

## An Early Bronze Age ‘dagger grave’ from Rameldry Farm, near Kingskettle, Fife<sup>‡</sup>

Louise Baker\*, Alison Sheridan<sup>†</sup> & Trevor Cowie<sup>†</sup>  
with contributions by K Anheuser, E Cameron, S Chambers,  
M Davis, D Henderson, C Heron, P Northover, B O’Connor &  
H Redvers-Jones

### ABSTRACT

*In February 2000, ploughing disturbed the capstone of a cist, located on the side of a prominent knowe at Rameldry Farm, near Kingskettle in central Fife. Excavation by Headland Archaeology Ltd on behalf of Historic Scotland revealed a short cist which contained the crouched inhumation of a man aged 40–50, who had suffered from arthritis, some tooth loss and possibly Paget’s Disease. He had been buried wearing a garment adorned with six V-perforated buttons. Five of these are of Whitby jet (including one with unique decoration including inlaid tin); the sixth is of the mineral lizardite, and has an enigmatic coating, possibly a glaze. Behind his shoulder was a dagger, of ‘Milston type (East Kennet variant)’; it had had a fancy horn hilt and a scabbard lined with animal skin. The scabbard yielded two AMS radiocarbon dates, with a mean value of 2280–1970 cal BC at 2σ.*

### INTRODUCTION

Louise Baker

On 21 February 2000 the capstone of a short cist was dislodged during ploughing on Rameldry Farm, near Kettlebridge, Kettle parish, in central Fife (NGR NO 3316 0630; illus 1). The driver, Colin Black, informed the farmer, Mr Smith of Rameldry, who in turn reported the find to Historic Scotland through the landowner, Balbirnie Estates. Headland Archaeology Ltd was contracted to undertake emergency excavation, which took place between 23 and 28 February. The cist was found to contain the poorly-preserved remains of a skeleton in a crouched position, along

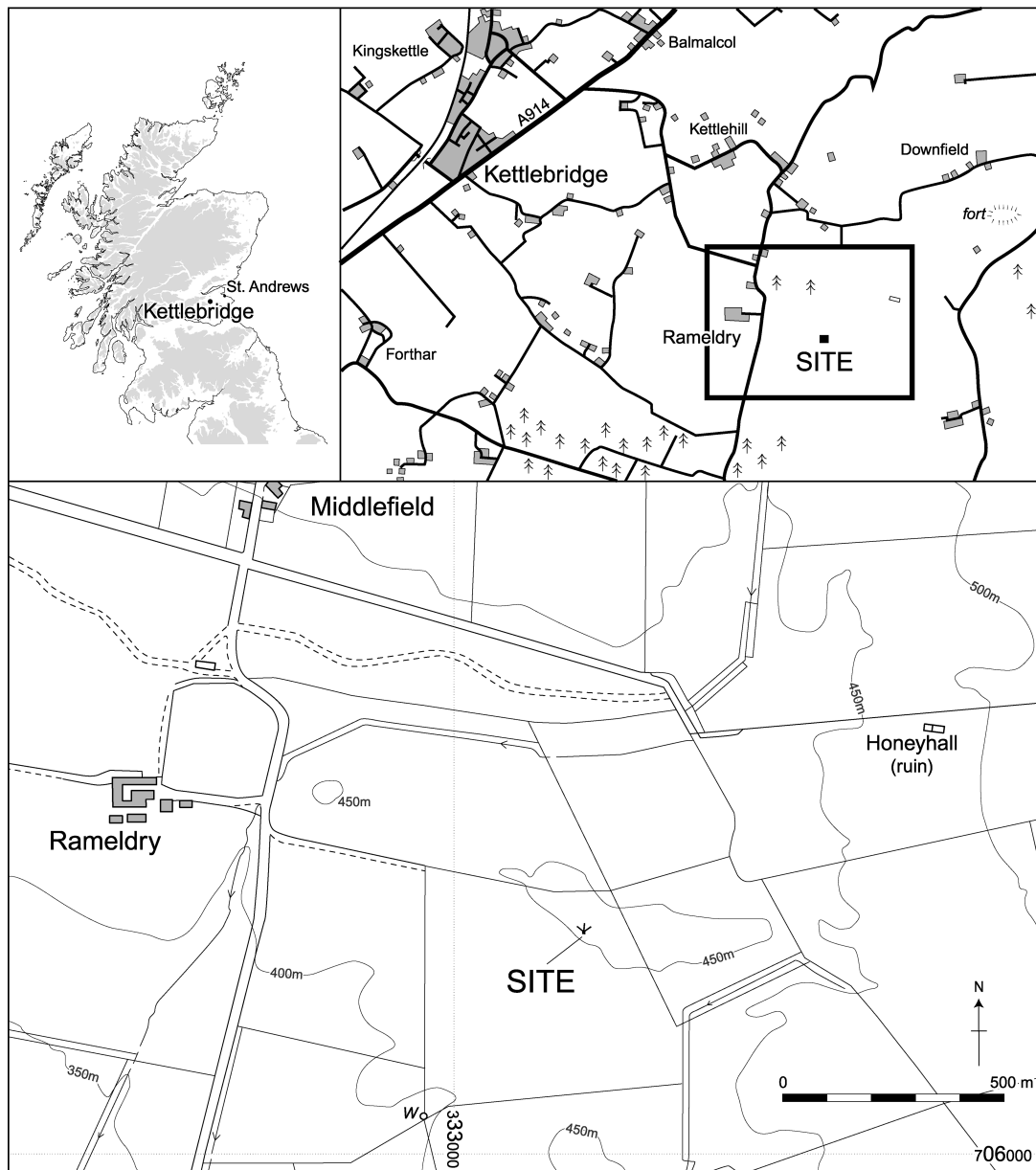
with six V-perforated buttons and a dagger, with the remains of its scabbard.

The finds (all damp and silt-encrusted when found) were taken to the AOC Archaeology Group for initial conservation by Amanda Clydesdale (Clydesdale 2001). Subsequent conservation of the buttons was undertaken by Mary Davis at the National Museums and Galleries of Wales in Cardiff, and final conservation of the dagger was undertaken by Tom Bryce at the National Museums of Scotland (NMS). Analysis of the buttons, dagger and scabbard was undertaken by a range of specialists in Edinburgh, Oxford, Cardiff and Bradford, and a sample from the scabbard was AMS radiocarbon-dated at the

\* Headland Archaeology Ltd, Unit 4B, The Europa Business Park, Middleton, Co Cork, Ireland

<sup>†</sup> Archaeology Dept, National Museums of Scotland, Chambers Street, Edinburgh EH1 1JF

<sup>‡</sup> This paper was awarded the R B K Stevenson Prize



ILLUS 1 Location of Rameldry Farm cist (Based on the Ordnance Survey maps © Crown copyright)

Scottish Universities Research & Reactor Centre (SURRC) at East Kilbride.

### THE CIST BURIAL

The cist was located on the south side of the crest of a prominent natural knowe in an arable field. It was

located directly beneath the topsoil, which varied from 0.3m to 0.35m deep. It is likely that regular ploughing of the field had resulted in gradual downward soil-creep from the crest of the knowe, leading to the eventual dislodging of the cist's capstone by the plough. It is unclear whether the cist grave had been 'flat' or marked by a mound.

No trace of a barrow or cairn is known from old maps; if there had been an earthen barrow, it is likely to have been ploughed away. It may be, in any case, that the natural knoll provided the prominent location sought by the people who constructed the cist. Three trenches were excavated, radiating from the cist for 10m, to investigate whether any additional archaeological features were present in the area. None was found.

The cist was rectangular on plan with its long axis aligned north-east/south-west (illus 2). It was constructed of large sub-rectangular side slabs of coarse-grained sandstone, set in a pit, and capped by a large, irregularly shaped coarse-grained sandstone slab which had been broken in two in antiquity. The cist measured 1.1m by 0.7m internally. The slabs fitted neatly into the pit and the space between the slabs and the sides was filled with the soil which had been dug out to form the pit. Some smaller stones had been inserted between the large slabs at the corners of the cist. The base of the cist was formed by a 0.1m thick layer of pebbles and stones laid directly into the pit following the insertion of the side slabs. The pebbles and stones were a mixture of quartz and other local stone. On top of this layer of pebbles and stones the crouched body of a man aged 40–50 had been placed on his left side with the head to the north-east, facing south. The bones were in a poor state of preservation and were very wet. The aforementioned six V-perforated buttons (marked 1–6 on illus 2) were found in the abdominal area while the dagger (illus 2) was located behind the neck of the skeleton with its blade pointing to the west, away from the body. Fragments of an organic hilt and scabbard were attached to the dagger. A detached rivet from the dagger (illus 2) was found at the south-west end of the cist.

Around the skeleton and grave goods was a layer of silt (003). This is likely to have formed through the gradual infiltration of soil into the sealed cist through the break in the capstone. Some disturbance of the contents of the cist was evident from the position of the detached rivet, along with an isolated human tooth, at the south-west end of the cist; to judge from their rather irregular disposition, some movement of the buttons from their original positions had also probably occurred. Several modern small mammal bones were retrieved from samples of this silt, indicating that burrowing animals were probably the cause of the disturbance. A layer of topsoil mixed with straw (009) overlay the silt; this clearly entered the cist when the plough lifted the capstone.

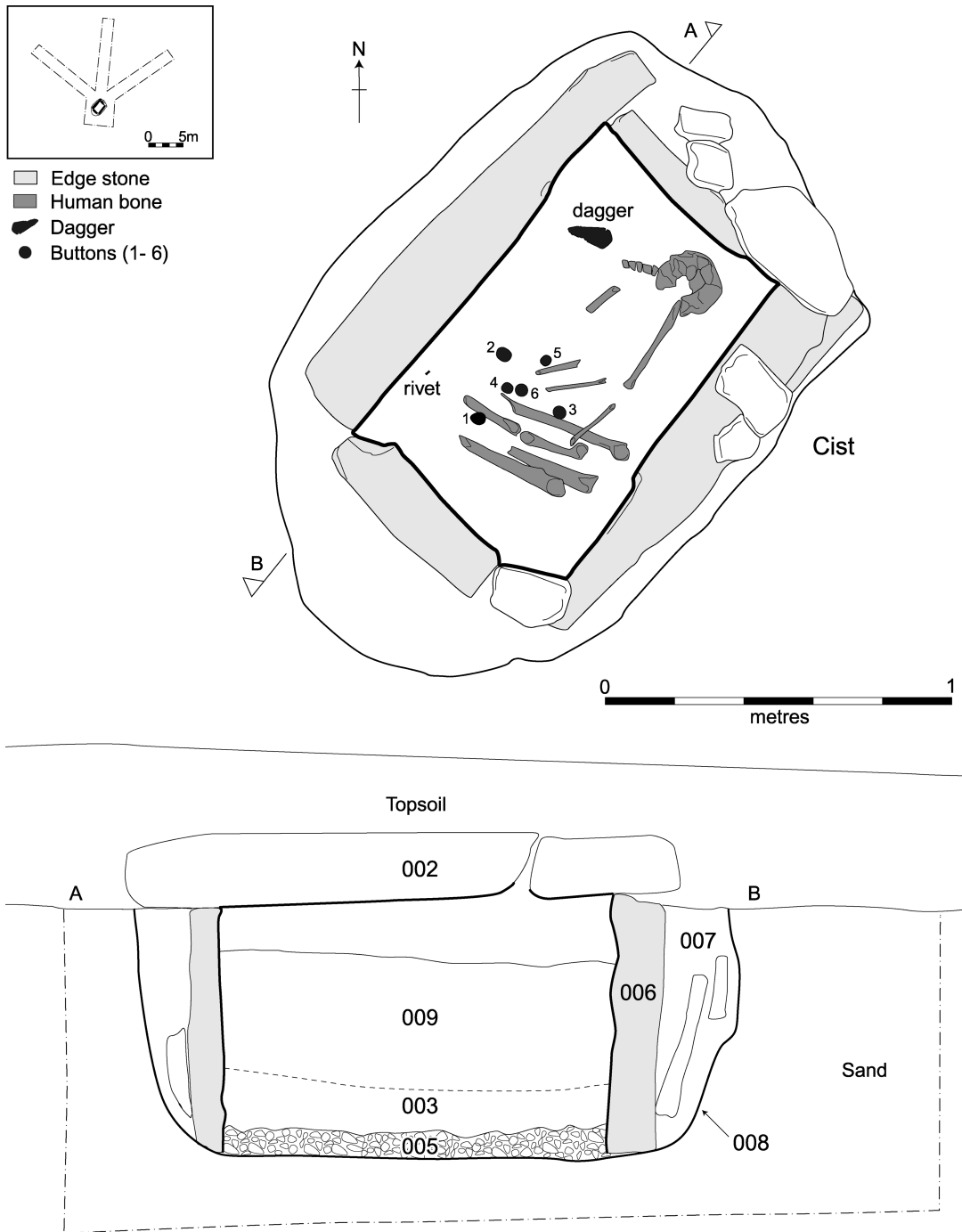
## RADIOCARBON DATES

Preliminary assessment of the contents of the cist indicated that there were two potentially datable materials: the skeleton and organic residues adhering to the dagger. Unfortunately, the former was found to be unsuitable for radiocarbon dating (OxA-P11984). A sample of the skin on the blade was submitted for AMS radiocarbon dating at the Scottish Universities Research & Reactor Centre at East Kilbride. It was processed at East Kilbride and divided into an alkali-soluble fraction and an insoluble residue. Both fractions were dated at the University of Arizona; the results are shown in Table 1. The weighted mean of these two radiocarbon ages was calculated by Gordon Cook (SURRC) as  $3725 \pm 40$  BP (GU-9574). Henceforth the date will be cited, at its  $2\sigma$  value, as 2280–1970 cal BC unless specified otherwise.

TABLE 1

The radiocarbon dates, calibrated using OxCal v3.8 (Bronk Ramsey 2002), with atmospheric data from Stuiver et al 1998

Lab code	Sample material	Yrs BP	$\delta^{13}\text{C}$ (‰)	Calibrated dates	
				1 $\sigma$	2 $\sigma$
AA-44623 (GU-9574A)	Residual material	$3765 \pm 50$	-29.9	see weighted mean	
AA-44624 (GU-9574B)	Alkali soluble fraction	$3685 \pm 50$	-26.8	see weighted mean	
GU-9574	Weighted mean of GU-9574AB	$3725 \pm 40$		2200–2160 (18.2%) 2150–2110 (14.9%) 2100–2030 (35.1%)	2280–2250 (3.4%) 2230–2220 (1.0%) 2210–2010 (88.2%) 2000–1970 (2.9%)



ILLUS 2 Plan and section of the cist

## THE HUMAN BONE

David Henderson

The skeleton was in a very poor state of preservation. The individual represented was a male about 40–50 years old. Stature was estimated at 1.65m–1.70m, and the body form was not particularly robust, except in the skull. Evidence of severe osteoarthritis was observed in the neck, and the bones of the skull vault and left humerus were thickened internally by a pathological process, possibly the beginning of Paget's Disease (a condition leading to painful and swollen bones in old age).

Most of the cortex of the bone was deeply fissured and exfoliating and the surviving elements were generally very delicate and friable. The right-hand (upper) side of the body was generally better preserved than the left-hand side, which had rested on the cist floor. Ribs, lumbar and thoracic vertebrae, most elements of the pelvis, and the feet and the hands were completely missing. The shafts of long-bones were present but no articular ends, except the distal end of the right femur and some fragments from the left femur and both tibiae. Fragments from most areas of the skull vault were present, but few joining pieces survived. The teeth, some in situ in the jaws, were fragile with considerable fragmentation of the enamels. In view of this, washing of the bone was kept to a minimum; only joint surfaces, occlusal surfaces of teeth and the cervical vertebrae and skull elements were cleaned. No measurements of long-bones or skull were possible. Stature was estimated by comparison with skeletal elements of similar size and robustness.

Age at death was estimated by analysis of tooth-wear (Brothwell 1981) to be about 40–50 years. The individual was probably male, based on robust skull morphology. No diagnostic parts of the pelvis survived. The individual's height was estimated at 1.65m–1.70m (5ft 5in–5ft 7in). None of the long-bones displayed prominent muscle markings and the *linea aspera* of the femur was not pronounced, indicating that the individual was of slight build.

The second to sixth cervical vertebrae were recovered. All displayed moderate to severe degeneration of the surface of the vertebral body and the apophyseal joints due to osteoarthritis. The third and fourth cervical vertebrae were fused at both the body and the posterior joints, with calcification of the *ligamentum flavum*. The individual would have

suffered increasing stiffness and pain in the neck, and eventually restriction of movement (Roberts & Manchester 1995).

Bone fragments from the frontal and parietal bones and also from the left humerus (but no other long-bone) showed thickening of the inner surface (in the skull bones involving the *diploë*, with a blurring of the demarcation with the inner table). In the humerus the bone at mid-shaft was over 8mm thick, double the normal. This may be an early sign of Paget's Disease, but the poor preservation of the bone makes the histological confirmation of this attribution impractical (Aufderheide & Rodríguez-Martín 1998). In its early stages, Paget's Disease is usually asymptomatic and is often found by chance in the present day, during X-rays in the over-40s. Its clinical manifestations, of bone-pain and -swelling and occasionally behavioural problems, become more common in the over-60s, with up to 15% of the over-80s affected in modern Britain.

No evidence of caries or abscess was observed in the surviving teeth. The lower right third premolar and the lower right molars may all have been lost *ante-mortem*. Although the mandible is broken in this area, no trace of the sockets for these teeth was observed and the wear on the upper right molars was less than that on the left.

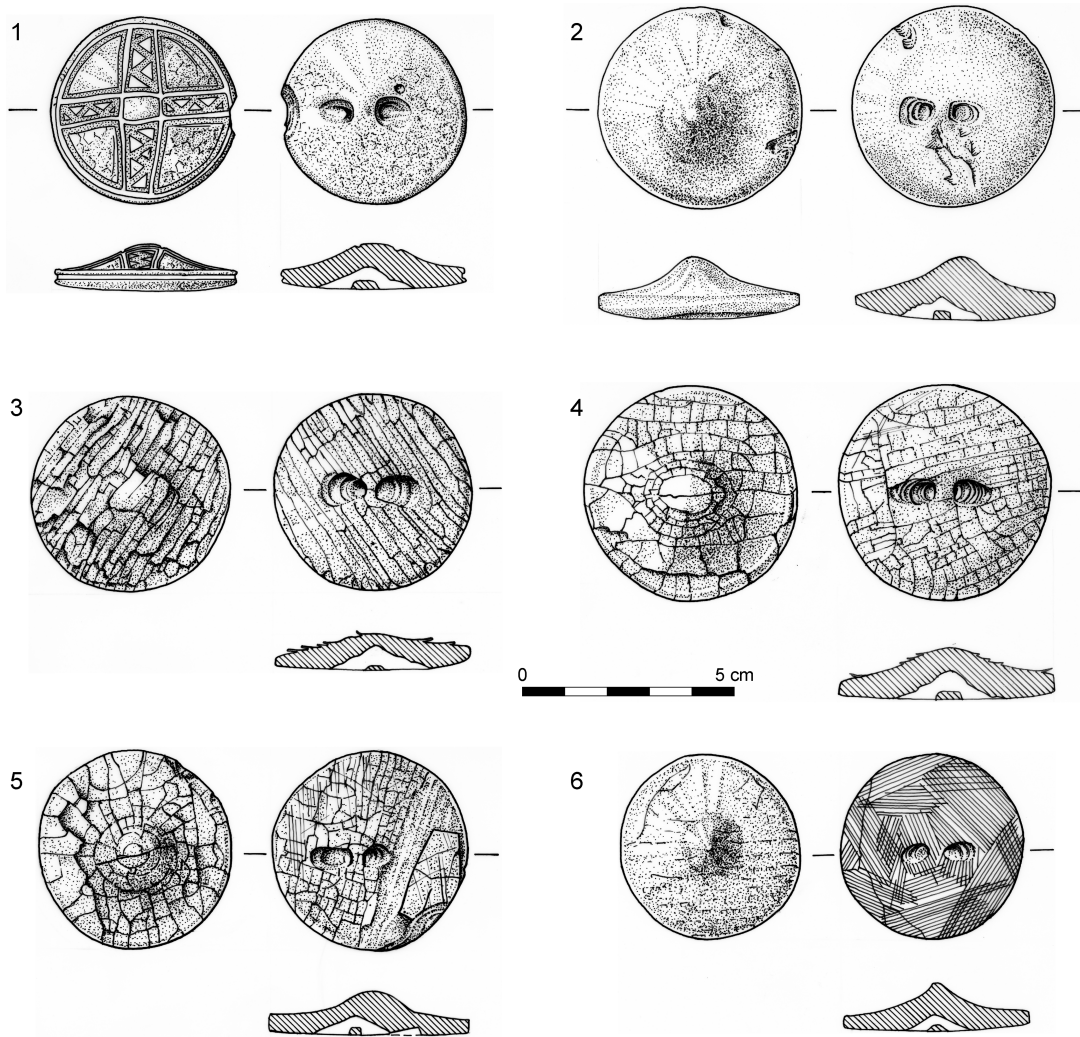
## THE FINDS

### THE V-PERFORATED BUTTONS

Alison Sheridan (JAS) & Mary Davis (MD), with additional contributions by Sara Chambers (SC), Kilian Anheuser (KA), Carl Heron (CH) & Hal Redvers-Jones (HR-J)

Of the six V-perforated buttons found in the abdominal area (illus 2, 3), five – including an unusually decorated example, Button 1 – were found to be of Whitby jet, and the sixth (Button 2) of the mineral lizardite. Details of the individual buttons, and summaries of the analytical techniques used in their investigation, are as follows.

**Button 1** (illus 3–5; original no SF 1) Diameter 43.5–43.7mm; maximum thickness 10.5mm. The upper surface is a low, dished cone with a rounded summit; the lower surface is slightly domed; and there is a well-defined edge facet, around 3.6mm wide, separating the two. A chip has been lost from

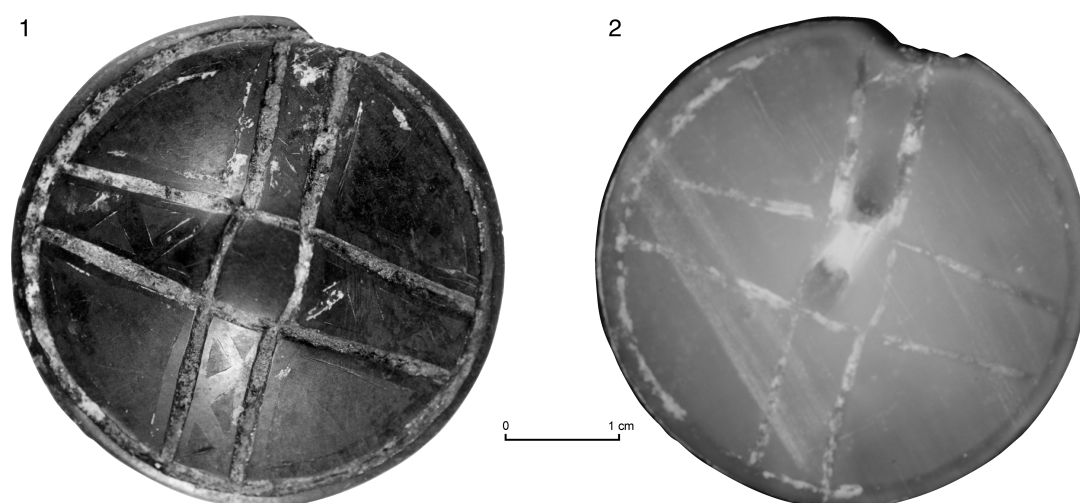


ILLUS 3 The buttons. Illustration by Sylvia Stevenson

the edge in antiquity. The surfaces have been carefully smoothed and polished (see below), and the upper surface and edge facet are decorated. Around the facet is a deeply incised line, with traces of white infill, and the same kind of decoration occurs on the upper surface, as a circumferential groove and central double-line cross design (illus 3, 4.1). The incisions range in width between 1–1.8mm; they are up to c 1mm deep, and are a squarish U-shape. Within each arm of the cross is a framed zig-zag design, featuring some matt areas contrasting with high-gloss areas, and the edge of each quadrant is framed by a narrow glossy band.

The zig-zag and quadrant designs had been delineated by narrow, shallow incisions, and there are traces of white infill in some of these.

Analysis of the white infill (by MD & SC), through semi-quantitative energy-dispersive spectrometry using a scanning electron microscope (SEM-ED) with a low vacuum chamber, and through X-ray diffraction (XRD), revealed that it was tin oxide, interpreted as the corrosion product of metallic tin, now corroded to tin oxide. Furthermore, SEM-ED analysis of the main body of the button revealed it to be of jet (the fossilized remains of *araucarioxylon*, wood from a family of conifers



ILLUS 4 1 Button 1 shortly after its discovery, showing corroded tin inlay and other decoration. 2 X-ray of Button 1, showing the jet's woody texture (as band running across button). Also visible is the V-perforation, roughly at the centre. Button diameter 43.5–43.7mm (*AOC Ltd, Crown copyright Historic Scotland*)

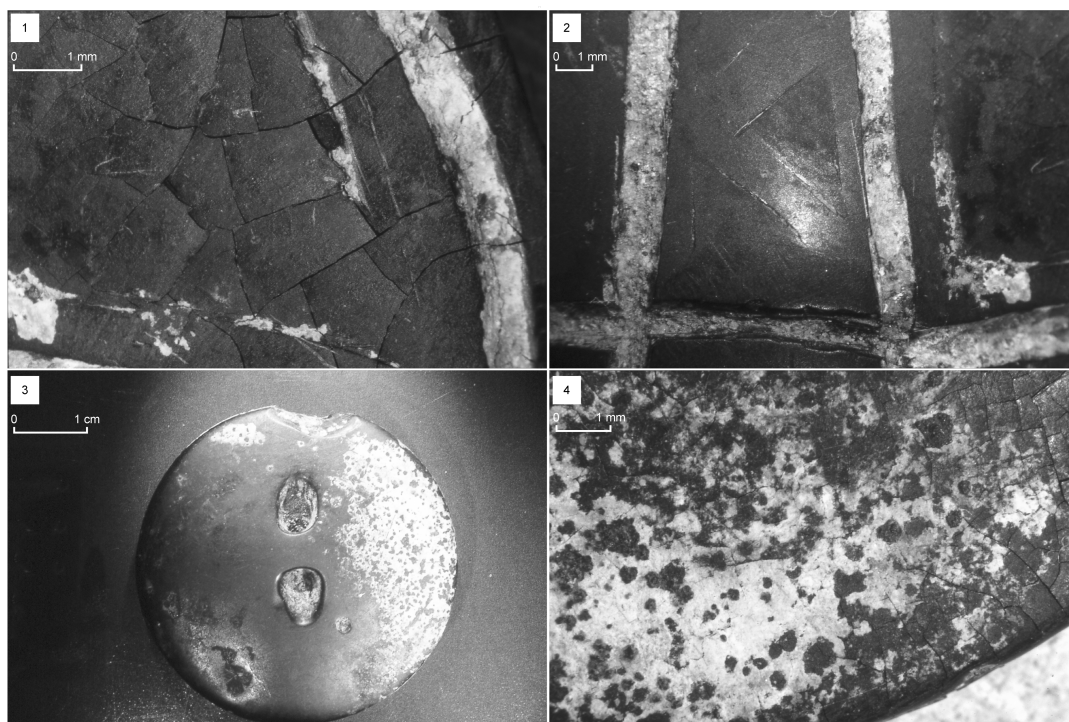
including the monkey-puzzle tree). Its composition is closely comparable with that of jet from Whitby in Yorkshire – Britain's only significant source of this material, lying some 250km to the south-east of Rameldry. Other features of the button are also characteristic of jet, namely its colour (black, but with hints of dark brown visible under strong light) and its compact-woody texture, as revealed in X-ray (illus 4.2) and in the pattern of criss-cross cracking (illus 5.1) which occurred, inexorably, as the button slowly dried under controlled laboratory conditions. Traditional Whitby jetworker Hal Redvers-Jones (HR-J) comments that this cracking indicates the use of soft Whitby jet, rather than the hard variety; the two types, in abraded beach pebble form, would have looked very similar.

As for the matt-gloss contrast effect (illus 5.2), HR-J has confirmed that this would have been achieved by first polishing the entire surface of the button, then selectively dulling certain areas using a twig or similar small tool. Rubbing of the surface in this way would have brought out the dark brown colouration of the freshly-exposed jet subsurface, as well as creating a matt texture. The original appearance of the button's upper surface would therefore have been striking, with the silvery tin contrasting with the black of the jet, and the matt-gloss effect creating a subtle surface texture and black-brown contrast.

The V-perforation had been made by two diagonal borings from the underside, leaving a pair of roughly oval holes. Thread-wear had worn the tool-marks smooth, but a small, roughly circular depression 2.4mm wide, close to the edge of one hole, offers a valuable clue as to the tool used to effect (or at least start) the perforation. This feature is probably a mis-bore – the aborted beginning of a V-perforation (illus 5.3). It resembles the decorative punctulation seen on many spacer-plate necklaces and seems to have been made by grinding a solid, perhaps slightly round-ended tool into the surface, roughly perpendicular to the button's lower face. As Ian Shepherd had previously observed and demonstrated experimentally (1981), button perforations had probably been started with a perpendicular bore, which was subsequently angled inwards. A metal awl could conceivably have been used (although, as HR-J has confirmed, these were designed as leatherworking piercers, and are not efficient jet borers). Alternative tools would have been a flint awl or a drill point made from narrow bronze wire.

The smoothness of the V-boring demonstrates that the button had been worn before burial, but the edges of the holes do not show heavy signs of wear.

On the button's lower surface is a thin, irregular deposit of whitish encrustation, with speckles and



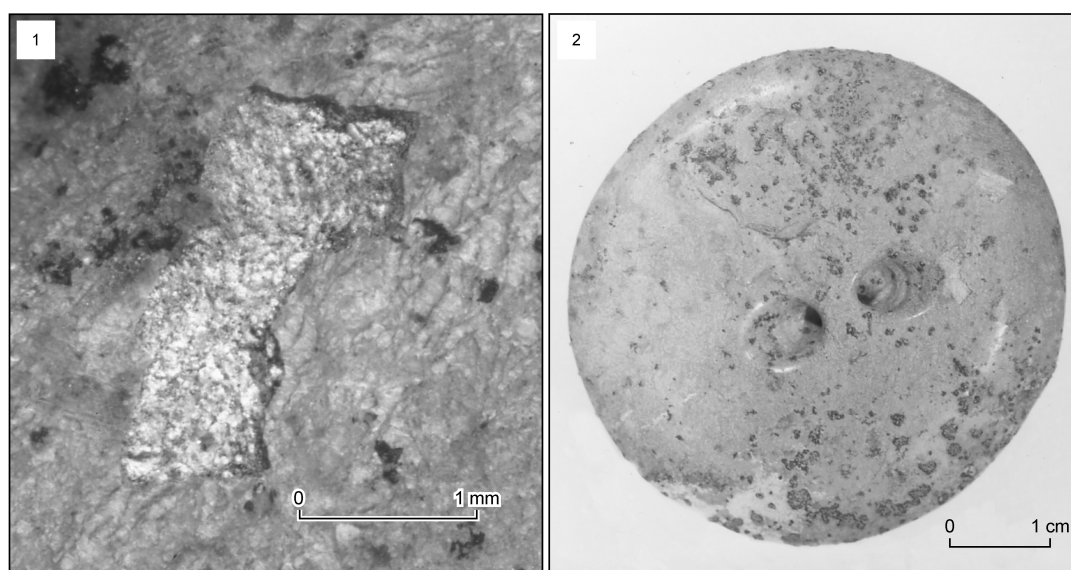
ILLUS 5 Details of Button 1: 1 Part of upper surface, showing pattern of surface crazing and, in white, areas of the corroded tin inlay; 2 Part of upper surface, showing the matt-gloss design and areas of the tin inlay; 3 Base, showing V-perforation and abortive borehole (to the right of the lower borehole); 4 Part of base, showing whitish encrustation (*National Museums & Galleries of Wales*)

lines of a black material (illus 5.4); when found, the button had also been covered with sediment from the cist. The black material was found to be manganese oxide, formed by the mineralization of rootlets or similar organic material which had accreted to the button after deposition. The whitish material on this button was not analysed, but similar material on the other buttons was found through analysis to be largely inorganic, a mixture of a magnesium–calcium–aluminium silicate with calcium carbonate and possibly also some calcium phosphate. (Analyses were by KA and CH, using Fourier-transform infrared spectroscopy (FTIR), SEM-ED, Ramen spectroscopy and gas chromatography-mass spectrometry (GC-MS).) Visually this material resembles the limescale-like encrustation as seen in some cists (eg on pottery), and its composition is consistent with the seepage of mineral-rich water into the cist. (The calcium phosphate, however, could derive from contact with the human bones.)

**Button 2** (illus 3, 6; original no SF3) Diameter 46.2–48.0mm; maximum thickness 13.5mm. Stone button, with a dished conical upper surface terminating in a nipple-like peak; a well-defined edge facet; and a truncated-dome lower surface. There has been minor chipping to the upper surface, edge and lower surface (the latter including one elongated chip) in antiquity. The surfaces have been carefully smoothed, and the whole bead – including the boreholes – has been deliberately covered with a thin layer of an orange-brown substance (illus 6.1), which had either been polished to a high sheen or (more likely) is naturally glossy (see below). Over parts of the upper surface this coating is obscured by an overlying black, speckled encrustation – the mineralized rootlets as noted in Button 1 – and there is a small patch of the whitish encrustation, as seen on Button 1, running over the edge at one point. These represent post-depositional changes.

Beneath the coating, the stone is a pale buff to grey colour. That it had been soft enough to carve





ILLUS 6 Button 2: 1 Base, showing the surface coating and (in centre) a patch of the original stone surface where the coating has come away. 2 Base, showing slight wear to V-perforation (*National Museums & Galleries of Wales*)

is self-evident; and traces of tool marks are visible on the surfaces and within the V-perforation. Analysis (by MD) using SEM-ED revealed it to be a magnesium silicate, and XRD analysis (by SC) identified it as a member of the kaolinite-serpentine group of minerals with a diffraction pattern closest to lizardite. Lizardite chiefly occurs as a component of serpentine rock, which outcrops on The Lizard, Cornwall, where it has traditionally been carved into trinkets. There are also less well-known deposits elsewhere, including Unst, Shetland; Angus; Portsoy, Moray; and Glen Urquhart, Highland (Hedde 1901; Whittaker & Zussman 1956). A specific provenance for the Rameldry button is not yet possible to identify, since further research is required on the Scottish outcrops to determine whether they could have provided the raw material for the button. (It may be noted in passing that re-examination of the 'steatite' V-perforated buttons – and indeed wristguards – in Ireland (Harbison 1976) may be worthwhile, to investigate whether other instances of this rock's use exist.)

The coating is a light orange-brown colour, grading to light brown and blue-grey on the upper surface. It was analysed in Cardiff (by MD & KA) and at Bradford University (by CH), using SEM-ED, FTIR, GC-MS and combustion of a minute

sample. The results confirmed that it was compositionally distinct from the stone, and structurally that it was a discrete layer, rather than a product of surface decomposition. They also demonstrated that it was inorganic, and almost entirely composed of silicon, thereby demonstrating that it could not have been beeswax or resin, as had initially been assumed. (The use of such materials is known both from prehistory – where in Bavaria, in Beaker contexts, bone V-perforated buttons were coloured to resemble amber (Clarke 1970, 95) – and in the recent past, again in Bavaria, where beeswax was used to coat steatite pipes to impart a rich surface colour and sheen.) Unfortunately it was not possible to arrive at a precise identification of the material, or to determine whether its colour had been achieved through the use of a colourant. The most plausible interpretation of the results is that the coating may have been a glaze, fired onto the stone. The significance of this wholly unexpected and exceptional finding will be discussed below.

Use-wear was indicated in the V-perforation, whose edges are smooth all round and whose internal tool marks (a series of scratches running around the hole) are slightly worn (illus 6.2). This, and perhaps also the minor chipping, indicates that the button had seen some wear before deposition.

**Button 3** (illus 3, 7.1; original number SF4) Diameter 45.7–47.0mm; maximum thickness 8.5mm. The upper surface is of a similar shape to Button 1, but with a lower and broader summit. The edge is rounded, rather than faceted, and the lower surface is slightly domed. The surfaces had been carefully smoothed and polished to a high sheen, but their appearance has been significantly altered by post-depositional encrustation and post-excavation cracking (the latter accompanied by some cupping on the upper surface). The encrustation is buff-coloured, rather than white as on Buttons 1 and 2, and analysis revealed a very small organic element in its composition, which was otherwise inorganic. From analysis (by KA & CH), it was concluded that the organic component could have derived from contact with the corpse or his clothing, and that the inorganic component was of the same origin as the white encrustation as seen on the other buttons. There are also small patches of mineralized vegetation.

The V-perforation displays evidence of wear. Although the rounded, interior ends of the boreholes are clearly visible, the tool marks in the inner two-thirds of the boreholes are slightly worn, and in the outer third the boreholes have been worn smooth (illus 7.1). Furthermore, the ‘bridge’ between the two holes is very thin and arched, indicating wear.

The button is black, with patches of dark brown visible under strong light, and SEM-ED analysis demonstrated that it is of the same material as Button 1 (ie Whitby jet).

**Button 4** (illus 3, 7.2; original number SF5) Diameter 49.8–50.6mm; maximum height 11.5mm. The upper surface is of similar shape to that of Button 1. The edge is rounded and the lower surface is almost imperceptibly domed. The surfaces had been carefully smoothed and polished to a high sheen, but this has become somewhat dulled on the bottom. There is the same kind of cracking as on the other jet buttons, and also some cupping on the upper surface. In colour and composition it matches the other jet buttons.

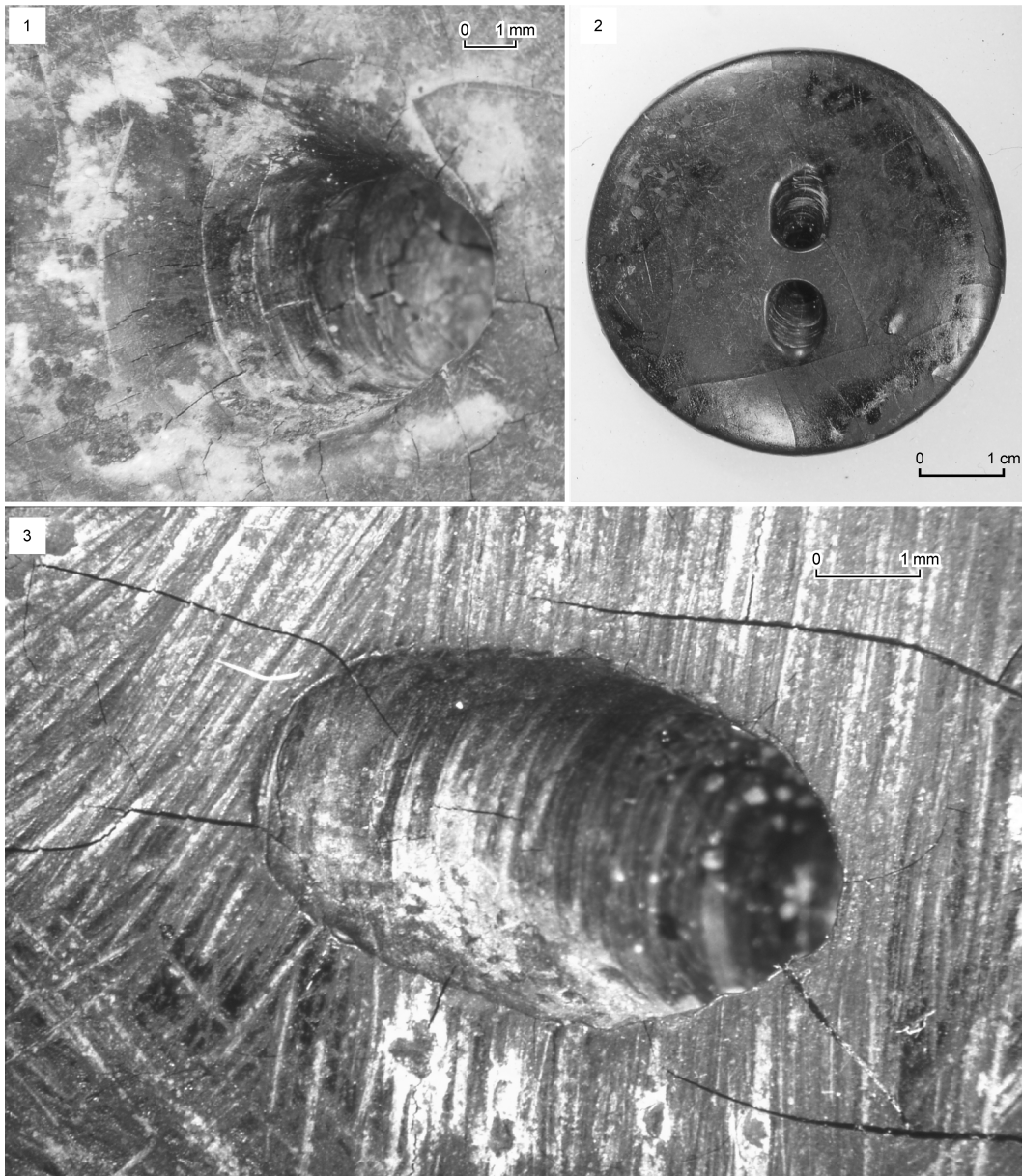
The encrustations as noted on the other buttons were present, but to a far smaller extent. The boreholes show a minor degree of wear, particularly on their outermost edges; tool marks are clearly visible, and the ‘bridge’ is robust (illus 7.2).

**Button 5** (illus 3; original number SF6) Diameter 45.2–46.25mm, maximum thickness 10.9mm. The upper surface has a well-defined ‘nipple’; there is a clear edge facet, 3.2–4.5mm wide; and the bottom is flat. Two chips had become detached from the edge in antiquity, along with a long shallow spall, lying along a deposit of spar (a mineral impurity sometimes found in jet). Two other linear stretches of impurity are visible on the bottom, where the surface is lifting. The V-perforation is slightly eccentric, as if to avoid the main area of impurity, and the side closest to the large spall is smaller than the other. The surfaces (except in the area of the spall) had been carefully smoothed and polished to a high gloss. As with the other jet buttons, there is criss-cross cracking, with some cupping on the upper surface; some of this cracking had occurred in antiquity, and this confirms the aforementioned view that soft jet had been used. In colour and composition the button matches the other jet ones.

As with Button 4, minor encrustations had been present. The interior of the V-perforation is slightly obscured by some remnant silt from the cist, but some smoothing of the borehole tool marks seems to have occurred. Their outer edges are smooth but not heavily worn, and the ‘bridge’ is robust.

**Button 6** (illus 3, 7.3; original number SF7) Diameter 42.3–43.5mm; maximum height 11.5mm. The upper surface has a small and pointed ‘nipple’, and there is a well-defined edge facet 2.4–2.7mm wide. The bottom is very gently domed, and is covered with tool marks – shallow striations, running in various directions – which had not yet been polished off (illus 7.3). By contrast, the upper surface had been smoothed and polished to a high sheen. The edge facet has some tool marks and some polish. There is some cracking, but not as marked as on most of the other jet buttons; in colour and composition it matches the others. There had been a thin layer of buff encrustation, and a few spots of mineralized rootlets; the buff material can still be seen in the tool marks and boreholes.

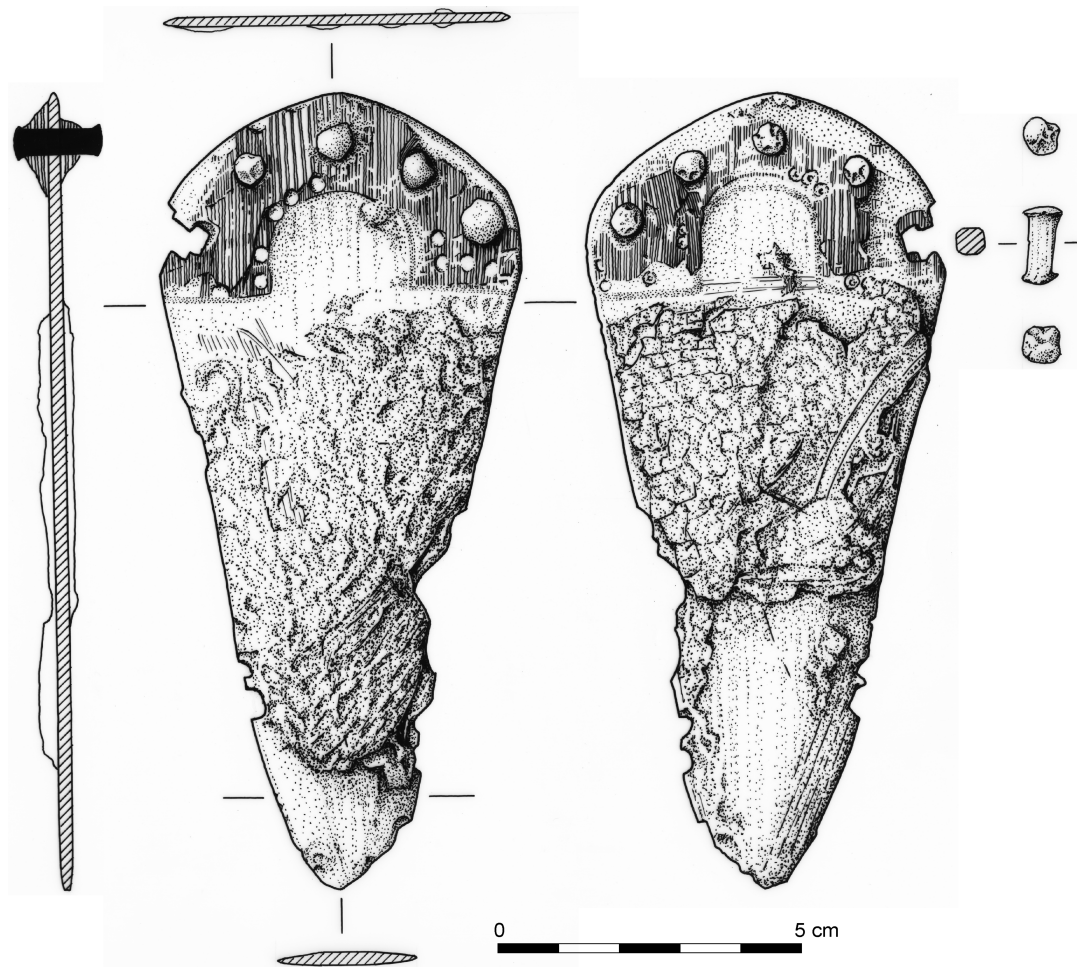
The boreholes are crisply defined, with tool marks clearly visible and only minimal edge smoothing. The overall impression is that this was a brand new – indeed, unfinished – button. As HR-J has observed, the V-perforation must have been done before the bottom was abraded into shape, as



ILLUS 7 1 Detail of the base of Button 3, showing wear to the V-perforation. 2 Base of Button 4; 3 Detail of the base of Button 6, showing unworn tool marks in the V-perforation and (truncating these) striations from coarse-smoothing of the base (*National Museums & Galleries of Wales*)

the tool marks in the hole are truncated (illus 7.3). (Indeed, perforation would have been done at a relatively early stage in the roughing-out process, as it is at this point that breakage is most likely to

occur.) Furthermore, the regularity of the tool marks inside the borehole indicates the use of some kind of powered drill, such as a bow-drill. This would have speeded the boring process significantly.



ILLUS 8 The dagger and traces of its scabbard, as found (ie prior to conservation). Left: Face A; right: Face B. Illustration by Sylvia Stevenson

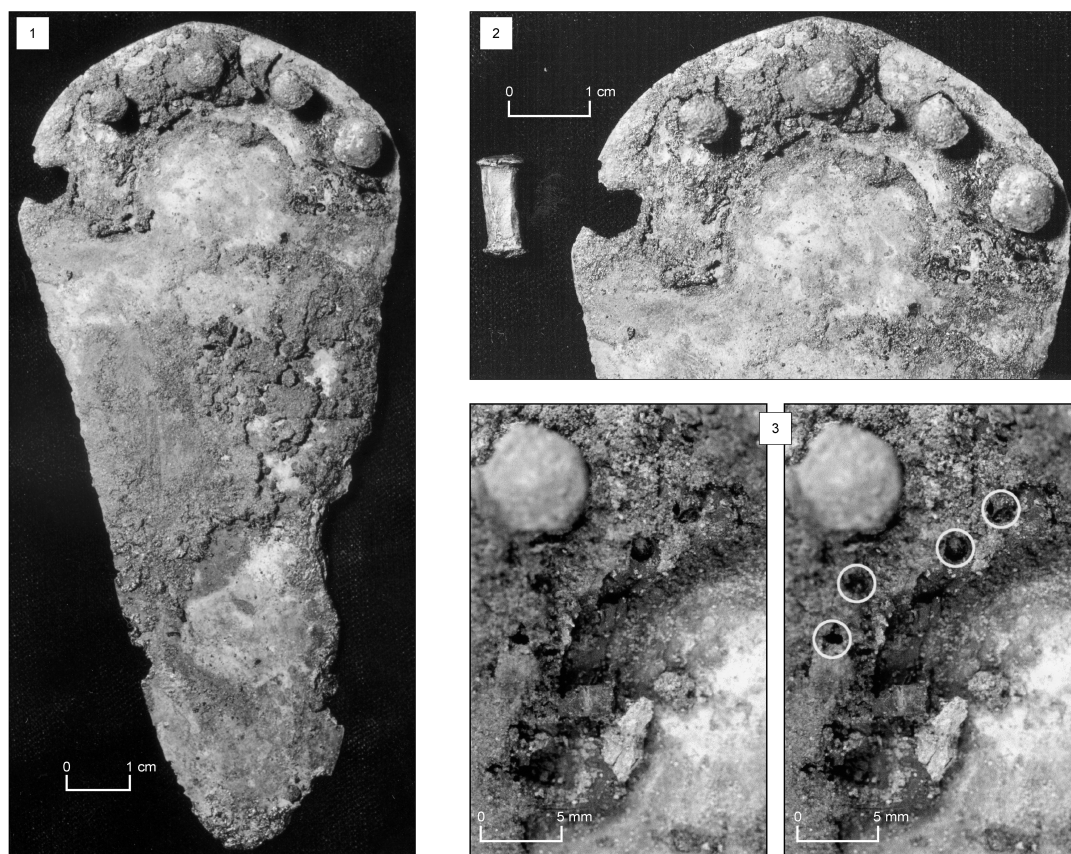
#### THE DAGGER: INTRODUCTION AND DESCRIPTION

Trevor Cowie

The dagger (illus 2; 8–10; original number SF 8) was found behind the skull and pointing away from the body. It consists of a flat blade with five peg rivets set symmetrically about the heel, inviting comparison with the multi-riveted daggers of Sabine Gerloff's *Milston* type, specifically with the *East Kennet* variant of that type (Gerloff 1975; for more details, see below, 'Discussion and conclusions'). Traces of an organic hilt and sheath or scabbard survive (Cameron, below). The bottom edge of the

hilt had been omega-shaped, and had been embellished by tiny inlaid copper alloy pins (illus 8, 9). Four of its five rivets were in situ: the fifth (original number SF2) was located at the south-west end of the cist within the deposit of mid to light brown silt (003) around and over the skeleton (illus 2). This ingress of soil is thought to have occurred in antiquity prior to the dislodgement of part of the broken capstone during ploughing.

A preliminary examination of the dagger was undertaken shortly after excavation, following initial assessment and X-raying of the object but prior to any formal conservation. It was clear that two principal groups of organic material were adhering



ILLUS 9 The dagger and surviving scabbard traces, after conservation. 1 Face A, general view; 2 Hilt, detail; 3 Detail: decorative haft pins following the margin of the hilt recess, highlighted on the right hand image (*National Museums of Scotland*)

to the blade. Although obscured by soil and moisture, the uppermost was an uneven dark brown/black deposit which appeared to be skin. Apparently underlying this was a series of fibres, arranged in 'bundles'. Together the suite of features was strongly suggestive of haired skin, probably representing the remains of a sheath or scabbard made of hide, with the coat forming the face in contact with the blade. These observations were partly confirmed by Cameron's analysis, although she has suggested the possibility of a composite scabbard (see below).

Owing to the fragility of the adhering deposits at that stage, only the exposed surface of the dagger was examined on that occasion – that referred to as face A below and in illu 8 (or as side 1 in the preliminary report on the grave assemblage: Clydesdale 2001). The dagger was examined again briefly immediately prior to the preparation of an initial

drawing. On the basis of these initial examinations, a preliminary report was prepared; this has been augmented and where necessary amended in the light of subsequent conservation. Metallurgical analysis was undertaken by Peter Northover, and is reported on separately, below.

The heel of the blade is in remarkably good condition, the original outline being intact apart from a gap where the outermost rivet has broken away from its rivet-hole. In some Bronze Age weaponry, torn rivet-holes can sometimes be the result of damage incurred during the cycle of use of the artefact. However, in this case, the X-rays and circumstantial evidence indicate that the damage to the rivet-hole and detachment of the rivet is simply due to corrosion of the strip of thinner metal at the edge of the blade forming the rim of the rivet-hole. Corrosion may perhaps have been promoted

preferentially in the damp conditions of the cist by the 'wick'-like effect of adhering organic material and the contact of this edge with the soil. As noted above, the detached rivet was found at the other end of the cist from the dagger, lying in the deposit of silt (003). The precise mechanism for this displacement is unknown but given the silt deposit, the presence of mammal bones and signs of burrowing noted during excavation, there is no reason to doubt that its position is due to recent disturbance.

The blade is substantially complete, but has suffered severe damage to the edge and tip on face B and less pronounced damage on face A. As a result the original edges survive only very intermittently but sufficiently to permit the original outline to be reconstructed with confidence. Although the blade is severely fretted by corrosion, the line of the edge bevel is well defined. Why one edge should be considerably more damaged than the other is not entirely clear; again, it is probable that the presence of organic material may have resulted in preferential corrosion of the inherently thinner edges of the lower part of the blade.

The heel of the dagger is very slightly arched rather than rounded, a gentle peak interrupting the smoothness of the curve at the midpoint. As noted above, the dagger originally had a symmetrical arrangement of five sub-circular rivets, held in rivet-holes set 7–8 mm from the edge. Their heads are c 5–7mm in diameter and their shanks are square with rounded corners.

The dagger's butt and shoulders were covered with traces of an organic hilt-plate, with a deep omega-shaped recess. On face A, the base of the hilt was particularly well demarcated immediately after discovery, and still in place apart from some contraction of the edges. The laminar structure of the organic material was strongly suggestive of horn rather than wood and this was subsequently confirmed by analysis (Cameron, below). Immediately around the surviving rivets the organic material was relatively undisturbed (except where the outermost rivet had been detached). There was no indication that the organic hilt plate had been dislodged, confirmation that the outermost rivet-hole had simply disintegrated due to corrosion in the grave rather than having been damaged or deliberately torn out prior to burial (see above). The omega-shaped line of the lower edge of the hilt shows as a clearly defined mark: a series of fine horizontal striations just below the hilt mark on either side of

the recess appear to be the result of polishing of the blade with the hilt in place.

When examined initially, traces of a line of tiny perforations could be observed in the remains of the organic hilt, following or in places slightly set back from its lower margin and apparently following the outline of the recess (illus 8). The recovery of several tiny peg-like fragments of corroded copper alloy loose on the surface of the dagger suggested that these holes might have contained decorative pins, the pins themselves having perhaps become detached due to slight contraction and warping of the hilt. The overall design is not certain but it seems likely that the immediate margin of the lower edge of the hilt, including the semicircular recess, had originally been embellished with a series of tiny copper alloy pins. If evenly spaced and continuous, there may originally have been as many as 14 or 15 pins on face A; face B was less well preserved but appears likely to have had a similar pattern. The individual pins are too corroded for their original overall form to be ascertained. Analysis of the metal of these pins was not possible.

Despite the attrition of the edges, the approximately triangular form of the blade is clear. The dagger is 130mm in overall length and measures 60mm in width at the shoulders. The thickness varies from 2–3mm. In both transverse and longitudinal section, the blade is flattened, with edge bevels c 8mm wide. The edge of the heel is gently bevelled. Where the underlying metal is exposed, the surface of the blade displays fine striations resulting from polishing.

#### THE DAGGER: METALLURGICAL ANALYSIS

Peter Northover

The blade and one of the rivets were analysed in Oxford using electron probe microanalysis with wavelength dispersive spectrometry. The results demonstrate that both the blade and the rivet are made from a medium tin bronze with an 'A' composition (see below, 'Discussion and conclusions'). This type of alloy had a currency from the 22nd to the 19th century BC.

#### *Sampling & analysis*

Two samples were drilled from the dagger using a modelmaker's electric drill with a 0.9mm bit. The first, labelled #R1657, was drilled from the blade,

TABLE 2  
Composition of the dagger blade and one of the rivets

Sample	Part	Fe	Co	Ni	Cu	Zn	As	Sb	Sn	Ag	Bi	Pb	Au	S
R1657/1	blade	0.05	0.02	0.01	87.01	0.03	0.22	0.29	12.07	0.11	0.07	0.08	0.00	0.04
R1657/2	blade	0.04	0.01	0.01	86.97	0.00	0.27	0.24	12.22	0.10	0.03	0.09	0.00	0.01
R1657/3	blade	0.02	0.01	0.00	86.70	0.06	0.25	0.26	12.58	0.11	0.00	0.00	0.00	0.01
R1657/4	blade	0.07	0.00	0.01	85.80	0.01	0.24	0.29	13.40	0.11	0.00	0.05	0.00	0.02
R1657/5	blade	0.04	0.00	0.00	88.86	0.00	0.22	0.20	10.36	0.08	0.09	0.15	0.00	0.01
R1658/1	rivet	0.06	0.02	0.00	88.18	0.01	0.21	0.20	11.14	0.14	0.00	0.00	0.00	0.03
R1658/2	rivet	0.00	0.00	0.00	87.91	0.01	0.22	0.28	11.32	0.15	0.00	0.02	0.00	0.08
R1658/3	rivet	0.00	0.00	0.03	87.99	0.00	0.21	0.30	11.33	0.07	0.00	0.00	0.02	0.05
R1658/4	rivet	0.02	0.00	0.02	87.88	0.00	0.22	0.26	11.44	0.10	0.00	0.03	0.02	0.02
R1658/5	rivet	0.04	0.00	0.00	87.95	0.00	0.24	0.27	11.30	0.07	0.00	0.10	0.01	0.01
R/1657 mean		0.05	0.01	0.01	87.07	0.02	0.24	0.26	12.12	0.10	0.04	0.07	0.00	0.02
R/1658 mean		0.03	0.00	0.01	87.98	0.01	0.22	0.26	11.30	0.11	0.00	0.03	0.01	0.04

and the second, #R1658, from the detached rivet. It was not possible to obtain an adequate sample from one of the decorative pins and the attempt was therefore not made. The samples were hot-mounted in a carbon-filled thermosetting resin, ground and polished to a 1µm diamond finish. Analysis was by electron probe microanalysis with wavelength dispersive spectrometry; operating conditions were an accelerating voltage of 25kV, a beam current of 30nA, and an X-ray take-off angle of 40°. Thirteen elements were sought, as listed in Table 2; pure element and mineral standards were used with a counting time of 10s per element. Detection limits were typically 100–200ppm. Five areas, each 30x50µm, were analysed on each sample; the individual compositions and their means, normalized to 100%, are shown in the table. All concentrations are in weight per cent.

### *The alloy*

The blade and rivet have very similar compositions, sufficiently so to suggest that they were made from the same melt, the metal being divided between casting the blank for the blade and a rod or rods for making the rivets. The alloy is an unleaded medium tin bronze, the blade having 12.1% tin and the rivet 11.3%. The principal impurities are arsenic (0.24%/0.21%), antimony (0.26% for both) and silver (0.10%/0.11%); there were significant traces of iron, nickel, bismuth, lead and sulphur, while cobalt, nickel and zinc were at or close to their limits of detection.

## THE DAGGER: HILT AND SCABBARD

### Esther Cameron

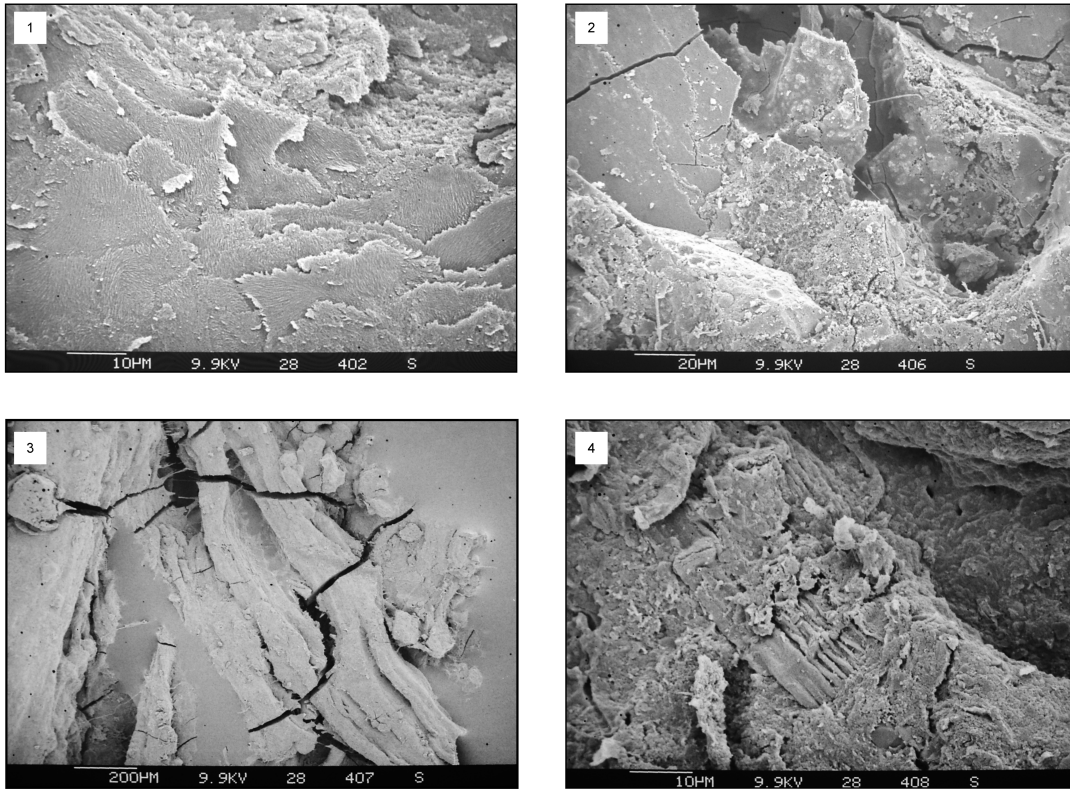
Organic remains on the dagger were found in two zones, representing the hilt and scabbard. Initial FTIR analysis of samples from each area by Anita Quye had confirmed that both were proteinaceous (Quye 2000). Further examination was undertaken at the Institute of Archaeology in Oxford several months later, using SEM to investigate the microstructure of the materials. This concluded that the substance of the hilt is horn, and that the scabbard is a skin product, presumably an untreated animal skin (see below for whether a scabbard or a sheath is represented).

### *The hilt*

The substance of the hilt, which had suffered some loss since being drawn soon after excavation, was brown and gel-like. The drawing (illus 8) implies that its surface had been ridged, but this was not a visible feature during my examination of it. In addition to in situ hilt remains, a separate collection of dry-sieved fragments was examined and found to contain copper-mineralized organic material and tiny copper-alloy pins. The former was brittle and layered, coloured buff and green-stained from the metal. It was conjectured that this, too, had once belonged to the hilt.

### *The scabbard*

A compact, dark brown layer, covering approximately half the surface area of the blade, lies directly



ILLUS 10 SEM photomicrographs of hilt and scabbard: 1 Fibrous plates of horn, from hilt; 2 As 1, detail less well preserved; 3–4 Fibrous structure from scabbard, possibly skin (*Institute of Archaeology, University of Oxford*)

on the metal surface and survives on each face to a maximum thickness of 1–2mm. The condition of this substance was gel-like, but in two small areas it also gave a slight impression of being fibrous. The direction of the fibres seemed uniform and ran transversely across the blade on one face, diagonally on the other. On top of this layer lay a mixture of fine sediment in a rust-coloured gel without shape or structure except that, on one face, traces of woody or grassy stalks curved in from the edge of the blade. None of this was regarded as a component of the scabbard but rather as contaminant material from the burial deposit.

### Sampling

Samples, approximately 3mm x 2mm in area, were removed from the scabbard and hilt and allowed to dry. A further sample of hilt material was taken from the sieved fragments. The samples were plasma-coated in gold and examined by SEM (using

a Cambridge S150 machine) at magnifications varying between x100 and x2000. Labelling was as follows: Ai = hilt substance, organic, from face A (following Cowie's terminology, see above); Aii = hilt substance (mineralized), from sieved fragments; B = scabbard substance (organic), from face A; C = scabbard substance (organic), from face B.

### Results

- Ai Layered structure with fibrous plates typical of horn, illus 10.1. Identification: horn
- Aii Fibrous plates (as above), detail less well preserved, illus 10.2. Identification: possibly horn
- B & C Fibrous structure: small fibres amassed to form larger (compound) fibres. The diameter of the fibres varied from less than 1µm to over 200µm, illus 10.3–4. Identification: possible skin product.



*Considerations on the substance of the scabbard*

Mindful of the fact that FTIR analysis had already pronounced the organic remains of the scabbard to be proteinaceous, animal products other than skin were considered. Horn was rejected because its microstructure bears no resemblance to those of samples B and C, and animal hair also seemed unlikely because of the range of diameters shown by the fibres. Fibres in samples B and C are composite, slightly rippled and are similar in appearance to bundles of collagen fibres in very decayed skin. Paradoxically, while skin products normally display a three-dimensional weave it was noted that the fibres in situ seemed to be aligned, but this observation depends on the size of area examined, a very limited view giving a directional effect.

Judging by the even distribution of organic remains at the broad end of the blade the hilt of the Rameldry dagger appears to have been made entirely of horn with an omega-shaped outline below the line of the rivets. Hilts of horn are a common feature of Early Bronze Age daggers in Scottish graves although a composite hilt of horn, wood and ivory (probably from a sperm whale tooth) is known from Ashgrove, Fife (Henshall 1968, 184, fig 41). Daggers of the Wessex-Armorican group usually have hilts of wood (Gerloff 1975, 69ff).

The organic substance that was found adhering to the blade, probably a skin product, might have derived from adjacent deposits within the grave, such as a container made of skin, or a human body. But since it was detected and sampled from each face of the blade and because there is ample evidence that daggers of the Early Bronze Age were normally placed in graves with their scabbards, it is likely that these remains represent a form of scabbard.

The term *scabbard* is used here in preference to *sheath* (scabbards are rigid, sheaths are flexible) because archaeological evidence from burials in Scandinavia and north west Europe points to a Bronze Age tradition of composite scabbards of wood and skin (Boye & Madsen 1896, pl V, X, XV, XVII & XX; Martin 1900, 172–4; Annable & Simpson 1964; Coles et al 1964). These scabbards, most frequently of alder or willow, were lined inside with an animal pelt with hair facing the blade. The

wood, finely-shaped and finished, was covered tightly on the outside with another layer of skin, possibly hairless, so that the outline of the scabbard and moulding on the wooden surface beneath the skin was visible and sharply defined.

Despite the lack of evidence for a wooden component the remains of the Rameldry scabbard can probably be assigned to this tradition and its single layer of skin described as a lining. Two Scottish daggers, from Collessie, Fife and Gilchorn, Angus, are known to have had composite scabbards but two others, from Ashgrove and Kirkcaldy, Fife, are recorded as having sheaths of skin in single and double layers respectively. Whether these were indeed sheaths or are incomplete scabbards is an open question and how we view this evidence influences in turn our interpretation of the Rameldry find. The Ashgrove dagger, for instance, had a very degraded layer of skin on the blade with ‘five lines of sewing forming tiny ribs’ (Henshall 1968, 184). If these remains had once been part of a scabbard, what could have happened to the wood? The hilt – of horn, wood and ivory – offers an interesting clue because the wooden elements are missing entirely and have always been assumed. Indeed, other plant materials from the grave had been reduced to a ‘black crumbly matter’, having survived so well because some of it was sphagnum moss, renowned for its resistance to decay. It is obvious that the acid burial conditions in this case had favoured the preservation of animal products and pollen grains. A less acidic environment would have turned the balance in favour of the survival of plant materials, the decay of horn, skin and ivory would have been much more advanced, and a wooden scabbard *might* have been found. Examination of the Kirkcaldy record (Henshall 1968, 187) suggests that similar circumstances dictated the type of remains that survived there also. This time two layers of skin were found on the dagger in a manner that suggested a sheath and lining; and ‘At the top of the sheath two thin layers, *presumably skin*, lie between the sheath and the lining. . .’ (ibid; my emphasis). It is not inconceivable that the material between the sheath and lining was in fact badly decayed wood, and that what is represented here is a scabbard, rather than a sheath. In order to verify this, a re-examination of the artefact would be necessary, using SEM to examine its microstructure.

## DISCUSSION &amp; CONCLUSIONS

Alison Sheridan, Trevor Cowie (TGC) & Peter Northover (PN)  
with a contribution on links with central Europe by Brendan O'Connor (BO'C)

The Rameldry grave is an important addition to the high-status Early Bronze Age dagger graves of Scotland (and indeed of Britain and Ireland as a whole); the dagger is one of the earliest bronze daggers to have been found in these islands, and – as noted above – the set of V-perforated buttons has some unique characteristics. The assemblage therefore warrants an extended discussion; this is followed by a discussion of Rameldry within the context of Scottish dagger graves in general.

## THE BUTTONS (JAS)

*Function, comparanda, associations, date*

Ian Shepherd's study of the V-perforated buttons of Britain and their Continental counterparts (1973; see also Shepherd 1985) enables us to assess the function and significance of the Rameldry set. Shepherd observed that buttons were probably used in various ways. Some large ones (including the exceptionally large, 63mm-diameter example from Harehope, Peeblesshire: Jobey 1980; Clarke et al 1985) were probably fasteners for a cloak-like overgarment, while some smaller ones found singly or in pairs at particular positions appear to have been used as fasteners for pouches or leg-wraps. Others had probably been used as decorative studs rather than buttons, and some had been used (or recycled) as necklace beads. Some sets of consistently-sized buttons had probably been fasteners for a shirt or jacket-like garment. This may well have been the case with the six Rameldry buttons, as indeed with a similar set of six buttons (five of jet, one of oolitic sandstone, the latter decorated) found in a dagger grave at Butterwick, North Yorkshire (Greenwell & Rolleston 1877, 186–91; fig 4). The fact that the Rameldry buttons, unlike the Butterwick ones, were not found in

a neat line in front of the body does not invalidate this interpretation since, as previously noted, there had been some post-depositional disturbance of the cist contents. Shepherd suggested that V-perforated buttons would have been used with loops rather than button holes, as the latter would have weakened garments made of skin; one may note that for woven garments, loops are easier to make than button holes.

The Rameldry buttons are of Shepherd's Types 6a and 6b (ie having reflex concave upper surfaces and flat or slightly convex bases). Thirty-three other examples of these types are known from various locations from Yorkshire northwards, with outliers further south in England and in Ulster. Finds within Scotland include one from Balbirnie, a few kilometres from Rameldry (Ritchie 1974), and a set of six, forming part of the hoard from Migdale, Sutherland (Anderson 1901; Piggott & Stewart 1958). If one considers the distribution of all types of V-perforated buttons, studs and toggle fasteners within Britain, Rameldry lies well within the fairly dense spread of finds from southern and eastern Scotland.

The association of V-perforated buttons with a dagger is paralleled at several other locations, both in Britain and abroad (eg Plinganserstrasse, Munich: Clarke 1970, 104; Ledce, Czech Republic: Hájek 1957, obr 7). Gerloff (1975) illustrates examples, in various materials, from Early Bronze Age dagger graves at Butterwick and Rudston in Yorkshire (her nos 20 and 38), Eaton and Alsop, Derbyshire (no 59, with a peg-decorated dagger hilt) and Wimborne St Giles, Dorset (no 69). Buttons have also been found in association with knife-daggers (eg at Kirkcaldy, Fife; Driffield, Yorkshire; and Upton Lovell, Wiltshire: Childe 1944; Piggott & Stewart 1958; Gerloff 1975, nos 296, 237, 272). As discussed below, dagger graves seem to be associated with males (often those senior in age, as at Rameldry: Henshall 1968), while knife-daggers are found with both males and females (Gerloff 1975, 159 ff). V-perforated

buttons not found with daggers or knife-daggers have both male and female associations.

As regards dating, British V-perforated buttons appear to have a long currency, perhaps exceeding 600 years (Shepherd 1973). The earliest dated example is a flattish, cruciform-decorated button of Shepherd's Type X from Cookston, Airlie, Angus (Coutts 1971, no 82b), found with a Beaker of Clarke's 'N3L' type (Lanting & van der Waals' 'step 6') and dated to  $3800 \pm 50$  BP (BM-2523: 2310–2140 cal BC at  $1\sigma$ , 2460–2045 cal BC at  $2\sigma$ ; Kinnes et al 1991). This is comparable with examples from Bell Beaker contexts in the Czech Republic (at Lysolaje and Jenišův Újezd) and from a late Globular Amphora context at Schwarzort, on the Baltic coast of Germany (Hájek 1857, obr 3, 9, 21). The latest use of V-perforated buttons appears to date to 1700–1500 BC: the example found at Oxteddle Bottom, Sussex, along with grave goods including a composite faience-amber-'jet' necklace, was found in a Collared Urn which Burgess attributes to his 'Late' group (1986, 348); according to Needham, such urns should date to 1700–1500 BC (Needham 1996, 132–3). The Rameldry buttons, with their associated date of 2280–1970 cal BC, therefore belong to the early part of this currency. Their date is comparable with that relating to the Type 6a (and Type 1) buttons from the Migdale hoard:  $3655 \pm 75$  BP (OxA-4659: 2150–1920 cal BC at  $1\sigma$ , 2300–1750 cal BC at  $2\sigma$ ; Sheridan et al 1995).

#### *Differential wear on the buttons*

The fact that some buttons appear more worn than others suggests that they were acquired at different times. It may be that they were added successively to the Rameldry man's jacket; it has been suggested (Ashmore, pers comm) that the observed variation in wear was due to everyday use, with some buttons being left unfastened. Alternatively, and arguably

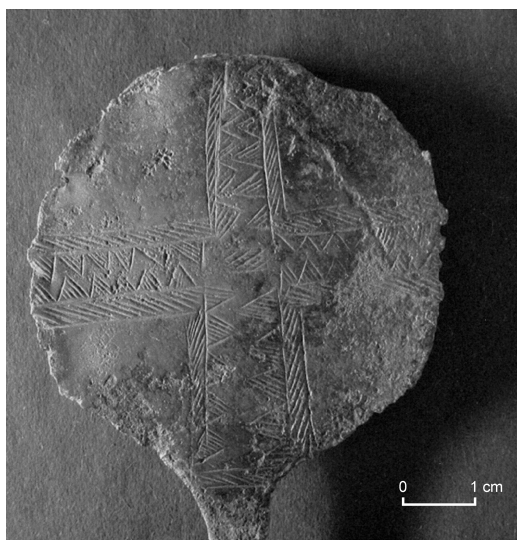
more likely (in view of the incompletely polished state of Button 6), it could be that a special funerary jacket was created, using some relatively old buttons, some not so old, and one new (specially-commissioned?) button. The older buttons could have been taken from a jacket worn by the Rameldry man during his lifetime.

This phenomenon of differential wear was also noted on the set of 32 circular buttons, of varying sizes, from Harehope (Jobey 1980; Shepherd 1981; 1985). It is also a feature of some 'jet' spacer plate necklaces where, in extreme cases, parts of several necklaces of differing antiquity and often of differing materials have been amalgamated (eg at Melfort, Argyll: Sheridan & Davis 1995). Such composite necklaces might not merely reflect the 'cannibalizing' of different items in order to substitute for missing or broken components; rather, the deliberate incorporation of valued heirlooms may have been involved.

#### *The decorated jet button (Button 1)*

The tin inlay, and the use of selective dulling to create a subtly-textured design, are features unique to Rameldry and they will doubtless have enhanced the already considerable prestige value of this set of exotic buttons. Decorated buttons are rare, and although the deliberate use of inlay has been demonstrated for spacer-plate necklaces (using materials other than tin: Sheridan & Davis 1995), its use has not been proven for other British buttons.

The use of a cruciform design can be paralleled on other decorated V-perforated buttons in Britain and abroad (eg Thwing barrow LX, Yorkshire: Greenwell & Rolleston 1877, fig 3; and on the aforementioned examples from Lysolaje, Jenišův Újezd and Schwarzort). Furthermore, as will be discussed below, it is also found on sheet gold discs in Ireland and southern England, and on central European disc-headed pins. A specific parallel for the zig-zag motif within the arms is offered by a disc-headed pin from Conthey,



ILLUS 11 Photo of head of bronze pin from Conthey, Valais, Switzerland (*Musée Cantonal d'Archéologie, Sion*)

Valais, in Switzerland (illus 11). This zig-zag is also seen on some Whitby-made spacer-plate necklaces, some Irish gold lunulae, and some Beakers and Food Vessels. The relative chronology of these design features, and the direction of their putative spread, will be considered below.

How was the tin inlaid? The presence of traces of tin in the shallow incisions as well as in the grooves suggests that it may have been applied in molten form (rather than as a wire or foil), with excess wiped off the button's surface. Furthermore, the shape of the grooves supports this idea: had wire been used, then theoretically a groove shaped like an inverted V would have been required to keep it in place after inlaying. Pure metallic tin (as in this case) melts at the low temperature of 232°C, and therefore in theory it should not have damaged the surface of the jet, which would have been polished all over prior to the decoration. Experimental work by HR-J is planned to test this hypothesis.

Was the decoration executed at Whitby or added locally, as Shepherd has argued for the largest of the Harehope buttons (1985,

208–9)? It is hard to say. On the one hand, the skill of a specialist would have been required to inlay the tin and achieve the differential-texture design; and, as noted above, both the cruciform design and the zig-zag motifs were within the repertoire of the specialist jet workers around Whitby. On the other hand, the slight unevenness of the incised lines contrasts with the relative fineness of the decoration on the jet buttons from Thwing barrow LX or Rudston barrow LXVIII, Yorkshire, and on the smaller of the decorated buttons from Harehope (Greenwell & Rolleston 1877, figs 3 & 124; Jobey 1980) – buttons which were arguably made and decorated in the Whitby area. Furthermore, the use of tin for decorative purposes is a feature of the north-east Scottish 'Migdale-Marnoch' bronzeworking tradition, where 'tinning' was used to give some flat axeheads a silvery appearance (Needham & Kinnes 1981; Cowie 1988, 11; Needham, in press). It is not a feature of the north-east English bronzeworking tradition. It is quite possible, therefore, that the decoration was added by a skilled individual within Scotland.

Where did the tin come from? The major British source is south-west England (Penhalurick 1986), and tin ingots must have been circulating widely for use by bronzeworkers. An alternative source, potentially available in Britain but far less plausible as a candidate (Needham, pers comm), is the central European alluvial tin deposits (Cowie 1988, 11). Whether minor British sources were also being exploited at the time is not known. It is not yet possible to distinguish tin from different sources through compositional analysis. However, given the volume of tin used by the 'Migdale-Marnoch' bronzeworkers in north-east Scotland (producing bronze with a consistent and relatively high tin content) and the attendant need for a regular tin supply, south-west England remains the only feasible source (Needham, in press). If the button had been embellished in Fife, the tin could have been obtained through whatever supply network

existed to move Cornish and Devon tin northwards, or else through links with north-east Scotland.

The use of tin at Rameldry represents one of the earliest examples of the use of metallic tin for decorative purposes in Europe. The other Early Bronze Age examples, which could be broadly contemporary with Rameldry, comprise: the aforementioned ‘tinned’ axeheads; a tin wire support around the rim of one of the two gold armlets from Lockington, Leicestershire (Needham 2000, 36); a dagger of central European origin found at Barge-roosterveld, Netherlands, which had tin pins in its hilt (reminiscent of the decorative pins in the Rameldry dagger hilt; Clarke *et al* 1985, fig 4.83). Also of Early Bronze Age date are the lost segmented tin bead from Sutton Veny, Wiltshire (Hoare 1812, pl XII); the segmented and plano-convex tin beads from the Exloo, Netherlands necklace (Clarke *et al* 1985; illus 4.82); and a necklace of segmented tin beads from a female inhumation at Buxheim, Bavaria (Möslein & Rieder 1998). Of these, the Buxheim necklace is contemporary with the Rameldry burial (Lanting & van der Plicht 2002, 128).

#### *The embellished stone button (Button 2)*

The source of the lizardite used to manufacture this button has already been discussed above, with Lizard Point, Cornwall being a distinct possibility in view of the south-west English tin connection. The existence of a source at Portsoy, Moray is also noteworthy in the light of the comments above on possible links with the Migdale-Marnoch metalworking tradition area; for the moment, all we can say with confidence is that the button (or, less likely, its raw material) was imported to Fife.

The use of stone for V-perforated buttons is known from Britain, Ireland and elsewhere in Europe (eg Butterwick, North Yorkshire, with crudely-incised decoration: Greenwell & Rolleston 1877, 186–91 & fig 4). The use of a deliberate coating, however, finds no parallel

in Britain, but intriguingly echoes practice in Bavaria, where bone buttons were supposedly made to look like amber (Clarke 1970, 95). Whether the Rameldry button’s colour represents an attempt to emulate bronze, or is due to some other factor, is far harder to determine.

The identity of the coating, and its method of application, remain unresolved questions. It should be noted, however, that the coating is not unlike that seen on fifth- to third-millennium Egyptian glazed steatite, which has been described as ‘a distinct glassy coating which easily chips and flakes from the body’, some 0.05–0.1mm thick (Kaczmarczyk & Hedges 1983, A-66). The firing of the steatite during the glazing process is known to strengthen the stone. Glazing (using ground sand, mixed with fluxing agents) might indeed account for the observed silica level in the Rameldry coating. The problem with such an interpretation, however, is that the requisite technological know-how – which is associated with faience beads, and which was probably acquired from Continental Europe, rather than Egypt – is not believed to have arrived in Britain *quite* as early as this, even though faience was being manufactured in central and eastern Europe during the second half of the third millennium (see Sheridan & Shortland, *in press*, on faience origins and dating). For the time being, the Rameldry coating remains a mystery.

#### *Links (albeit indirect) with central Europe (JAS, BO’C)*

The question of the origin of the Rameldry buttons – in terms of the inspiration for their specific shape and their decoration – is an intriguing one. It is generally accepted that the practice of using buttons in general was adopted in Britain and Ireland from Continental Europe, where they had been in widespread use, particularly in some Bell Beaker contexts (Hájek 1957; Shepherd 1973, chapters 4 & 6, map 1; Harbison 1976). As far as

the use of the cruciform design on V-perforated buttons is concerned, David Clarke had postulated (1970, 95) that this derived from the disc-headed pins found in Bavaria and the Upper Rhine. He also cited these pins as the design source for the large decorated metal 'button covers' of the Straubing-Adlerberg cultural group (eg at Straubing: Hundt 1958, Tafel 13.4, 15.1,2; their actual function is uncertain) and on the gold 'sun discs' or 'button covers' of Ireland and Britain, arguing that these items resembled the heads of the pins, whose shafts would have been largely invisible when in use. Although he did not mention it, the central nipple on some of the cruciform-decorated disc-headed pins (eg Branč, Slovakia; Neudorf bei Staats, Austria; Šlapanice, Moravia: David-Elbiali 2000, fig 13.5,6,9), echoed in the Straubing-Adlerberg 'button covers', is also echoed in the particular shape of Shepherd's Types 6a and 6b buttons.

Since Clarke wrote, however, views on the relative chronology of the various elements of this model have changed. Regarding the gold 'button covers', the chronology of the earliest gold ornaments in Britain and Ireland has been put back considerably and, although there is still very little direct dating evidence, it now seems likely that they pre-date the disc-headed pins and the Continental decorated 'button covers' (Needham 2000; O'Connor, in press). The dating and distribution of the disc-headed pins has also been clarified (Novotná 1980; David-Elbiali 2000, 143–50 and see in particular map 24; Lanting & van der Plicht 2002, 128–30; Hafner & Suter 2003; Krause 2003). The currency for disc-headed pins in general is now estimated at between c 2000 BC and 1600/1500 BC, and there are radiocarbon dates for two specific examples: the aforementioned pin from Conthey in Switzerland (2000–c 1800 cal BC: David-Elbiali 2000, 143, no 139), and one from Jelšovce, Slovakia (1920–1730 cal BC: Krause 2003, 83, abb 33). This, together with the fact that V-perforated buttons with simple cruciform designs are known from third-millennium contexts on the

Continent and in Britain (as noted above), makes it highly unlikely that the disc-headed pins with cruciform decoration were the inspiration for cruciform-decorated buttons in Britain. Indeed, it may be that the striking similarity in design between the complex cruciform design seen on Rameldry Button 1 and on the Conthey disc-headed pin relates to stylistic influence *from* Britain *to* central Europe around the beginning of the second millennium BC.

Other sources should be sought for the decoration and shape of the Rameldry buttons. Regarding the former, while the gold 'button covers' cannot be ruled out, the parallels are not exact; the distribution appears mutually exclusive with that of cruciform-decorated buttons; and the buttons are likely to post-date them (though by how long is unknown). It appears more likely that the ultimate source of inspiration was the Continental V-perforated buttons with simple cruciform decoration; we have already noted that this type of button was in use in late third-millennium Britain. The elaboration in the cruciform design, as manifested at Rameldry and in other north British buttons, could well relate to the borrowing of designs from contemporary jet spacer plate necklaces. These are known to have been made in Whitby, where at least some of the buttons are likely to have been decorated (Sheridan & Davis 2002). In turn, as Shepherd has pointed out (1973, ch 5), some of these motifs closely echo those seen on the Beaker pottery found in north-east England; and, as noted above, zig-zag and triangular motifs are also known on some Food Vessels (which should, theoretically, fall within the relevant date bracket: Manby, pers comm; Brindley, pers comm).

As for the origin of the specific concavo-convex shape of the Rameldry buttons (and other buttons of Shepherd's types 6a and 6b), the presence of this type of button in the aforementioned Migdale hoard provides a clue. Other items in this hoard are strongly reminiscent of artefacts found in Early Bronze

Age funerary contexts in central and east-central Europe, in particular those of the Straubing-Adlerberg cultural group in Bavaria, Austria and the Upper and Middle Rhineland. The pair of graduated sets of arm- or leg-bangles may be skeuomorphs of the Continental one-piece spiral arm- or anklets (eg at Straubing: Hundt 1958, Tafel 9, 10, 12–14, 16), while exact parallels exist for the conical sheet bronze ‘stud covers’ and tubular sheet bronze beads, both of which had probably been used as clothing- or headdress-accessories (eg Hundt 1958, Tafel 8). Some of these comparanda are of early Straubing-Adlerberg date, c 2200–2000 BC (Reinecke’s Bz A1 phase, in conventional central European chronology) and are thus early enough to have been prototypes for the Migdale objects. Although actual V-perforated buttons are rare in Straubing-Adlerberg contexts, there are some items from these assemblages which do bear some resemblance to the concavo-convex profile of Type 6a and 6b buttons, and could conceivably have influenced their design. These are the small, flattish sheet metal ‘button covers’ with central nipple, and the concavo-convex spiral metal wire ‘tutuli’ with pronounced central nipple, which were some kind of clothing- or headdress accessory (eg at Straubing: Hundt 1958, Tafel 8.17 & 8.19–21 respectively). Indeed, if Rameldry Button 2 had been glazed to resemble a shiny metal object, the small ‘button covers’ represent a fairly close parallel.

The reason why such long-distance echoes should exist between items in the Migdale hoard and those in central and east-central Europe has been considered elsewhere (eg Cowie 1988, 11). Put simply, it is related to the establishment of the bronzeworking tradition in north-east Scotland which, while still relying heavily on Irish supplies of copper (see above; Cressey & Sheridan this volume; Needham, in press), presumably had some input of alloying expertise from those in central and/or east-central Europe who had already acquired the know-how (cf Pare 2000). Returning to the Rameldry buttons and others of types 6a and

6b, it is therefore not implausible that their shape could have been influenced by these distant European fashions in dress accessories, given that this conduit for transmission of design ideas existed at the time. If these ideas arrived in Britain via the Migdale area, then the existing network of contacts within Britain (Sheridan & Davis 2002) may have allowed them to filter through to button makers at Whitby (who were almost certainly responsible for one of the six Migdale buttons).

#### THE DAGGER (TGC, PN)

The Rameldry dagger is a significant addition to the series of Early Bronze Age daggers from Scotland, principally recovered from funerary contexts and more rarely as components of hoards or as single finds (Henshall 1968; Gerloff 1975). The key features in defining the Rameldry dagger’s place in the development of Early Bronze Age daggers in Britain are the flat blade, the five rivets attaching the hilt, the omega-shaped hilt-mark and the line of decorative pins around it. The primary source for British dagger typology is the doctoral research of Sabine Gerloff (1975). Gerloff’s basic classification is still sound but the associated chronology of her types has required much revision in the light of new finds and a growing number of radiocarbon dates (Northover 1999). Flat riveted daggers, the earliest form of bronze dagger, seem to have appeared around the 22nd century BC (for example at Gravelly Guy, Stanton Harcourt, Oxfordshire: Northover 1999, 213; Gerloff, in press), and to have continued in use until their replacement by Gerloff’s Armorico-British types of the Bush Barrow phase, early in the second millennium BC (Northover 1999, 213–4).

The principal flat dagger type is the *Butterwick* type, and through its occurrence at Gravelly Guy, is the earliest dated dagger form. All blades of this type are characterized by three plug rivets, thus excluding the Rameldry dagger from this group. Gerloff places daggers with more than three rivets into her

types *Milston*, with its *East Kennet* variant; *Masterton*; and a small number of miscellaneous blades. The *Masterton* type is ruled out because of its V-shaped hilt mark, and the *Milston* type by its having more than five rivets. Overall it is a small number of blades of the *East Kennet* variant that have the requisite pattern of rivets, in particular a blade from Homington, Wiltshire (Gerloff 1975 no 68), while blades from Amesbury G85, Wiltshire and Garton-on-the-Wolds, Yorkshire, have decorative patterns of peg rivets on their hilts (Gerloff 1975, nos 66–7).

That said, however, the *East Kennet* daggers form rather a disparate group: where some have rivet-holes, others have a combination of rivet-holes and rivet-notches, and they vary considerably in size. What unites the daggers of the *Milston* type and its variants is thus the use of multiple rivets and in some cases the ornamentation of the hilts. As noted above, in addition to the symmetrical arrangement of five functional rivets holding the hilt in place, the hilt of the Rameldry dagger had an arrangement of decorative pins embellishing the outline of the hilt plate close to its junction with the face of the blade and following the contour of the semicircular recess. This is the first recorded discovery of an elaborate dagger hilt of this form from Scotland, although a knife-dagger from Barns Farm, Fife seems to have a similarly-decorated hilt (Watkins 1982, 77, 79); and there are one or two other, more elaborate examples in Britain (on later, Armorico-British, daggers from Bush Barrow and possibly Winterbourne Stoke, Wiltshire; the pins being of gold: Gerloff 1975, 113, 108 respectively). The method of decoration of the organic components varies – from the use of multiple rivets to hold the separate hilt-plates together, to the use of non-functional pegs (as noted above) or pins (as at Rameldry). Another way of rendering a hilt ‘fancy’ is shown in the Gravelly Guy dagger, whose copper rivets would have provided a colour contrast with the bronze of the blade, and surely reflect a conscious design choice.

And in the case of the eponymous *Milston* dagger the wooden hilt appears to have been ornamented with an indented pointillé pattern, as well as with decorative peg rivets (Gerloff 1975, no 57). Ornamentation and elaboration of the hilt offer an obvious way of personalizing a dagger and of making the quality of its craftsmanship apparent, particularly when sheathed. The relative heterogeneity of the *Milston* and *East Kennet* series of daggers may simply be a reflection of their manufacture as one-off pieces of craftsmanship where a premium was set upon the individuality of the finished piece.

Both three-riveted and multi-riveted daggers could have been contemporary. The dates for the Type *Butterwick* dagger from Gravelly Guy, for an *East Kennet* blade from Barrow Hills, Radley, Oxfordshire, and for a *Masterton* dagger from Collessie, Fife, are all comparable with the Rameldry date, as shown in Table 3.

As far as the composition of the Rameldry metal is concerned, for immediate comparison there is now a sizeable body of analytical results for British copper and bronze daggers, covering some 20 specimens of Gerloff’s *Butterwick*, *Merthyr Mawr*, *Milston*, *East Kennet*, *Masterton* and related types. These results include the data from a number of laboratories mentioned in Gerloff’s corpus (1975); unpublished analyses by the present author (PN); and analyses, both published and unpublished, by the British Museum’s Department of Scientific Research (eg Kinnes 1985; 1994; Rohl & Needham 1998). They can be found tabulated elsewhere in this volume, in the report on the dagger from Seafeld West (Cressey & Sheridan 2003, Table 5), and will therefore not be repeated here. The discussion of these data will use the labels for impurity patterns devised by Northover (1980) for the description of Welsh Bronze Age metalwork; although the present discussion covers a much larger geographical area, the descriptions are still useful.

In the Copper Age of Britain and Ireland metalwork was dominated by the ‘A’ group of



TABLE 3

Radiocarbon dates for Early Bronze Age riveted flat daggers, calibrated using OxCal v3.8 (Bronk Ramsey 2002), with atmospheric data from Stuiver et al 1998

Findspot	Lab code	Sample material	Yrs BP	Calibrated dates	
				1 $\sigma$	2 $\sigma$
Gravelly Guy, Oxfordshire	UB-3122	human bone, unburnt	3709 $\pm$ 35	2190–2180 (2.0%), 2150–2030 (66.2%)	2200–2010 (91.0%), 2000–1970 (4.4%)
Barrow Hills, Radley, Oxfordshire (barrow 3)	OxA-4355	human bone, unburnt	3785 $\pm$ 90	2400–2380 (2.7%), 2350–2120 (56.2%), 2100–2030 (9.4%)	2500–1950 (95.4%)
Collessie, Fife	i) OxA-4510	i) ox skin from dagger scabbard	i) 3690 $\pm$ 80	i) 2200–2160 (9.3%), 2150–1950 (58.9%)	i) 2350–1750 (95.4%)
	ii) GrA-19054	ii) human bone, cremated	ii) 3695 $\pm$ 45	ii) 2150–2020 (62.8%), 2000–1980 (5.4%)	ii) 2210–1940 (95.4%)
Rameldry, Fife	GU-9574	skin from scabbard	3725 $\pm$ 40	2200–2160 (18.2%), 2150–2110 (14.9%), 2100–2030 (35.1%)	2280–2250 (3.4%), 2230–2220 (1.0%), 2210–2010 (88.2%), 2000–1970 (2.9%)

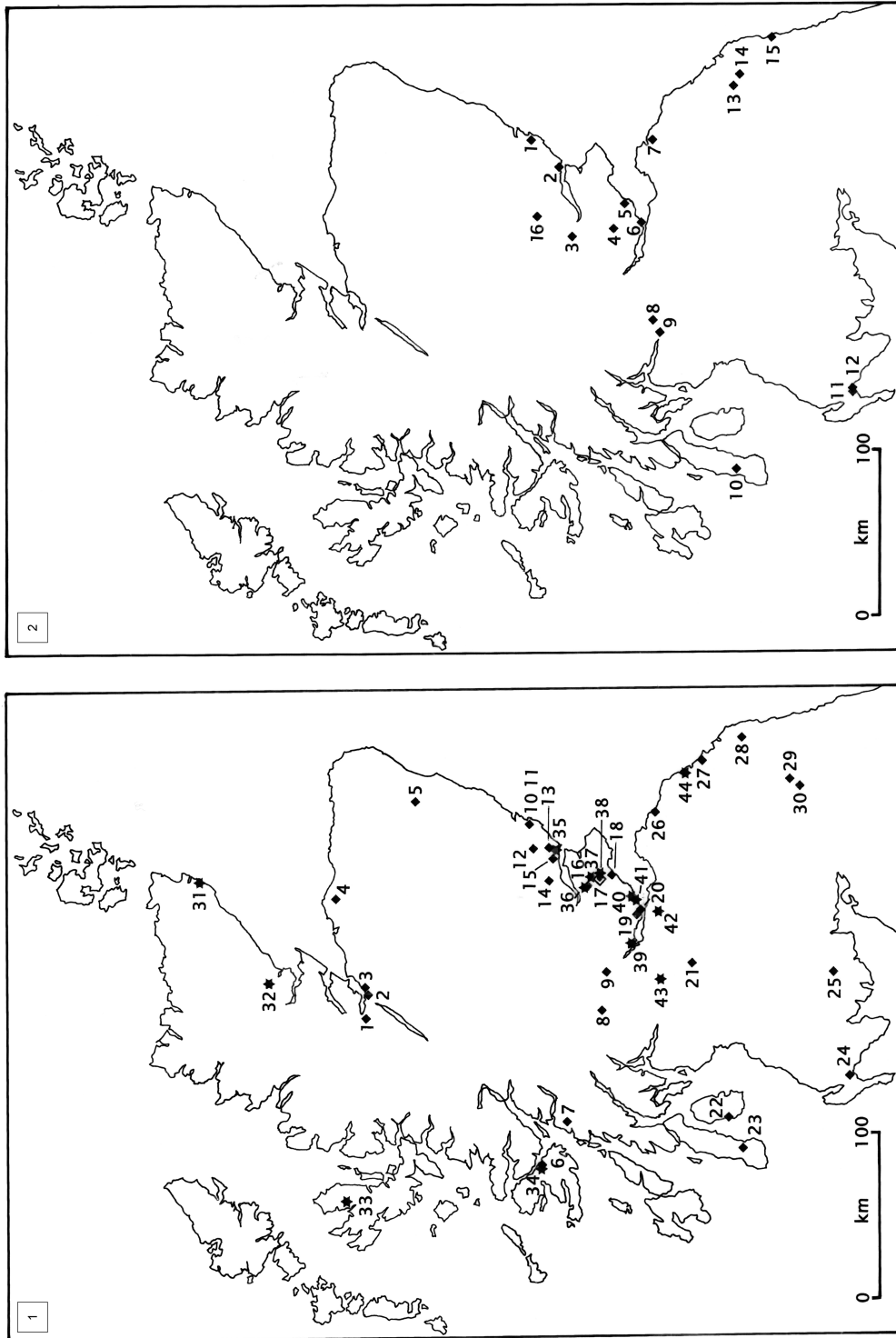
impurity patterns with arsenic, antimony and silver as the principal impurities. With the arrival of bronze this copper type continued in production, eventually disappearing from view about 1900–1800 BC. Fully half the flat daggers analysed fall into the ‘A’ group, the metal being especially visible in the *Butterwick* and *East Kennet* types, including the Rameldry dagger. There are however differences between the two types, with the *Butterwick* analyses having proportions of arsenic and antimony very typical of Irish production. Further, given the associated dates of some of these blades (Northover 1999), it is clear that the type includes some, if not all, of the earliest bronze daggers. Out of the *East Kennet* analyses, that of the eponymous dagger could be said to fall into this pattern as well. That from Auchnacree could also belong here but its specific values for arsenic and antimony mean that it could fit equally well with the analyses of Scottish Migdale axeheads whose copper has been suggested to be of Scottish origin (Northover 1983).

This brings us to the Rameldry dagger and rivet with both arsenic and antimony in the range 0.20–0.26%. There is one very close parallel for this impurity pattern in a dagger and that is in the *East Kennet* type blade from Wimborne St Giles G9, Dorset, geographically

very distant. The impurity pattern is practically identical, the primary differences between the daggers being that the latter has only 6.7% tin. It should be noted that arsenic/antimony/silver impurity patterns are not confined to an Irish or Scottish origin but could also be continental in origin. However, where metal can be identified as imported from the continent (Rohl & Needham 1998, 83–92), it is generally not of ‘A’ type.

#### RAMELDREY AND SCOTTISH DAGGER GRAVES (JAS, TGC)

‘Dagger graves’ as a class of high-status Early Bronze Age burials in Scotland were discussed by Audrey Henshall in 1968, who described 17 examples together with two stray dagger finds. Further examples were listed by Coles (1969) and Gerloff (1975), and a few more have come to light (or have been recognized as such) since 1975; the current total of definite examples stands at 26. In addition, some 13 burials accompanied by knife-daggers – similarly-shaped but smaller objects – are known, and there are at least 14 further specimens that are likely to have been daggers or knife-daggers, but which are either lost or too fragmentary to be identifiable definitively. These are all listed in Table 4 (along with similar objects from



ILLUS 12 Distribution of: 1 Dagger graves (shown by diamonds; Rameldry an open diamond) and possible dagger or knife-dagger graves (shown by stars); 2 Knife-dagger graves, in Scotland and north-east England (based on Henshall 1968 and Gerloff 1975, with additions)

Northumberland that form part of the same geographical grouping), and their distribution is shown in *illus 12*. As noted by Henshall, there is a marked concentration of these finds in east-central Scotland: around 50% of all the definite and possible Scottish dagger graves, for example, have been found in Fife and Angus. This area also has a relatively high concentration of other rich Early Bronze Age graves, such as those with jewellery made from jet and similar materials (eg East Kinwhirrie, Angus, with spacer plate necklace and bracelet: Sheridan 1998), and it is likely that its agricultural fertility was a factor in the wealth of its ancient inhabitants.

In Scotland, as elsewhere in Britain and Ireland, only a few dagger graves have reliable evidence for the sex and age of the deceased (Henshall 1968). However, in every case where the former has been determinable, it has been male; and often – as here at Rameldry – the man had reached a relatively senior age. Knife-daggers, however, appear to be associated with both males and females (Gerloff 1975, 159 ff). As Henshall has pointed out, the high status of the individual in dagger and knife-dagger graves is often underlined in other ways as well, such as with other luxury grave goods (eg ox-hides at Bishopmill, Moray & Masterton, Fife) or an exceptionally large cairn (eg at Collessie, Fife and Carloch Cairn, Dumfries & Galloway).

The practice of burying individuals with a dagger appears to have been adopted in Britain from continental Europe during the late third millennium BC (where it was widely associated with Bell Beakers), and to have had a currency of several centuries (Needham 1998; Northover 1999). (Note that Humphrey Case has argued (Case et al 2003, 177; cf Greenwell & Rolleston 1877, 187) that the blades are more likely to have been used as knives rather than as daggers; however, to avoid confusion, the term ‘dagger’ will be retained here.) They are found not only with inhumation burials, but also with those of cremated remains. The earliest examples are the Beaker-associated

tanged copper daggers. Two, from Chilbolton, Hampshire and Barnack, Cambridgeshire, were found with European-style Beakers of Clarke’s W/MR type (Clarke 1970; cf Lanting & van der Waals’ ‘step 3’, 1972). Associated radiocarbon dates, from human bone, place them within the last quarter of the third millennium BC at  $1\sigma$  values (Chilbolton: OxA-1072,  $3740 \pm 80$  BP: 2290–1980 cal BC at  $1\sigma$ , 2500–1900 cal BC at  $2\sigma$ ; Barnack: BM-2956,  $3770 \pm 35$  BP: 2280–2130 cal BC at  $1\sigma$ , 2300–2030 cal BC at  $2\sigma$ ). Although these dates are comparable with those cited above for the earliest bronze daggers, Northover has pointed out that the daggers themselves may have been old when deposited, and perhaps even rendered obsolete by the appearance of the new, bronze daggers. A Scottish example of a tanged (and riveted) copper dagger from a funerary context is that from Callachally, Mull associated (*inter alia*) with an N3/step 5 Beaker and an S3(E)/step 6 Beaker (Gerloff 1975, no 14). The latest examples of dagger (and knife-dagger) graves in Britain as a whole are those of ‘Wessex II’ attribution and those in the Arreton metalworking industry which, on current reckoning, should date to c 1700–1500 BC (Gerloff 1975, 155 ff; Needham 1998, 188). The latest directly-dated example in Scotland is the knife-dagger/razor from Gilchorn, whose date is comparable with this (see Table 4 — after the References — for details).

As Needham has recently and persuasively argued, the practice of honouring senior males through ‘dagger graves’ probably spread to Scotland from southern England, and may indeed have been linked with the establishment of a reliable tin supply from the south-west to northern Britain (Needham, *in press*). The compositional similarity between the Rameldry dagger and the aforementioned Dorset example, and the typological similarity with examples from southern England, may well not have been due to mere coincidence.

To conclude, the Rameldry grave belongs among the earliest graves in Britain and

Ireland to contain a dagger of bronze, and it lies within an area relatively rich in high-status Early Bronze Age burials. The deceased (and his mourners) had access to exotic and precious artefacts – the jet buttons from Whitby, the possibly glazed stone button, the dagger – and he may even have organized the embellishing of one of the jet buttons during his lifetime, using tin obtained from a distant source. All of this was used to underline his wealth and importance, and it implies the existence of an extensive network of contacts, in which he was able to participate due to his elevated position. That this network of contacts was articulated with other, more distant networks linking Britain to the Continent is implied in the specific shape of his buttons (and, perhaps, in the subsequent reciprocal flow of design ideas to the Continent, as suggested in the Conthey pin decoration). The Rameldry grave therefore reveals a great deal about the extent to which objects, materials and fashion ideas – and, to a certain extent also, people – travelled around some 4000 years ago.

#### ALLOCATION OF FINDS & ARCHIVE

The artefact assemblage was allocated to the National Museums of Scotland through the Finds Disposal system in November 2000 (Registration no NMS X.EQ 1098–1104). The skeletal material will also be passed to NMS, and the excavation archive (including full details of the various analytical techniques used to investigate the artefactual finds) has been deposited in the National Monuments Record of Scotland (NMRS no NO30NW 173).

#### ACKNOWLEDGEMENTS

The excavation and publication of the Rameldry dagger grave, and some of the analytical and conservation work, was funded by Historic Scotland. Headland Archaeology would like to thank Patrick Ashmore (who managed the project for Historic Scotland) in particular, for his interest and forbearance during the long and complex (but ultimately rewarding) process of finds analysis. The

site plans were drawn by Laura Speed of Headland Archaeology and the finds were drawn by Sylvia Stevenson.

Alison Sheridan and Mary Davis wish to thank Drs Carl Heron (University of Bradford), Sara Chambers (formerly of NMGW) and Kilian Anheuser (formerly of Cardiff University) for their considerable generosity in providing free analyses and identifications; Richard Brewer (NMGW), for his assistance and forbearance; Brian Jackson (NMS), for his advice on lizardite; Ian Shepherd (Aberdeenshire Archaeology) for his advice on buttons; Dr David Clarke (NMS), for advice on antiquarian finds; Adrian Zealand, for checking the lost Broughty Ferry blade; and Terry Manby and Anna Brindley, for advice on the dating of Food Vessels. Particular thanks go to Dr Stuart Needham (British Museum) for his help and comments on the text; to Dr Jan Lanting (University of Groningen) for alerting the authors to the Buxheim tin necklace; and to Philippe Curdy, curator of the Musée Cantonal d'Archéologie, Sion, for the image of the Conthey pin. The radiocarbon dates for Barnhill and Auchterhouse were funded by Groningen University and the Natural Environment Research Council respectively. Esther Cameron thanks Alison Sheridan for commenting on an earlier draft of her report.

All the contributors thank Gordon Barclay, Graham Ritchie and Ian Shepherd for their helpful comments, which have improved the text; any errors that may remain are the authors'.

#### REFERENCES

- Anderson, J 1868 'On the horned cairns of Caithness: their structural arrangement, contents of chambers, &c', *Proc Soc Antiq Scot*, 7 (1866–8), 480–512.
- Anderson, J 1878 'Notes on the character and contents of a large sepulchral cist of the Bronze Age at Collessie, Fife, excavated by William Wallace Esq of Newton of Collessie, in August 1876 and 1877', *Proc Soc Antiq Scot*, 12 (1877–8), 439–61.
- Anderson, J 1901 'Notice of a hoard of bronze implements, and ornaments, and buttons of jet found at Migdale, on the estate of Skibo, Sutherland, exhibited to the Society by Mr Andrew Carnegie of Skibo, LID, FSA Scot', *Proc Soc Antiq Scot*, 35 (1900–1), 266–75.

- Annable, K & Simpson, D 1964 *Guide Catalogue of the Neolithic and Bronze Age Collection in Devizes Museum*. Devizes.
- Ashmore, P J 2002 'The road to discovery', *Historic Scotland*, summer 2002, 18–19.
- Aufderheide, A C & Rodriguez-Martin, C 1998 *The Cambridge Encyclopaedia of Human Palaeopathology*. Cambridge.
- Boye, V & Madsen, A 1896 *Fund af Egekister fra Bronzealderen I Danmark*. Copenhagen.
- Bronk Ramsey, C 2002 *OxCal Program v3.8*. Oxford.
- Brothwell, D R 1981 *Digging up Bones*. London.
- Burgess, C 1986 "'Urnets of no small variety": Collared Urns reviewed', *Proc Prehist Soc*, 52, 339–51.
- Callander, J G 1923 'Scottish Bronze Age hoards', *Proc Soc Antiq Scot*, 57 (1922–3), 123–66.
- Case, H J, Robinson, P & Hopper-Bishop, A 2003 'Beaker presence at Wilsford 7', *Wiltshire Archaeol Natur Hist Mag*, 96, 161–94.
- Childe, V G 1944 'Two cist burials at Kirkcaldy and their contents', *Proc Soc Antiq Scot*, 78 (1943–4), 109–14.
- Clarke, D L 1970 *Beaker Pottery of Great Britain and Ireland*. Cambridge.
- Clarke, D V, Cowie, T G & Foxon, A 1985 *Symbols of Power at the Time of Stonehenge*. Edinburgh.
- Clydesdale, A 2001 *Rameldry Farm Fife 2000. Examination and Recording of the Artefacts from a Cist Burial*. Unpubl archive report.
- Coles, J M, 1969 'Scottish Early Bronze Age metalwork', *Proc Soc Antiq Scot*, 101 (1968–9), 1–110.
- Coles, J M, Coutts, H & Ryder, M 1964 'A Late Bronze Age find from Pyotdykes, Angus, Scotland, with associated cloth, leather and wood remains', *Proc Prehist Soc*, 11, 86–198.
- Coutts, H 1971 *Tayside Before History*. Dundee.
- Cowie, T G 1988 *Magic Metal: Early Metalworkers in the North-East*. Aberdeen.
- Cowie, T G & Ritchie, J N G 1991 'Bronze Age burials at Gairneybank, Kinross-shire', *Proc Soc Antiq Scot*, 121, 95–109.
- David-Elbiali, M 2000 *La Suisse Occidentale au IIe Millénaire av J-C*. Lausanne (= Cahiers d'Archéologie Romande, 80).
- Dickson, J 1978 'Bronze age mead', *Antiquity*, 52, 108–13.
- Duns, J 1883 'Notes on North Mull', *Proc Soc Antiq Scot*, 17 (1882–3), 79–89.
- Garwood, P & Barclay, A 1998 'Late Neolithic and Early Bronze Age funerary deposits', in Barclay, A & Halpin, C, *Excavations at Barrow Hills, Radley, Oxfordshire. Volume I: The Neolithic and Bronze Age Monument Complex*, 281–93. Oxford.
- Gerloff, S 1975 *The Early Bronze Age Daggers in Great Britain and a Reconsideration of the Wessex Culture*. München (=Prähistorische Bronzefunde VI/2).
- Gerloff, S in press 'The dagger from grave 4013. Typology and affinities', in Lambrick, G, Allen, T G & Healy, F M (eds) *Gravelly Guy, Stanton Harcourt: the Development of a Prehistoric and Romano-British Landscape*. Oxford (= Thames Valley Landscape Monographs).
- Greenwell, W & Rolleston, G 1877 *British Barrows*. Oxford.
- Hafner, A & Suter, P J 2003 'Vom Endneolithikum zur Frühbronzezeit: Wandel und Kontinuität zwischen 2400 und 1500 v Chr', *Archäologisches Korrespondenzblatt*, 33, 325–44.
- Hájek, L 1957 'Knoflíky středoevropské skupiny kultury zvoncovitých pohárů', *Památky Archeologické*, 48, 389–424.
- Harbison, P 1976 *Bracers and V-perforated Buttons in the Beaker and Food Vessel Cultures of Ireland*. Bad Bramstedt (= *Archaeologia Atlantica* Res Rep, 1).
- Harding, A 2000 *European Societies in the Bronze Age*. Cambridge.
- Heddle, M F 1901 *The Mineralogy of Scotland*, vol 2. Edinburgh.
- Henshall, A S 1964 'A dagger-grave and other cist burials at Ashgrove, Methilhill, Fife', *Proc Soc Antiq Scot*, 97 (1963–4), 166–79.
- Henshall, A S 1968 'Scottish dagger graves', in Coles, J M & Simpson, D D A (eds) *Studies in Ancient Europe*, 173–95. Leicester.
- Hoare, R C 1812. *The Ancient History of South Wiltshire*, vol 1. London.
- Jervise, A 1857 'Notices descriptive of the localities of certain sculptured stone monuments in Forfarshire, viz.– Benvie, and Invergowrie; Strathmartin, and Balutheran; Monifieth; Cors of Camus; and Arbirlot. Part III', *Proc Soc Antiq Scot*, 2 (1854–7), 187–99.
- Jobey, G 1980 'Green Knowe unenclosed platform settlement and Harehope cairn, Peeblesshire', *Proc Soc Antiq Scot*, 110 (1978–80), 72–113.

- Jockenhövel, A 1980 *Die Rasiermesser in Westeuropa*. München (=Prähistorische Bronzefunde VIII/3).
- Kaczmarczyk, A & Hedges, R E M 1983 *Ancient Egyptian Faience*. Warminster.
- Kinnes, I A 1985 *British Bronze Age Metalwork, A7–/16: Beaker and Early Bronze Age Grave Groups*. London.
- Kinnes, I A 1994 *British Bronze Age Metalwork, A17–/30: Beaker and Early Bronze Age Grave Groups*. London.
- Kinnes, I A, Gibson, A, Ambers, J, Leese, M & Boast, R 1991 'Radiocarbon dating and British Beakers', *Scott Archaeol Rev*, 8, 35–68.
- Krause, R 2003 *Studien zu Kupfer- und Frühbronzezeitlichen Metallurgie zwischen Karpatenbecken und Ostsee*. Rahden/Westfalen (= *Vorgeschichtliche Forschungen*, 24).
- Laing, A 1871 *Some Notices of the History of Newburgh and of the Remains of Antiquity in the Neighbourhood: an Address*. Newport-on-Tay.
- Lanting, J N & van der Plicht, J 2002 'De  $^{14}\text{C}$  chronologie van de Nederlandse pre- en protohistorie IV: brons-tijd en vroege ijzertijd', *Palaeohistoria*, 43–4 (2001–2), 117–262.
- Lanting, J N & Waals, J D van der 1972 'British Beakers as seen from the Continent: a review article', *Helinium*, 12, 20–46.
- Longworth, I H 1984 *Collared Urns of the Bronze Age in Great Britain and Ireland*. Cambridge.
- Martin, A 1900 'Les sépultures armoricaines du bronze à belles pointes de flèche en silex', *L'Anthropologie*, 11, 159–78.
- Morrison, A 1968 'Cinerary urns and pygmy vessels in south-west Scotland', *Trans Dumfriesshire Galloway Natur Hist Antiq Soc*, 45, 80–140.
- Möslein, S & Rieder, K H 1998 'Zinnperlen aus einem frühbronzezeitlichen Grab von Buxheim', *Das Archäologische Jahr in Bayern 1997*, 68–70.
- Needham, S 1996 'Chronology and periodisation in the British Bronze Age', *Acta Archaeologica*, 67, 121–40.
- Needham, S 1998 'Radley and the development of early metalwork in Britain', in Barclay, A & Halpin, C, *Excavations at Barrow Hills, Radley, Oxfordshire. Volume I: The Neolithic and Bronze Age Monument Complex*, 186–92. Oxford.
- Needham, S P 2000 'The development of embossed goldwork in Bronze Age Europe', *Antiq J*, 80, 27–65.
- Needham, S P in press 'Migdale-Marnoch: sunburst of Scottish metallurgy', in Shepherd, I A G & Barclay, G J (eds).
- Needham, S P & Kinnes, I A 1981 'Tinned axes again', *Antiquity*, 55, 133–4.
- Newman, T G & Miket, R F 1973 'A dagger-grave at Allerwash, Newbrough, Northumberland', *Archaeol Aeliana*, 1 (5th Ser), 87–95.
- Northover, J P 1980 'The analysis of Welsh Bronze Age metalwork', in Savory, H N, *Guide Catalogue to the Bronze Age Collections*, 229–43. Cardiff.
- Northover, J P 1983 'The exploration of the long-distance movement of bronze in Bronze and early Iron Age Europe', *Bull Inst Arch Univ London*, 19 (1982–3), 45–72.
- Northover, J P 1999 'The earliest metalworking in southern Britain', in Hauptmann, A, Pernicka, E, Rehren, T & Yalçin, Ü (eds) *The Beginnings of Metallurgy*, 211–26. Bochum (= *Der Anschnitt*, 9).
- Novotná, M 1980 *Die Nadeln in der Slowakei*. München (=Prähistorische Bronzefunde XIII, 6).
- O'Connor, B in press 'The earliest Scottish metalwork since Coles', in Shepherd, I A G & Barclay, G J (eds).
- Pare, C F E 2000 'Bronze and the Bronze Age', in Pare, C F E (ed), *Metals Make the World go Round*, 1–38. Oxford.
- Penhallurick, R D 1986 *Tin in Antiquity*. London.
- Piggott, S & Stewart, M 1958 *Early and Middle Bronze Age Grave-groups and Hoards from Scotland*. London (= *Inventaria Archaeologica* (Great Britain), 5th set, 25–34).
- Proudfoot, E 1997 'Short-cist burials from Fife. Upper Kenly Farm, Belliston Farm and Dalgety Bay', *Tayside Fife Archaeol J*, 3, 1–21.
- Quye, A 2000 *FTIR Analysis of Organic Remains on a Bronze Age Dagger Blade Excavated at Rameldry Farm, Fife*. Unpubl report, NMS Department of Conservation & Analytical Research.
- Ralston, I 1996 'Four short cists from north-east Scotland and Easter Ross', *Proc Soc Antiq Scot*, 126, 121–55.
- Ritchie, J 1920 'The stone circle at Broomend of Crichtie, Aberdeenshire', *Proc Soc Antiq Scot*, 44 (1919–20), 154–72.

- Ritchie, J N G 1968 'A Bronze Age cairn at Moleigh, Lorn, Argyll', *Proc Soc Antiq Scot*, 100 (1967–8), 190–2.
- Ritchie, J N G 1974 'Excavation of the stone circle and cairn at Balbirnie, Fife', *Archaeol J*, 131, 1–32.
- Ritchie, J N G & Adamson, H C 1981 'Knappers, Dunbartonshire: a reassessment', *Proc Soc Antiq Scot*, 111, 172–204.
- Ritchie, J N G & Shepherd, I A G 1973 'Beaker pottery and associated artefacts in south-west Scotland', *Trans Dumfriesshire Galloway Natur Hist Antiq Soc*, 50, 18–36.
- Roberts, C & Manchester, K 1995 *The Archaeology of Disease*, 2nd edn. Stroud.
- Rohl, B & Needham, S P 1998 *The Circulation of Metal in the British Bronze Age: the Application of Lead Isotope Analysis*. London (=British Museum Occ Pap, 102).
- Shepherd, I A G 1973 *The V-bored Buttons of Great Britain*. MA thesis, Univ Edinburgh.
- Shepherd, I A G 1981 'Bronze Age jet working in north Britain', *Scott Archaeol For*, 11, 43–51.
- Shepherd, I A G 1985 'Jet and amber', in Clarke, D V, Cowie, T G & Foxon, A, *Symbols of Power at the Time of Stonehenge*, 204–16. Edinburgh.
- Shepherd, I A G & Barclay, G J (eds) in press *Scotland in Ancient Europe*. Edinburgh.
- Sheridan, J A 1998 'Jet spacer plate and necklace [from East Kinwhirrie]', in Taylor, D B, Rideout, J S, Russell-White, C J & Cowie, T G, 'Prehistoric burials from Angus: some finds old and new', *Tayside Fife Archaeol J*, 4, 34–7.
- Sheridan, J A 2001 'The National Museums of Scotland "Dating Cremated Bones Project"', *Discovery Excav Scot*, NS 2, 129.
- Sheridan, J A 2002a 'The radiocarbon dating programmes of the National Museums of Scotland', *Antiquity*, 76, 794–6.
- Sheridan, J A 2002b 'The National Museums of Scotland dating programmes: results obtained during 2001/2', *Discovery Excav Scot*, N53, 154–5.
- Sheridan, J A & Davis, M 1995 'The Poltalloch "jet" spacer plate necklace', *The Kist*, 49, 1–9.
- Sheridan, J A & Davis, M 1998 'The Welsh "Jet Set" in prehistory: a case of keeping up with the Joneses?', in Gibson, A & Simpson, D D A (eds), *Prehistoric Ritual and Religion*, 148–62. Stroud.
- Sheridan, J A & Davis, M 2002 'Investigating jet and jet-like artefacts from prehistoric Scotland: the National Museums of Scotland project', *Antiquity*, 76, 812–25.
- Sheridan, J A, Hunter, F J & Saville, A 1995 'Organic artefacts from the collections of the National Museums of Scotland', in Hedges, R E M, Housley, R A, Bronk Ramsey, C & van Klinken, G J, 'Radiocarbon dates from the AMS system: datelist 20', *Archaeometry*, 37.2, 423–5.
- Sheridan, J A & Shortland, A in press '"... beads which have given rise to so much dogmatism, controversy and rash speculation": faience in Early Bronze Age Britain and Ireland', in Shepherd, I A G & Barclay, G J (eds).
- Stuiver, M, Reimer, P J, Bard, E, Beck, J W, Burr, G S, Hughen, K A, Kromer, B, McCormac, G, van der Plicht, J & Spurk, M 1998 'INTCAL98 Radiocarbon Age Calibration, 24000–0 cal BP', *Radiocarbon*, 40.3, 1041–83.
- Thomson, J K 1971 'Another dagger from a Scottish grave', *Proc Soc Antiq Scot*, 103 (1970–1), 225–7.
- Watkins, T 1982 'The excavation of an Early Bronze Age cemetery at Barns Farm, Dalgety, Fife', *Proc Soc Antiq Scot*, 112, 48–141.
- Whittaker, E J W & Zussman, J 1956 'The characterisation of serpentine minerals by X-ray diffraction', *Mineralogical Magazine & J Mineralogical Soc*, 233, vol 31, 122.
- Wilson, D 1863 *Prehistoric Annals of Scotland*, vol 1. London.

*This paper is published with the aid of a grant from Historic Scotland.*

TABLE 4

Definite and possible examples of dagger and knife-dagger graves in Scotland and north-east England, as shown in illus 12. References are cited where they do not already exist in Henshall 1968, Gerloff 1975 or Coles 1969, or where additional information is presented. Radiocarbon dates calibrated using OxCal v3.8 (Bronk Ramsey 2002, with atmospheric data from Stuiver et al 1998)

Dagger graves (nos 1–30) and possible dagger (or knife-dagger) graves (nos 31–44)

No	Findspot, NGR	Henshall (H) /Gerloff (G) no, Coles (C) page ref	Dagger type (Gerloff)	Burial mode	Associations	Date BP and cal BC, 1σ (bold), 2σ	References; comments
1	Craigscorry, Highland NH 503 452	H12; G133; C90	Armoric-British B (Cressingham)	Partly-burnt skel, rock-cut grave	Burnt flint barbed-and-tanged arrowhead & knife	AA-29064: scabbard 3385 ± 45 BP <b>1740–1610 (68.2%)</b> 1870–1840 (2.1%) 1780–1520 (93.3%) (date considered to be too late)	Cressey & Sheridan in press
2	Bught Park, Inverness, Highland NH 656 437	H11; G75; C90	Masterton	Inh; male c 50; cist			
3	Seafield West, Inverness, Highland NH 695 458		Butterwick	Inh; log-coffin under small cairn inside ring-ditch	2 flint flakes (residual, so not grave goods)		
4	Bishopmill, Moray NJ c 220 635	H15; G129; C90	Armoric-British B (Cressingham)	Prob inh; cist	Ox hide		
5	Tavelty, Aberdeenshire NJ 788 172		Copper (frag)	Inh, young male (late teens/early 20s); cist	Beaker (N2/step 4); quartz barbed-and- tanged arrowhead	GU-2169: human bone 3710 ± 70 BP <b>2000–2010 (63.3%),</b> <b>2000–1970 (4.9%)</b> , 2300–1880 (95.4%)	Ralston 1996; O'Connor in press
6	Callachally (Glenforsa), Mull, Argyll & Bute NM 591 422	G14; C89	Tanged copper	Inh; cist	2 Beakers (N3/step 5 and S3 (E)/step 6); wristguard		
7	Gleigh (Moleigh), Loch Nell, Argyll & Bute NM 881 263	H4; G28; C89	Butterwick	Crem bone fragments; also lower deposit of crem remains & 3 minute burnt flint flakes; cist (disturbed) at the centre of cairn			RCAHMS 1975 <i>Argyll</i> Vol 2, no. 57; Ritchie 1968
8	Drumlanrick, Callander, Perth & Kinross NN c 549 064	H16; G73; C90	Masterton	Cist; no further details	No info		



Dagger graves (nos 1–30) and possible dagger (or knife-dagger) graves (nos 31–44)							
No	Findspot, NGR	Henshall (H) /Gerloff (G) no. Coles (C) page ref	Dagger type (Gerloff)	Burial mode	Associations	Date BP and cal BC, 1 $\sigma$ (bold), 2 $\sigma$	References; comments
9	Doune Rd, Keir, Perth & Kinross NN 778 015.	G49; C90	Merthyr Maavr	Inh; in one of four cists found in a gravel mound			Thomson 1971
10,11	Gilchorm, Angus NO 650 483	H2; G130, 131; C89	Armorico-British B (Cressingham)	Disturbed; prob inh in cist, central, primary, under cairn	Fragments of a second Armorico-British B (Cressingham) dagger (Henshall's 'small blade')		
12	Mains of Craichie, Dunnichen, Angus NO 504 473	G85	Masterton	Prob inh; cist	Handled bowl with Beaker-style decoration		
13	Camus's (Comuston) Cross, Angus NO 520 379			Inh, prob cist in/under tumulus	Food Vessel		Jervise 1857, 447 Just gold pommel mount
14	Hill of West Mains, Auchterhouse, Angus NO 315 376	H3; G100; C89	Ridgeway (var. Auchterhouse-Barrasford)	Found with partly burnt bones in 2-compartment cist under large cairn; other compartment contained more fully cremated bones		GrA-19990: crem human bone 3610 $\pm$ 50 BP <b>2030–1880 (68.2%)</b> 2410–1870 (89.8%), 1850–1810 (3.6%) 1800–1770 (2.0%)	Date hitherto unpublished
15	Cairn Greg, Linlathen, Angus NO 466 337	H1; G74; C89	Masterton	Prob inh; cist, central, under cairn	Beaker/Food Vessel hybrid (S4/step 7)		
16	Gask Hill, Collessie, Fife NO 288 131	H8; G84; C90	Masterton (with gold pommel-mount)	Crem; prob final burial under large kerbed cairn		i) OxA-4510: scabbard 3690 $\pm$ 80 BP <b>2200–2160 (9.3%)</b> <b>2150–1950 (58.9%)</b> 2350–1750 ii) GrA-19054 crem human bone 3695 $\pm$ 45 BP <b>2150–2020 (62.8%)</b> <b>2000–1980 (5.4%)</b> 2210–1940 (95.4%)	Sheridan et al 1995; Sheridan 2001

Dagger graves (nos 1–30) and possible dagger (or knife-dagger) graves (nos 31–44)							
No	Findspot, NGR	Henshall (H) /Gerloff (G) no, Coles (C) page ref	Dagger type (Gerloff)	Burial mode	Associations	Date BP and cal BC, 1σ (bold), 2σ	References; comments
17	Rameldry Farm, Fife NO 332 063		Milston (var. East Kennet)	Inh, male 40–50; cist	6 V-perforated buttons of jet & lizardite	<b>2200–2160 (18.2%)</b> <b>2150–2110 (14.9%)</b> <b>2100–2030 (35.1%)</b> 2280–2250 (3.4%) 2230–2220 (1.0%) 2000–1970 (2.9%)	This paper
18	Ashgrove, Methilhill, Fife NT 352 999	H7; G27; C90	Butterwick	Inh male, c 55; cist	Beaker/Food Vessel hybrid (S4/ step 7), formerly containing mead or ale; plant material covering body	Q-764; mixed vegetable matter 2950 ± 150 BP 1380–1330 (5.9%) <b>1320–970 (62.3%)</b> <b>1500–800 (95.4%)</b> (Note: a reject date)	Dickson 1978; Kinnes et al 1991, 55
19	Masterton, Fife NT 121 845	H10; G70; C90	Masterton	Inh, likely to have been of male & female; large cist	Ox-hide; [with presumed female:] jet and cancell coal necklace, pair bronze armlets; small blade		
20	Carrick Drive, Dalgety Bay, Fife (cist 2) NT 154 834		Masterton	Inh, adult male, 30s; cist	Animal bone; one cist stone has cup- and-ring mark		Proudfoot 1997
21	Law of Maudslie, Carluke, South Lanarkshire NS 821 514	H14; G97; C90	Ridgeway	Inh; cist			
22	Blackwaterfoot, Arran, North Ayrshire NR 898 281	H5; G227; C90	Arreton Series (with gold pommel- mount)	Disturbed cist under once-massive cairn			
23	Campbeltown Gasworks, Argyll & Bute NR 716 208	H no no, p 192; G198; C90	Camerton	Crem; said to have been found in a 'crock' (cinerary urn?) within probable cist cemetery	Cinerary urn? (lost)		
24	Dunragit, Glenluce, Dumfries & Galloway NX 152 573	H17; G71; C91	Masterton	Crem; presumably wrecked cist			

Dagger graves (nos 1–30) and possible dagger (or knife-dagger) graves (nos 31–44)							
No	Findspot, NGR	Henshall (H) /Gerloff (G) no, Coles (C) page ref	Dagger type (Gerloff)	Burial mode	Associations	Date BP and cal BC, 1σ (bold), 2σ	References; comments
25	Carlochan Cairn, Crossmichael, Dumfries & Galloway NX 757 675	H13, G72; C90	Masterton	Presumably inh; cist, central, under massive cairn			
26	Skateraw, Dunbar, East Lothian NT 733 751	H6; G83; C90	Masterton (with gold pommel- mount) Ridgeway	Inh; cist (prob central), under massive cairn Inh; cist			
27	Nr Cheswick, Northumberland NU c 03-46	G96	Ridgeway	Inh; cist			
28	North Charlton, Northumberland NU 16 22	G82	Masterton	Inh; cist under cairn			
29	Riverhill Farm, Barrasford, Northumberland NY 91 73	G101	Ridgeway (var. Aughterhouse- Barrasford) Masterton	Inh; cist under barrow Inh; cist			Newman & Miket 1973
30	Allerwash, Northumberland NY 871 673			Inh; cist			Anderson 1868, 502. Note: not in British Museum, as Anderson stated (Needham pers comm)
31	Loch of Yarrows (east side), Highland c ND 312 434	C90		Inh; cist under cairn			NMRS no NC70SW 12 <i>New Statistical Account</i> 1845, Vol 14, <i>Inverness-shire</i> , 291
32	Dalmore, Highland NC 714 031			Cist; no further details			
33	Snizort, Skye, Highland NG 42 56			Prob inh; cist in/ under cairn	?Beaker; ?awl		
34	Salen (Free Church site), Mull, C90 Argyll & Bute NM 571 432		Arsenical copper, 2 sm frags	Prob inh; cist	Beaker (AOC/ step 1–2); flint scraper		Duns 1883, 84–5; Clarke 1970, 63; RCAHMS 1980 <i>Argyll</i> Volume 3, no 80; Ritchie & Shepherd 1973, 23. Fragments look more likely to be from a dagger than from basket-shaped hair ornament (as Clarke had suggested)

Dagger graves (nos 1–30) and possible dagger (or knife-dagger) graves (nos 31–44)							
No	Findspot, NGR	Henshall (H) /Gerloff (G) no, Coles (C) page ref	Dagger type (Gerloff)	Burial mode	Associations	Date BP and cal BC, 1σ (bold), 2σ	References; comments
35	Barnhill, Broughty Ferry, Angus NO 482 318	C89		Prob inh; cist	Unknown		NMRS record no NO43SE 28 states on loan to Dundee Museum; but this is not the case (Zealand pers comm) Laing 1871, 7
36	Cairnie Hill, Abdie, Fife NO 279 155			Inh; prob cist, under barrow			
37	Walton Hill, Cupar, Fife NO 362 104			Inh; cist			NMRS no NO31SE 37
38	Clatto Hill ( Knock of Clathe), Fife NO 355 065			Inh; cist	'Several trinkets'		<i>Old Statistical Account</i> , 1791–9, vol 1, 381
39	Tulliallen Estate, Fife NS 948 870			Inh; cist in sandy knoll	Flint object		NMRS no NS98NW 10
40	Balbie, Burntisland NT 228 880			Inh; cist under cairn			Wilson 1863, Vol 1, 132
41	Dalachy, Aberdour, Fife NT 204 861			Inh; cist, central under cairn	'Piece of clear substance like amber'		<i>Old Statistical Account</i> , 1791–9, vol 4, 334
42	Newbridge, Huly Hill (Old Liston), Midlothian NT 123 726	C90		'Small fragments of bones' and charcoal; in/under barrow, reportedly not in a cist			NMRS no NT17SW 8
43	Annathill, Glenboig, North Lanarkshire NS 724 705	C90		Unclear; from cemetery with 14 burial deposits; several Food Vessels, cinerary urn, 'jet' disc-bead necklace & several flint knives or scrapers found, but not known what (if anything) was found with the 'three-riveted dagger in an ox-hide sheath'			RCAHMS 1978 <i>Lanarkshire</i> 69–70, no 122

Dagger graves (nos 1–30) and possible dagger (or knife-dagger) graves (nos 31–44)							
No	Findspot, NGR	Henshall (H) /Gerloff (G) no, Coles (C) page ref	Dagger type (Gerloff)	Burial mode	Associations	Date BP and cal BC, 1σ (bold), 2σ	References; comments
44	Edrington Mains, Scottish Borders NT 952 546			Inh; cist			RCAHMS 1980 <i>Berwickshire</i> 17, no 110
Definite knife-dagger graves							
No	Findspot	Henshall (H) /Gerloff (G) no, Coles (C) page ref	Burial mode	Associations	Date BP and cal BC, 1σ (bold), 2σ	References; comments	
1	Gilchorn, Angus NO 650 483	G306	Crem in urn under cairn, secondary	Collared urn	GrA-18693: crem human bone 3370 ± 60 BP <b>1740–1600 (57.9%)</b> <b>1570–1530 (10.3%)</b> 1880–1840 (3.4%) 1780–1510 (92.0%) OxA-11025: human bone 3607 ± 39 BP <b>2030–1910 (64.4%)</b> <b>1900–1890 (3.8%)</b> 2130–2080 (5.5%) 2040–1870 (87.8%) 1840–1820 (2.1%)	Longworth 1984, no. 1994; Sheridan 2001. Note: Jockenhövel (1980, no. 2) describes this item as a razor	
2	Barnhill, Broughty Ferry, Angus NO 482 318	G285; C89	Inh; cist	2 sheet gold discs		Sheridan 2002	
3	Letham Quarry, Tibbermuir, Perth & Kinross NO 084 238	G291; C90	Inh; cist				The bone pins, bone toggle & boar's tusk that Callander (1923) claimed were found in this cist were not mentioned in the original reports and seem to be from a separate burial associated with cremated remains
4	Gairneybank, Perth & Kinross (cist 1) NT 127 988		Inh, adult, sex indet; cist	Unusual small bowl with Food Vessel-type decoration	GU-1118: human bone 3470 ± 110 BP (adjusted from ± 80; see Historic Scotland datelist) <b>1940–1630 (68.2%)</b> 2150–1500 (95.4%)	Cowie & Ritchie 1991	
5	Kirkcaldy, Fife (cist 2) NT 272 916	H9; G296; C90	Inh, male c 50; cist	Leaves of sweet woodruff (a fragrant plant)			

Definite knife-dagger graves								
No	Findspot	Henshall (H) /Gerloff (G) no, Coles (C) page ref	Burial mode	Associations	Date BP and cal BC, 1σ (bold), 2σ	References; comments		
6	Barns Farm, Dalgety Bay, Fife (grave 3) NT 178 842		Prob inh, & crem bone deposit, organic coffin (?coracle), under barrow. Artefacts prob outside coffin, in grave pit	Flint plano-convex knife & slug knife		Watkins 1982		
7	Eweford Cottages, East Lothian NT 665 776		Crem in urn, secondary to early Neolithic non- megalithic funerary site	Collared urn		Ashmore 2002		
8	Low Blochairn, Baldernock, East Dunbartonshire NS 585 753	G342	Found in one of three urns discovered in a natural mound	'Urn' (now lost)				
9	Knappers, Kilbowie, West Dunbartonshire NS 507 713	G287; C90	Prob inh; grave or cist, unrecognised as such by excavator			Ritchie & Adamson 1981, 174, 192		
10	Kilmaho, Argyll & Bute NR 679 242	G288; C89	Inh; grave	Food Vessel, two flint knives or scrapers; bronze awl				
11	Mid Torris (Knockencrunge), Glenluce, Dumfries & Galloway NX 143 554	G290	Crem in urn	Collared urn, perforated whetstone		Morrison 1968, no 77		
12	Mid Torris, Glenluce NX 133 557	C91	Prob from crem in urn	'Fragments of urns' found nearby				
13	Humbleton, Northumberland NT 97 28	G295	Inh; cist					
14	West Lilburn, Northumberland NU c 03 23	G240	Inh; cist	Beaker (N2/step 4), V-perforated jet/jet- like button, flint flake, piece of chalk				
15	Amble, Northumberland NU 26 04	G 260	Inh; cist under cairn	Food Vessel, small piece of flint				

Definite knife-dagger graves						
No	Findspot	Henshall (H) /Gerloff (G) no, Coles (C) page ref	Burial mode	Associations	Date BP and cal BC, 1σ (bold), 2σ	References; comments
16	Beech Hill House (cist 1), Perth & Kinross NO 220 404		Crem (one of two deposits) in cist beside kerbed cairn. Sub-adult, indet sex	Burnt bone toggle, burnt ?agate pebble, 11 pieces burnt flint & other stone	GrA-19426: crem human bone 3665 ± 45 BP <b>2140–2070 (28.4%)</b> <b>2060–1960 (39.8%)</b> 2200–2160 (3.4%) 2150–1910 (92.0%)	Stevenson 1995; Sheridan 2002b. Item represented by burnt bone fragment & bronze staining on bones of sub-adult