the nearside hindfoot. The offside hindleg is brought forward so that the foot touches the backswept forefoot. A rivet, perhaps secondary, remains in position under the right foreleg. Both the body of the animal and the interlaced knot are filled with yellow enamel. The two lost quadrants were probably similarly decorated and arranged alternately with those that survive.

The Aberdour mount is without exact parallel, although the subdivision of a disc into quadrants about a central circle is an essentially simple scheme. It is shared by a number of analogous mounts and/or fragments of decorated metalwork of Insular origin in Scandinavia (Wamers 1985, nos 61, 70, 90, 125). However, in these examples the pattern incorporates a cross with arms forming radial lines, while on the Aberdour mount the cross is unconnected with the radii and forms a discrete central motif. This treatment is reflected in the ornament of the domed enamelled mount from Tårland, Norway (Wamers 1985, no 102) (illus 4) already cited in the case of the Freswick and Cramond mounts. This bears four L-shaped cells at the centre which can be read as an equal-armed cross and which are unconnected with four radial panels of millefiori. However, each of the quadrants essential to the scheme is subdivided into rectilinear cells. Closer in feeling to the Aberdour piece is the sub-conical mount from Ballycatteen, Co Cork (O'Riordáin & Hartnett 1944, 17-22, fig 5.63) (illus 5). This bears a broad ring divided into quadrants by narrow enamelled radii, and a free-moving three-dimensional swivel is engaged in a central hole. In contrast to the Aberdour mount the quadrants of

that from Ballycateen are filled with plain yellow enamel and are indented on their outer sides.

The Aberdour mount has been discussed by Laing and identified as a basal escutcheon from the interior of a hanging bowl (1974, 194–5, pl 11.b). However, this identification is open to question and is in any case incapable of proof. The Ballycateen mount is provided with elongated loops at diametrically opposite points and may have functioned as a strap attachment. The Aberdour mount could have served the same function, although the presence of the central cross suggests that it derives from an ecclesiastical milieu. The mount might equally have functioned as an escutcheon on a house-shaped shrine or as part of another composite piece.



ILLUS 5 Mount from Ballycateen, Co Cork (scale 1:1). Courtesy National Museum of Ireland

The interlace of the Aberdour mount is too simple to allow meaningful comparison. The running animal, however, has a number of distinguishing features, chiefly the coiled hindquarters which are so disposed that the offside leg appears as the nearside (and *vice versa*), the lolling tongue and the depiction of four legs rather than two as a profile pose allows. As Laing recognized, all of these features are found on bowl no 2 and pommel no 11 from St Ninian's Isle, in a context claimed to be Pictish (Wilson 1973, 144, figs 21, 31). The Aberdour animal's head is unlike those of the St Ninian's Isle beasts and is closer to those depicted in sculpture at Rosemarkie, Ross-shire, and Dunfallandy and Meigle, Perthshire (Allen 1903, figs 84, 305c, 318b). These animals exhibit the same short snout and pointed, slightly upturned, upper jaw. The angle of the head, pointed ear and lolling tongue recall the uppermost beast on one face of the Banagher, Co Offaly, shaft (Henry 1965, pl 92). However, it is not possible to accept Laing's suggestion (1976, 18) that the Aberdour animal is 'exactly matched' by those on the back of the Kilmainham, Co Dublin, brooch (Wilson 1973, pl xlvii.b).

Apart from considerations of style, the Aberdour mount adds to the Insular corpus of enamelled zoomorphic ornament. Related examples are the ridge-terminals of the 'Emly' tomb-shaped shrine (Cone 1977, no 31), the central boss of the Co Antrim cross (Harbison 1978, pl xii. 2, 3), a brooch terminal from Co Westmeath (Hencken 1938, fig 20.c), the 'buckle' of the Moylough, Co Sligo, belt-shrine (O'Kelly 1965, pl 13), an appliqué bird head from Helgö, Uppland, Sweden (Wamers 1985, no 143d), a hinge-plate from a tomb-shaped shrine from Sanddal, Breim, Sogn og Fjordane, Norway (*ibid*, no 53), and two related hinge-plates from Ireland (Mahr 1932, pl 50. 3, 5), one of them already referred to. Considerably earlier than these, perhaps of the sixth or seventh century, is the penannular brooch from Bath, Avon, which bears enamelled zoomorphic ornament on both terminals (Laing 1987, ill 18). The relatively small number of the examples reflects the bias in favour of non-representational patterns in Insular enamelled metalwork. The list excludes zoomorphic pieces bearing enamelled ornament but cast in the round.

Nothing directly comparable with the central equal-armed cross on the Aberdour mount has been noted, although crosses of this form are common in Insular sculpture (eg Allen 1903, figs 19, 258A; Lionard 1961, fig 12). The inserted loops of wire compare with the undulating wires within the radial fields of the quadranted mount from Kilmainham/Islandbridge, Co Dublin (Graham-Campbell 1980, no 308.8). Undulating wires also appear in L-shaped cells on a hinge-plate from

Gjøannes, Hedrum, Vestfold, Norway (Wamers 1985, no 119). Thus the Aberdour mount combines a number of features which are widespread geographically in Insular art. The bulk of the St Ninian's Isle material has been dated to the eighth century (Wilson 1973, 103, 147–8), and the Insular finds from Kilmainham/Islandbridge arguably belong to that century or the ninth (cf Graham-Campbell 1976, 40). The Aberdour mount and the other comparative material cited must be roughly contemporary. Irrespective of its place of manufacture, by its form and ornament the mount adds to the evidence for the interdependence of the arts of Pictland and Ireland at this period.

CONCLUSION

As noted above, the pin from Vallaquie increases the small number of such proto-zoomorphic pins and extends the range of their distribution. The four mounts form part of a small Scottish corpus of enamelled metalwork of eighth- or ninth-century date. Those from Cramond and Aberdour are accomplished pieces, and the presence on the latter of wires set in an enamelled field is a most unusual feature. Although any of the mounts could have been made in Ireland, all four were found in eastern, coastal locations (illus 1). Thus they are more likely to have been made by artisans in Scotland who worked in parallel with their Irish counterparts.

NOTES

- 1 Three of the objects are now in the Royal Museum of Scotland, Edinburgh (formerly the National Museum of Antiquities of Scotland); the other two are in the care of the Scottish Urban Archaeological Trust, Perth, and Inverness Museum. In the drawings some corrosion has been omitted in order to show details of the enamelling.
- 2 The term 'red enamel' is used here throughout, although an apparently similar substance on the escutcheons of the large hanging bowl from Sutton Hoo was identified as 'cuprite red glass' rather than a 'true enamel' after analysis (Bimson 1983, 941–44).
- 3 The find was made during excavations conducted by Jonathan Wordsworth for the Scottish Urban Archaeological Trust and funded by the Scottish Development Department (Ancient Monuments).
- 4 The dimensions of the St Andrews mount and of the other mounts described here vary slightly about the averages quoted.
- 5 The Royal Museum of Scotland Register is quoted.

APPENDIX

ANALYSIS OF METALS AND ENAMELS

J Tate*

The pieces discussed below were all investigated in the Research Laboratory of the National Museum of Antiquities of Scotland (now the Royal Museum of Scotland) in 1982 and 1983. All analyses were made by energy-dispersive X-ray fluorescence using a Rh target X-ray tube operating at 38 kV and with an air path to the detector. Low atomic number elements were not therefore detected. All analyses were on surfaces which had not been prepared other than by wiping away surface dirt (so far as possible), and are, therefore, strictly qualitative.

Vallaquie (F326B)

The yellow-brown paste in the pinhead contains lead, tin and antimony, consistent with other analyses of yellow enamels of this date, and showing the colourant to be lead antimonate. The metal of the pin itself is bronze with a small amount of lead.

St Andrews (F802-8B)

The visible yellow enamel has high amounts of lead and tin and is presumed to be lead-tin oxide.

*Research Laboratory, Royal Museum of Scotland

There is no detectable antimony (ie if present it is in quantities less than about 0.5%). Visual examination showed that there are traces of red in the enamel which may be caused by copper; this could not, however, be confirmed with the XRF system because of their small size (the area analysed is an ellipse approximately 1 mm by 1.5 mm).

The base metal is copper alloyed with zinc, lead and tin, perhaps also a result of mixing scrap brass and bronze.

Freswick (F742-5B)

The visible yellow enamel in the background area has a high lead content with a small amount of tin (copper, zinc and tin may also be present from the corrosion of the metal body). No antimony could be detected. No significant trace of enamel could be detected in the diagonal cross by XRF.

The base metal is copper alloyed with zinc, lead and tin, possibly a result of mixing waste bronze and brass.

Cramond (FF1077-8B)

The yellow enamel in the background has a high lead content, some tin and a small amount of copper. As for the St Andrews stud, it is assumed to be lead–tin oxide; again no antimony could be detected. The decayed, now greenish, enamel filling the dividing bands contains copper, lead and traces of tin. Some copper must be from corrosion of the base metal, but the analyses are not inconsistent with an original red colour. Antimony is present in the millefiori, either from the white glass (?calcium antimonate) or the blue (?antimony clarifier) (cf Warner & Meighan 1981, 61–2).

The base metal is bronze containing lead but no detectable zinc.

Aberdour (F1327B)

The visible yellow enamel filling the interlaced ribbons, the animal's body and the dividing bands was analysed in the ring surrounding the central cross. The analysis revealed a high lead content with tin and traces of copper. It is assumed to be lead–tin oxide, no antimony being detected. The decayed creamy-whitish enamel surrounding the interlaced loops was analysed. The enamel here was extensively decayed and contaminated by corrosion from the base metal. However, no tin or antimony could be detected, while lead was present strongly in the spectrum as was a moderate amount of copper. The lack of antimony or tin suggests that this could be decayed red, not white, and under magnification traces of red enamel can be seen beneath the decayed surface in a few places.

The material filling the central cross showed high lead, tin and antimony (also iron, copper, manganese and strontium). A few remnants of blue enamel can be seen in this area, and the analysis is similar to that of the blue enamel of an earlier first- or second-century piece, the enamelled fragment from Rispain Camp, Wigtownshire (Haggarty & Haggarty 1983, 47–8). The blue colour, as was suggested for the Rispain enamel, may be due not to a copper compound but to a small amount of cobalt, the presence of which is hard to detect with this technique (it is masked by the second fluorescence peak of iron).

The base metal is bronze containing some lead.

Comment

The use of lead antimonate to colour the enamel of the earliest piece, the Vallaquie pin, but not the four later objects is in agreement with results from elsewhere. Biek and Bayley (1979, 10) have noted that this substance was used to colour yellow enamel down to the Roman period (eg the Rispain piece quoted above), but that it is found only exceptionally later.

It is perhaps worth noting that the square mounts from St Andrews and Freswick were made from a copper alloy containing zinc, as opposed to the discs which are both copper–tin–lead alloys with no zinc. The number of samples is clearly too small, however, to draw any conclusions, and it must also be emphasized that all analyses were on unprepared, patinated surfaces.

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Mitford provided an X-ray of the Aberdour mount, taken by the British Museum, which allowed corroded details to be deciphered. Miss Harman kindly allowed publication of the Vallaquie pin and Mr Flemming Kaul, Nationalmuseet, Copenhagen, made the Kalmergården hinge-plate available for study. K Bourke, J Graham-Campbell, R Warner and N Whitfield read and commented on the text.

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