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Redcastle, Lunan Bay, Angus: the excavation of an Iron Age timber-lined souterrain and a Pictish barrow cemetery

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ABSTRACT

Cropmarks of a cemetery, containing square- and round-ditched burials, were excavated at Redcastle in 1997 and 1998. A total of 16 graves was recorded: five in square barrows, two in round barrows and nine unenclosed graves. Another round barrow is clearly visible on the aerial photograph outside the excavation area. Preservation of the graves and the human remains therein varied considerably. Analysis of the bones identified two females, three possible females and one possible male. Radiocarbon dating showed that the burials dated from the third–eighth centuries AD. *There was no readily apparent connection between gender or age and the use of square or round ditches to enclose the graves. Some evidence was recovered for Neolithic activity in the area while the remains of a timber-lined souterrrain were also excavated. The fill of the souterrain contained a range of artefacts including native and Roman pottery, Roman glass and iron tools. Detailed palaeoenvironmental studies were undertaken of the basal deposits in an attempt to clarify the use of the souterrain. Radiocarbon dates indicate that it was in use prior to and during the first–fourth centuries* AD.

INTRODUCTION

This report presents the results of two seasons of excavation on a cropmark at Redcastle, Lunan Bay, Angus (NGR: NO 6878 5085; NMRS no: NO65SE 18; illus 1). The work was carried out in September 1997 and 1998 as part of the University of Edinburgh's Angus and South Aberdeenshire Field School.

The main aims of the Field School were to investigate a variety of cropmark sites, to examine their nature, extent and date, and to assess the amount of damage to these features by ploughing (Finlayson et al 1999). Lunan Valley is extremely rich in cropmark sites and Historic Scotland has undertaken one of its largest cropmark scheduling programmes in the area. The site at Redcastle was chosen for investigation as it was subject to ongoing erosion by regular ploughing. Throughout the report the spelling of the site name is taken from the farm to the south as marked on the Ordnance

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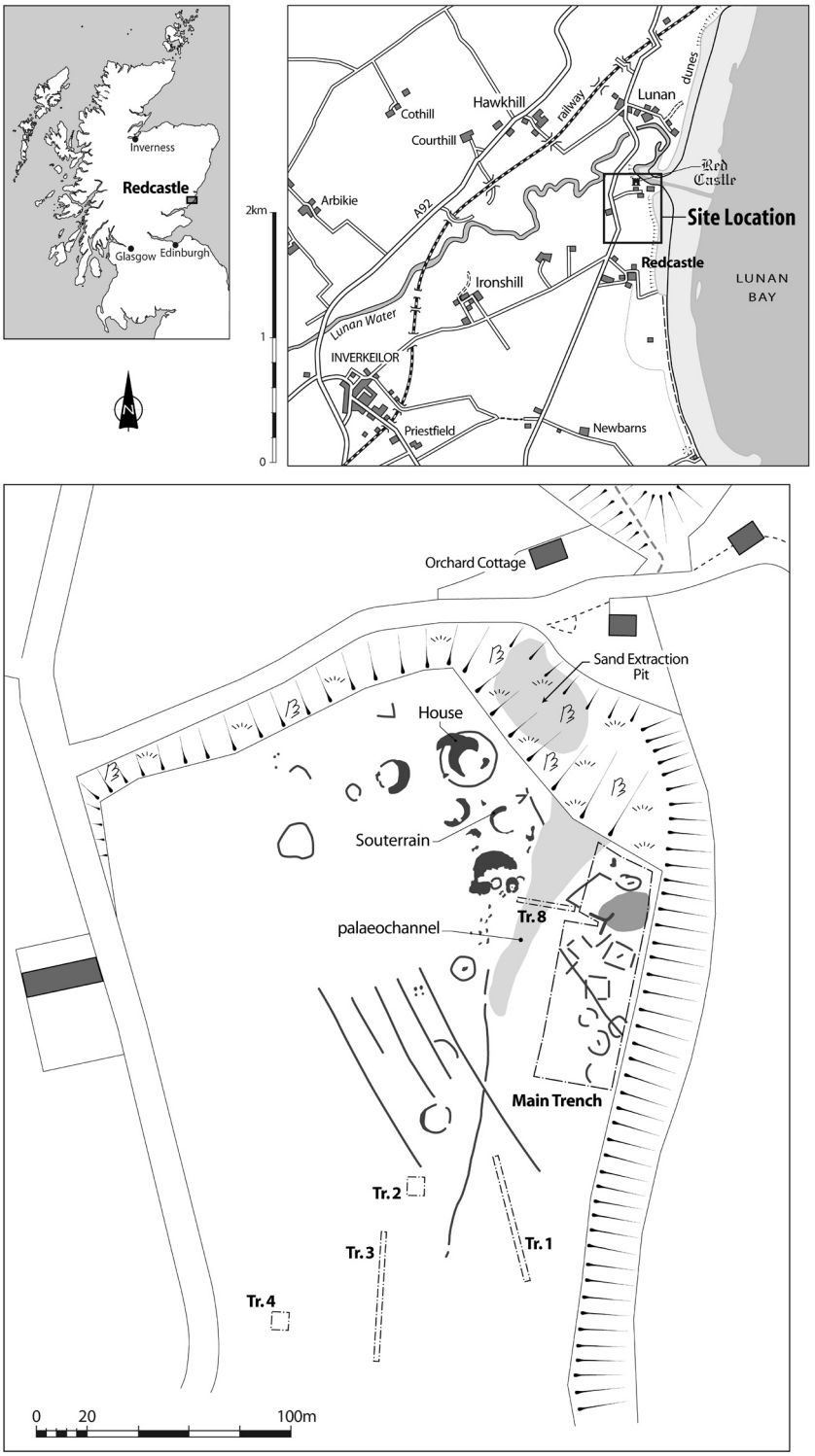


ILLUS 1 Location map showing aerial photographic features

Survey maps, 'Redcastle', and differs from the name of the medieval castle, 'Red Castle'.

The cropmark site at Redcastle is located immediately above the steep beach cliff to the south of the ruins of the 13th-century Red Castle (illus 1). These cropmarks consist of a series of features including square- and round-ditched barrows, curved features (possibly ring-ditches or souterrains) and a possible roundhouse site (illus 1 & 2). The subsoil consists of sands and gravels and the surface of the field suffers from wind blow when bare soil is exposed after ploughing, so it is possible that continued cultivation over the site has been gradually eroding the features (Dunwell & Ralston 2004). A relict stream channel extends through the middle of the site from north-east to south-west.

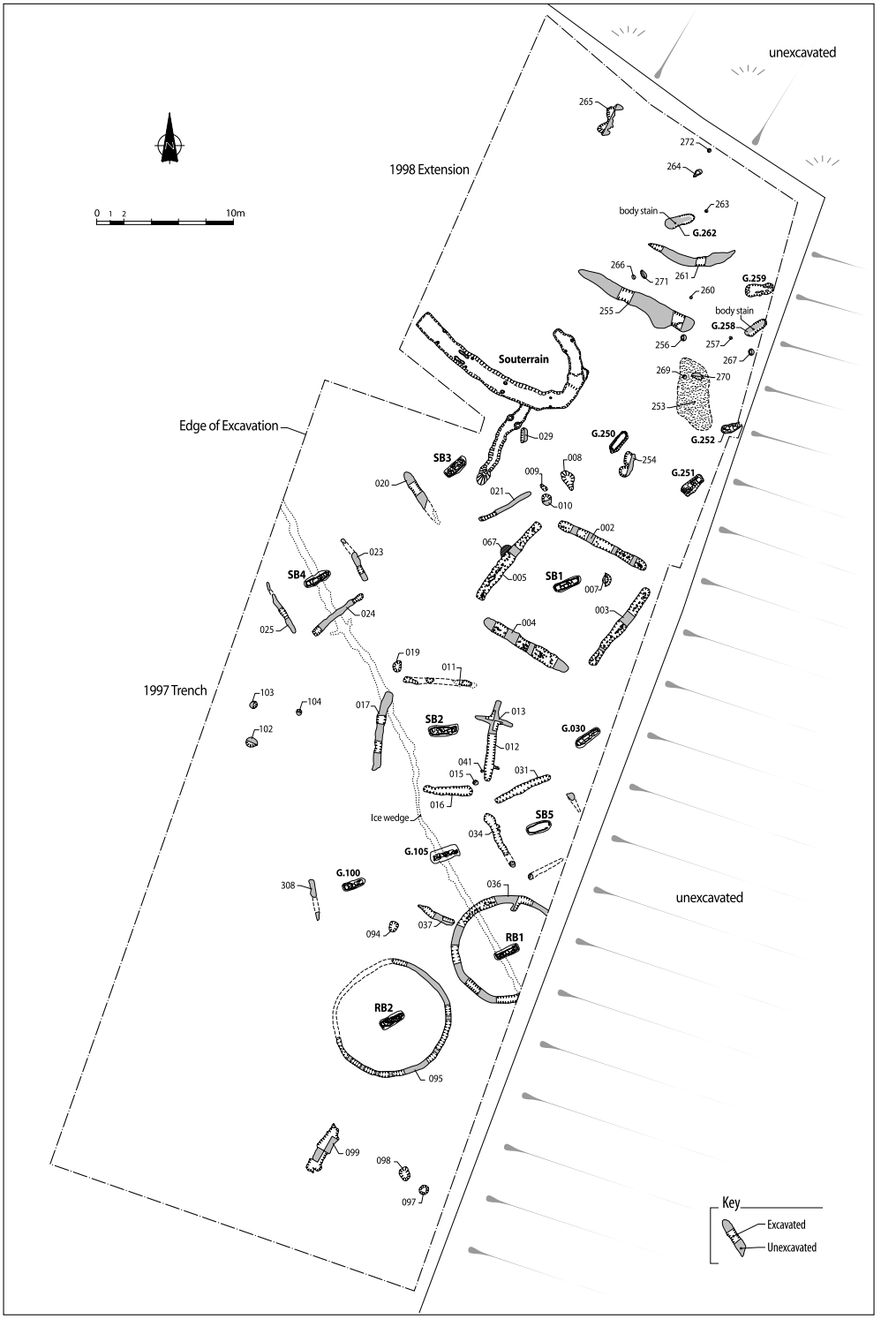
ARCHAEOLOGICAL BACKGROUND & METHOD

Although the number of known square barrow sites in Scotland has increased, mainly through aerial photography, few have been excavated and their date is still a matter of debate. Excavation of the site at Boysack Mills, 6.5km to the west of Redcastle, uncovered one complete square barrow and the remains of another (Murray & Ralston 1998). The central burial at Boysack contained an iron ring-headed pin which suggested a date in the first–second centuries AD (ibid, 379). However, there were clear differences between the square barrow at Boysack and the cropmarks visible at Redcastle, the most notable difference being that at Boysack the ditch was continuous whereas those at Redcastle have breaks at the corners. The upstanding remains of a square-ditched barrow at Garbeg, Inverness-shire, also had breaks at the corners (Wedderburn & Grime 1984) and the recovery of a Pictish symbol stone from an adjacent round cairn at that site has led to comparisons of square barrows with Early Historic 'platform cairns' (Close-Brooks 1984). Generally it has been thought that square barrows like those at Redcastle date from the Early Historic period.

The site at Redcastle, therefore, presented the opportunity not only to recover dating evidence from a barrow cemetery but also to determine the degree of erosion caused by ploughing and wind blow. In addition this site offered the possibility of locating early prehistoric sites by fieldwalking and excavation along the raised beach/cliff line.

All excavation work at Redcastle was undertaken by first year undergraduate students from the University of Edinburgh under professional supervision. The excavation was undertaken in two seasons. In 1997, a large trench measuring approximately 60m long by 30m wide was opened over the main part of the

ILLUS 2 Aerial photograph of Redcastle cropmarks (© *Crown copyright RCAHMS*)



ILLUS 3 Plan of excavated area

cemetery. In the following year, a further area to the north was excavated. In addition, seven trial trenches were excavated in the southern part of the field (illus 1, Tr 1–4; Tr 5–7 were located further south and are not shown), to investigate whether negative features not apparent on the aerial photographs were located in this area. No major concentrations of archaeological features were recovered by this trial trenching and the archaeological remains, as the aerial photographs indicated, were focused in the northern end of the field. A further trench (illus 1, Tr 8) was excavated across a palaeochannel.

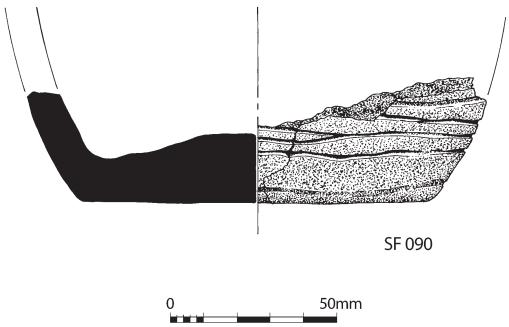
Three main phases of activity were identified, the most recent being the cemetery itself, which had been preceded by an Iron Age timber-lined souterrain. Earliest of all, however, was a scatter of Neolithic pits.

NEOLITHIC ACTIVITY

NEOLITHIC PITS

Prehistoric activity at Redcastle was attested by a number of pits which included Neolithic artefacts. Two pits (015 and 041, illus 3) close to the south-east corner of Square Barrow 2 (SB2) contained sherds of Grooved Ware pottery. The very shallow remains of Pit 041, adjacent to the end of the eastern ditch of SB2, held the base of a Grooved Ware vessel (illus 4, SF 090; P3) along with a number of sherds and fragments. A number of sherds from this vessel were also recovered from the lower fill of the ditch of SB2, indicating that the vessel may have been disturbed by the construction of the ditch. Another two sherds, one decorated with criss-crossing diagonal grooves, were recovered from Pit 015 and appear to belong to the same vessel as those above. Both pits also included charcoal fragments in their fills. At the southern end of the excavation area, another two pits (097 and 098) also contained Neolithic artefacts. Pit 097 contained a sherd of pottery, decorated with incised parallel lines (P2), along with five flints and charcoal. Pit 098 contained a sherd of pottery (P1) decorated with irregular impressions, a fragment of burnt bone, charcoal and a fragment of carbonized hazelnut shell.

A number of other pits may belong to this period of activity, but without diagnostic pottery sherds present such an attribution remains impossible. Neolithic pits are a very common find on cropmark sites and their discovery at Redcastle is unsurprising, especially given the excellent location close to a river mouth and above a beach. These finds of Grooved Ware are an important addition to the small but growing corpus of sites with Late Neolithic pottery in this part of Scotland. Recent excavation of the souterrain site at Auchlishie, near Kirrriemuir, has also located pits containing Grooved Ware, and radiocarbon dates of 2460–2290 cal BC (AA-45406) and 2400–2140 cal BC (AA-45407) were obtained (raw data in Dick 2001; calibrated using OxCal v3.10).



ILLUS 4 Neolithic pottery: SF 090, Grooved Ware base

A small collection of flint material was recovered from a number of contexts across the site. In general, these appear to be isolated finds and could have been redeposited. The only diagnostic artefact, however, was a lozenge-shaped flint arrowhead (illus 5, SF 001) which was recovered from the top fill of irregularly-shaped Pit 265 at the extreme northern end of the excavation.

NEOLITHIC POTTERY

Ann MacSween

Sherds from three vessels are represented in the assemblage. In each case the fabric is fine clay with up to 50% of angular rock fragments. All three vessels were decorated. One of the vessels is decorated with ovoid impressions, apparently random (P1). The second vessel is represented by a sherd with lightly incised parallel lines (P2). The decoration on the third vessel (P3, illus 4, SF 090) is also incised – there is a band of three horizontal lines around the vessel just below the lip on the exterior and further incised decoration, some lozenge-based, extending to the base.

Too little remains of the first two vessels to ascribe them to a tradition, but the third vessel is Neolithic

Grooved Ware. The use of incised parallel lines below the rim, in particular, is common in Grooved Ware assemblages. A similar combination – incised horizontal lines with incised lozenges below – was noted on a vessel from Balfarg Henge (Henshall 1993, illus 31, P64). Dates for this material in Scotland span about a millennium from *c* 3200 BC.

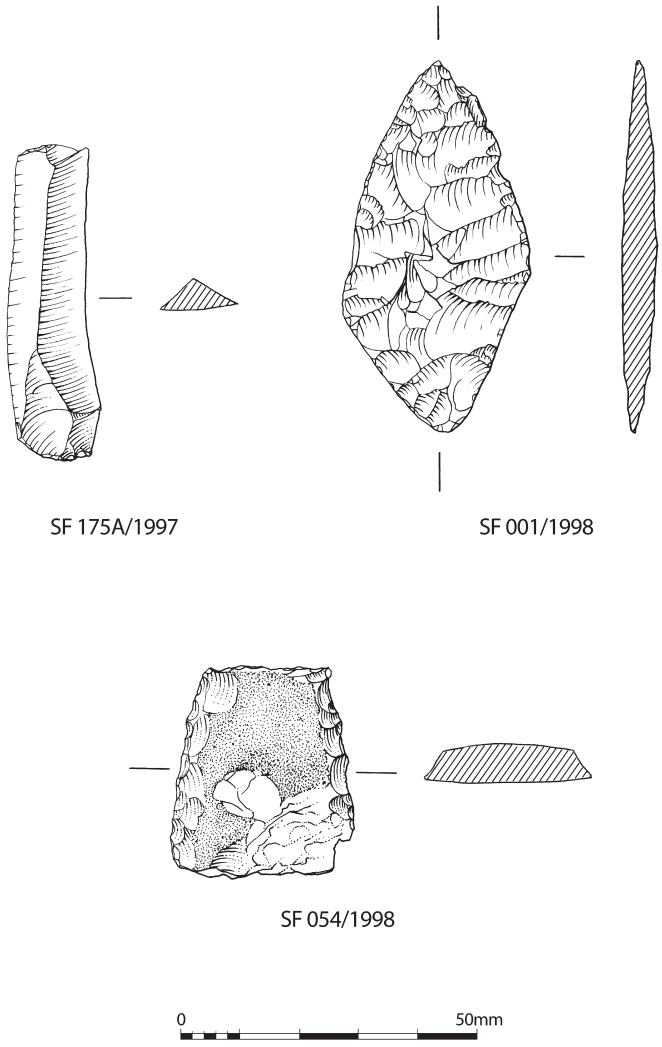
CHIPPED STONE

Graeme Warren

A total of 42 chipped stone artefacts was recovered from excavations at Redcastle. These items were analysed macroscopically, classified according to standard descriptive procedures (Wickham-Jones 1990, 58; Finlayson et al 1996) and recorded in a database constructed in Access97; a catalogue and detailed report are deposited in the site archive.

In general, the assemblage, especially the flint component, is quite homogenous, based upon the production of fine narrow flakes and broad blades. It appears to be Neolithic in date.

The artefacts were found in a range of contexts comprising ditch, souterrain, pit and grave fills. The concentration of seven lithics in Pit 097, containing decorated pottery (P2), is notable. This pit also contained a very small chip of agate and a burnt fragment of flint, neither of which were catalogued due to their small size and the impossibility of definitely ascertaining their character. Most of the artefacts are in exceptionally good condition, especially those within primary fills of pits or the souterrain, but five rather more abraded pieces were all recovered from ditch or grave fills. Five artefacts are burnt, these were found in souterrain and grave fills, as well as in Pit 097. Nine artefacts were edge-damaged, some apparently in use, and 17 definitely broken (five were possibly broken). The high number of breaks may reflect the fragile character of the flakes and blades produced.



ILLUS 5 Chipped stone artefacts

Most of the artefacts are flint, although a significant number of agate and quartz items are present (Table 1). The flint is generally of quite high quality, grey or brown-grey in colour, and some flakes are quite large. Very few pieces are cortical (seven pieces, 22.6%) but, where present, the cortex is congruent with a pebble source for this material, although the flint is of very good quality for such a source. The agate artefacts are generally crude chunks or bashed lumps. Agate is abundant locally and often forms a small part of assemblages, usually in the form of crude flakes and chunks. All of the quartz artefacts are platform flakes or blades, evidently the product of

Table 1
Chipped stone raw materials

Raw material	*No*	*%*
Flint	31	73.8
Agate	6	14.3
Quartz	4	9.5
Quartzite	1	2.4
Total	42	100

structured knapping processes rather than expedient techniques.

Flakes, both regular and irregular, dominate the assemblage, and formal blades make up quite a significant proportion (Table 2). Four artefacts are clearly retouched and one fine flint blade may have very faint blunting across the distal, although edge damage obscures this. The piece is possibly an end scraper, although it would be rather lightweight (illus 5, SF 175A/1997). A small fragment of a morphologically non-distinctive edge-retouched flint flake was recovered from Pit 097 in conjunction with six other artefacts. The other edge-retouched artefact is a non-diagnostic, grey, tertiary flake.

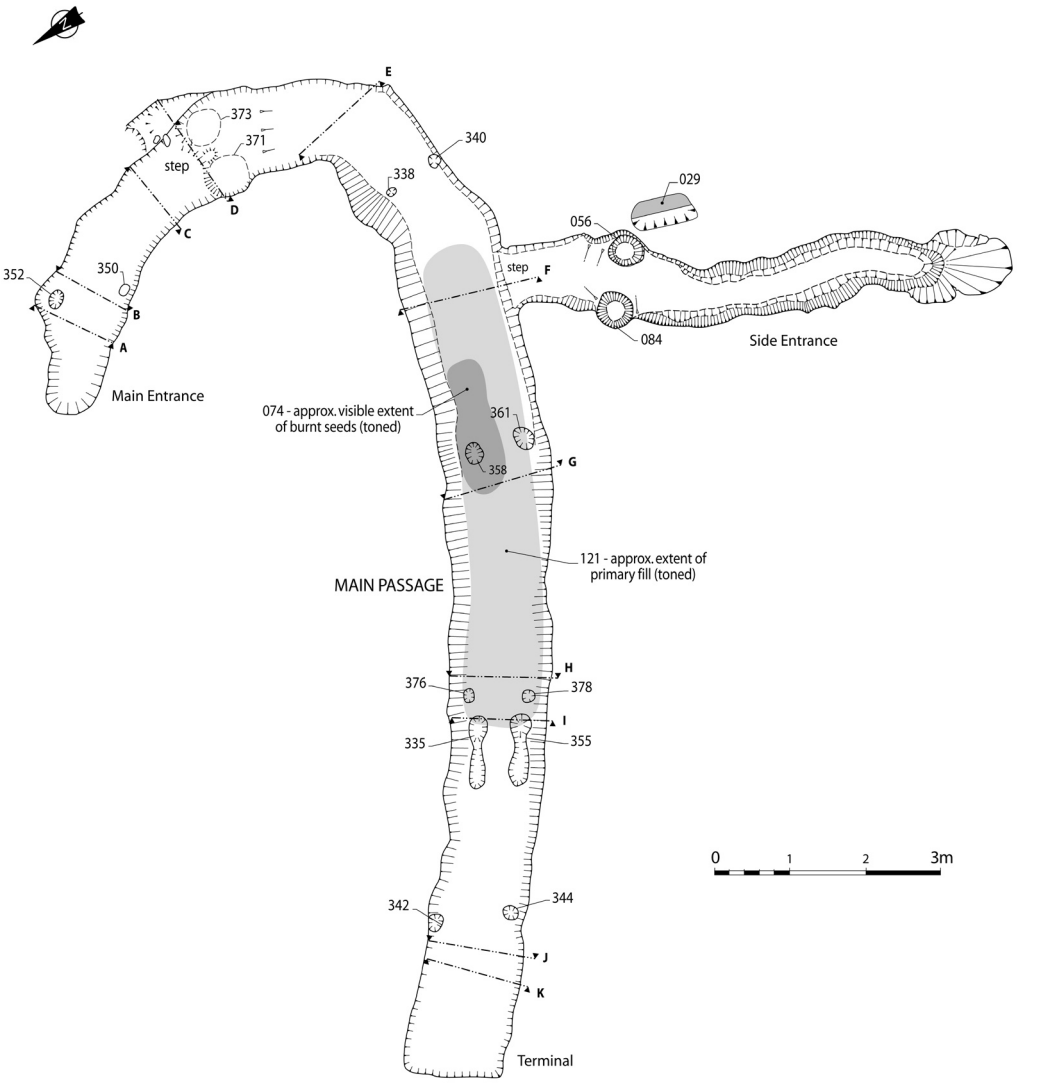
The finest retouched artefact is a kite-shaped arrowhead found in the fills of an irregular pit and split in two by a modern break (illus 5, SF 001/1998). The artefact closely approximates to Green's type 2Ca (Green 1980), although damage to the tip and left-hand shoulder, as well as the slightly convex character of all the sides, makes formal comparisons difficult. The arrowhead is 42 × 21 × 4mm and weighs 3.2g. It is manufactured from a dull, honey-coloured flint and is slightly abraded. The bifacial retouch is extensive and delicate; in places the controlled character is clearly demonstrated by parallel removals.

Kite (or 'lozenge') shaped arrowheads are quite a rare form of leaf-shaped arrowheads, often medium to large in size, and found most frequently in Northern Britain (Green 1980, 75, fig 35). Green argues that distinctive large kite-shaped arrowheads were deliberately incorporated into burial contexts and draws attention to the significance of their broad associations with earthern long barrow traditions, common in eastern Scotland, as opposed to megalithic traditions (ibid, 85–6). He also highlights Piggott's observations that kite-shaped arrowheads are associated with the later Neolithic 'Duggleby phase' in Yorkshire, which is also characterized by plano-convex knives and Rinyo–Clacton (now Grooved Ware) pottery. Edmonds (1995, 46) comments on the associations of lozenge arrowheads with early Neolithic burials and argues that these artefacts were closely associated with masculinity. He also highlights the use of these artefacts in the later Neolithic, arguing that the increased elaboration and controlled flaking of arrowheads is connected to their use as statements of identity (ibid, 99–101).

A medial fragment of a burnt edge-retouched knife, recovered from upper souterrain fills, is another interesting formal tool (illus 5, SF 054/1998). This is a fine large secondary blade of flint with cortex covering the dorsal ridge. Unifacial retouch has been applied to both edges of the dorsal surface. On one side this is a neat, regular retouch forming an acute angle; on the other, a slightly more irregular, steeper retouch forms a crudely 'serrated' edge. The ventral surface has not been modified. The artefact has been badly burnt and appears to have broken during this process. Because

Table 2
Composition of the chipped stone assemblage

Type	*Agate*	*Flint*	*Quartz*	*Quartzite*	*Total*	*%*
Bashed lump	1				1	2.4
Bipolar core		1			1	2.4
Blade		4	1		5	11.9
Chunk	3	4			7	16.7
Flake (irregular)	2	10	2	1	15	35.7
Flake (regular)		12	1		13	31.0
Total	6	31	4	1	42	



ILLUS 6 Plan of souterrain showing sections and main features

it is incomplete it is difficult formally to assess the affinities of this artefact but it may have associations with plano-convex knives.

EXCAVATION OF THE SOUTERRAIN

A long curvilinear shallow gully, which led into a deeper ditch, was excavated in 1997 at the then northern limit of the excavation area. These features were interpreted as the side entrance leading into the main passage of a timber-lined souterrain. This souterrain was completely excavated in 1998 (illus 3). With hindsight it is possible to see the main passage and side entrance to the souterrain on the aerial photograph (illus 2).

As with most Angus souterrains (Wainwright 1963), the Redcastle example was tightly curved in plan. The description of the souterrain can be broken down into three parts: the 'axial' or main entrance in the north-west, the main passage and the side entrance (illus 6 & 7).

MAIN ENTRANCE

ILLUS 7 Photograph of souterrain fully excavated

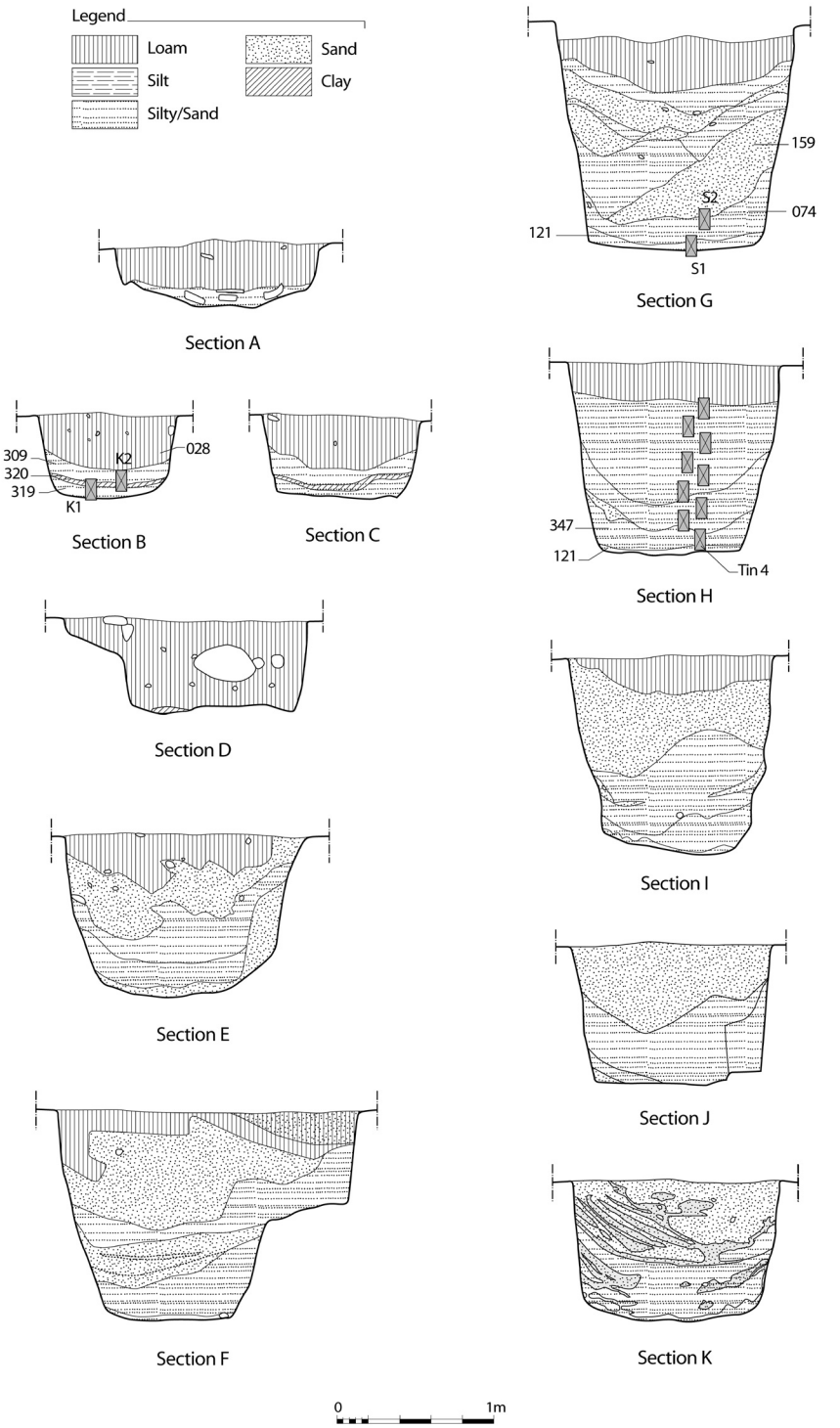
At the main entrance to the souterrain the floor slopes down relatively gently to a depth of about 0.4m and then continues on at about 0.55m deep to around 3.5–4m from the entrance where there is a pronounced 0.4m-high step down in the base. The area from the entrance to the step was filled with a clear sequence of deposits (illus 8, Sections A–D). The upper fill (028) was a medium-brown silty sand containing varying amounts of charcoal flecks and was *c* 0.35m deep. Just inside the entrance this upper fill was noted to contain a number of large stones which appear to have tumbled in and do not represent the remains of collapsed walling. Below this upper fill were dark brown silty sand layers (eg context 309) containing more numerous charcoal flecks. From these layers and mixed in with the layer above were a range of artefacts including: sherds of a greenish-brown tubular rimmed Roman glass bowl (SF 024, 033, 041, 049 & 051); an iron handle for a bucket or cauldron (SF 021), pieces of iron (SF 036 & 042); a rim sherd of a globular everted-rimmed vessel (SF 039); and a base sherd from a Roman samian vessel (SF 028). The iron handle was found leaning against the western side of the entrance passage where it seems to have been placed rather than fallen. Below these deposits was a discontinuous layer of yellowish brown clay (320) with some patches of charcoal-rich soil. Patches of the clay extend right up to the step and may represent the remains of collapsed wattle-and-daub walling. Underneath the layer of clay there was a medium-brown silty sand (319) immediately above the clean natural sand subsoil. It is clear from the sequence of deposits and the numerous artefacts at this entrance that it was one of the most complex areas of the souterrain. Kubiena tin samples were taken from the lower deposits in this sequence (illus 8, Section B) for soil micromorphology (see Tams below).

Although the cluster of artefacts immediately inside the main entrance (SF 036, 039, 041 & 042) was in the lowest fill, those further along (SF 028, 020, 049, 021 & 051) were within the third fill, above the clay layer (320), and were clearly deposited once the souterrain had fallen into disuse. Given the similarity between the artefacts in these two clusters, both are likely to have been deposited around the same time. Thus even the lowest fill in the main entrance is most probably associated with abandonment of the souterrain rather than its initial use.

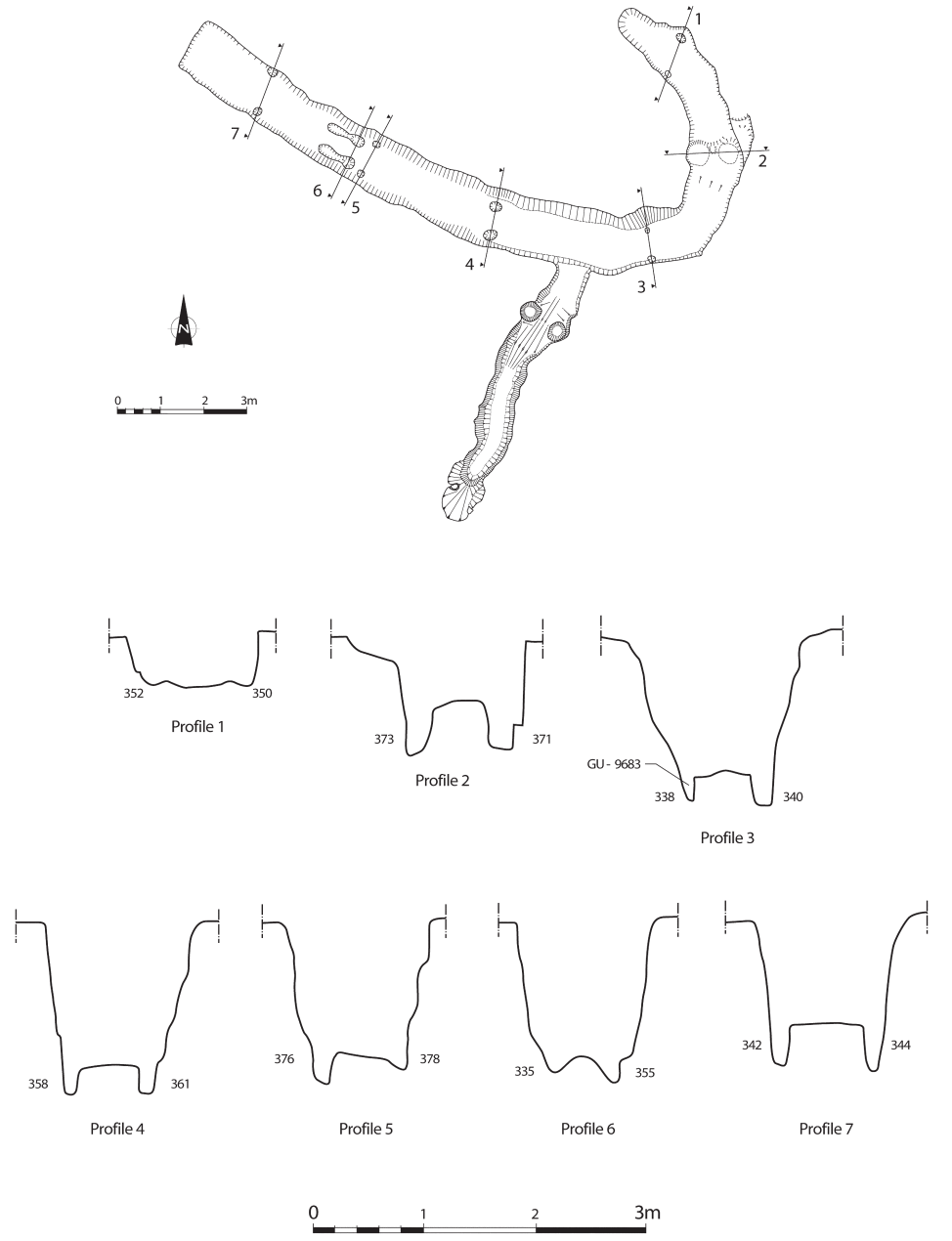
Two shallow depressions (illus 6 & 9, contexts 350 & 352) were found, *c* 0.6m and 0.7m from the entrance, cut into the subsoil and set obliquely across the entrance passage. These may represent the remains of two upright posts but were quite shallow. Further along the passage, however, where the base steps down, there were a further two post positions (illus 6 & 9, contexts 371 & 373) on either side of the passage, suggestive of a doorway. The full circumference of these post-holes was not complete; their northern sides were formed by the step in the level of the base, while the steep outer edges of the souterrain walls also provided support. The southern sides of the post-holes, however, were missing and there was a slight ridge between the two post positions. These represent the position of a door framework which was held in place not by earthfast upright posts but by being held tightly against the sides of the souterrain and the step, and possibly by being attached to other elements of a timber framework. Without the exact impressions of the posts surviving, the actual width of the door is difficult to estimate but it must have been between 0.5 and 0.6m wide.

MAIN PASSAGE

Going through this doorway and down the step, the base gradually descended and angled sharply to the south-west where it became the more gently curving



ILLUS 8 Souterrain sections



ILLUS 9 Souterrain profiles

line of the main passage (illus 6). A series of four pairs of post-holes were positioned along the main passage (illus 9). These were *c* 0.15m in diameter by up to *c* 0.4m deep and were spaced 3–3.5m apart. Surprisingly, there was no indication of a pair of post-holes cut into the corners at the western terminal of the souterrain, although there were darker stains higher up within the fill at this location. The main passage was *c* 12m long by 1.5m wide at the top and narrowed to 0.9m wide at the base. Its depth

varied from as much as 1.3m deep down to 0.9m at the west end. This reduced depth at the western end was not because the base of the souterrain sloped up but that the subsoil surface sloped down into the natural hollow of the relict stream channel to the west. It is likely that this end of the souterrain and the surrounding subsoil has been more heavily truncated by ploughing on the slope. The western terminal of the souterrain is formed by a vertical face and would not have been used as an entrance.

About 3.7m east of the terminal were two parallel linear features (illus 6, contexts 335 & 355) cut into the subsoil at the foot of the side walls of the main passage. These both consisted of a deeper circular depression at the east end with a shallow channel running up from the base of these pits westwards. These features may represent former post-holes from which the posts have been removed by pulling them out to the west. Perhaps the two posts located immediately to the east replaced the ones that had been removed. Alternatively, these uprights may have been inserted while the roof was still on and used to prop it up.

The nature of the structure based on these post-holes remains a matter of debate. At the terminal of the main passage a dark linear stain was intermittently visible in plan around the edges. This was, however, discontinuous and was not readily apparent in section. It is possible that this stain represented wooden planking that had decayed in situ held against the sides by the upright posts. Alternatively, it may simply have been an interface deposit, between the fills of the souterrain and the natural subsoil, disturbed by water penetration and bioturbation. There was no evidence of the other upright posts having been pulled out and they too may have rotted in situ. These upright posts would also have supported the roof and cross braces, both at floor level and higher up. If there were cross braces at floor level, these could also have formed joists for a raised wooden floor. During the excavation, it was noticeable just how easily disturbed the sand floor was and a more durable floor, whether planking slightly raised on joists or simply laid along the base, would have prevented excessive damage by repeated use. It should be pointed out, however, that even with careful cleaning nothing which could be described as timber impressions in either the sides or the floor were recovered.

A 3m length of the main passage was excavated in 1997 (illus 6 & 8, Sections G & H) and a complex series of fills were recorded within the souterrain: the lowest (121) may represent the remains from its use based on the evidence from soil micromorphology (see Carter below) while the numerous upper layers represent at least four stages of infilling. From this basal deposit, fragments of sheet bronze (SF 227), perhaps part of an ornamental mount, were recovered.

The second lowest fill (074) of the souterrain at this point (illus 8, Section G) was a deep deposit of silty sand within which numerous carbonized cereal grains were distributed. There was a notable concentration of burnt seeds on the northern side of the main passage. These grains have been identified as barley and wheat (see Church below). The remains of an iron dagger (SF 043) with an organic handle were recovered from this fill.

From the higher infill deposits came a rim sherd of native pottery (SF 048), iron tools (SF 037 & 040) and some extremely fragmented shards of a Roman glass cylindrical cup (SF 284).

The fills of the western end of the main passage, excavated in 1998, consisted of a series of sandy fills on top of silty sands (illus 8, Sections F–K). The majority of these upper fills were sterile sands that had either collapsed from the sides of the souterrain or had blown in. Occasionally, however, artefacts were recovered from these fills, including iron objects, flint, glass, stone and pottery. The only object to be found in the lower fill (074) was a reaping hook (SF 053). Another unusual artefact from the upper fills was a pebble that had been pecked down to form a waisted centre (SF 019); this may have been used as weight or sinker. A single shard of what appears to be modern green bottle glass (SF 026) was recovered from the upper fill at the terminal and suggests that the upper fill of the souterrain only occurred recently or at least has been subject to mixing.

SIDE ENTRANCE

The side entrance, which was excavated before the rest of the souterrain in 1997, consisted of a narrow, shallow curvilinear passage leading into the deeper main passage. The curvilinear passage was *c* 6.5m long, 0.8–0.9m wide and up to 0.5m deep. About 1m from the intersection of the entrance passage with the main souterrain, two post-holes (056 & 084) marked the position of a timber doorway similar to that in the main entrance. At the end of this passage there was a *c* 0.6m step down into the main passage.

The silty sand fill of the side entrance contained lumps of clay, possibly daub, and fragments of charcoal, suggesting that the sides may have been

lined with wattle and daub. Artefacts recovered from this area include the base of a native pot (SF 206) and a sherd of Roman Greyware (SF 059).

USE, ABANDONMENT & INFILL

The fills within each of the main elements of the souterrain can be attributed to either the period when the souterrain was in use, just after it was abandoned and began to fill up, or to later periods of infilling. Only one possible deposit (121), a very thin layer of silty sand along the base of the main passage, could potentially be associated with the use (last use) of the souterrain. The deposit (074) above this may have collapsed in from the roof, may have been deliberately dumped in from nearby, or may simply be the result of disturbance during the removal of the structural timbers. This may also have been the case for the lowest deposit at the western terminal. Above this, the deposits all appear to have been mixed layers of silty sand and finer windblown sand (as identified by the soil micromorphology). These layers appear to have eroded in from the sides, suggesting that the upper part of the souterrain filled in naturally rather than being deliberately backfilled. This argument might also be supported by the sloping sides of the souterrain visible in the sections and profiles (illus 8 & 9) which are markedly off-vertical. These middle deposits probably accumulated quite rapidly as the subsoil is quite loose and would have eroded easily. The lack of organic material in these fills was noticeable and it was only towards the upper fills that the soil became more mixed. The discovery of a piece of modern green glass within the uppermost fill at the western terminal suggests that material was still being incorporated into the hollow which must have marked the location of the former souterrain until relatively recently (perhaps in the 19th century).

In the main and side entrances, there was no lowest fill that could clearly be identified and attributed to the initial use of the souterrain, but here the lowest fills appeared to contain collapsed structural remains which must relate to the abandonment of the site.

ASSOCIATED PIT

An elongated, steep-sided pit (029) was situated 2m to the south of the main souterrain and 1m east of the side entrance passage (illus 3 & 6). The pit, which was 1.05m long, 0.25m wide and 0.55m deep, contained numerous burnt and cracked stones, sherds of coarse ware pottery (eg SF 141), charcoal and two stone lamps (SF 246 & 143). The stone lamps each consist of a figure-of-eight depression cut into a triangular-shaped stone. One of the lamps is broken, but the other is complete and has four circular impressions on the underside, forming what looks like a skull or a face. The proximity of this pit to the souterrain, the presence of the stone lamps and similar coarse ware pottery, suggests that they were broadly contemporary.

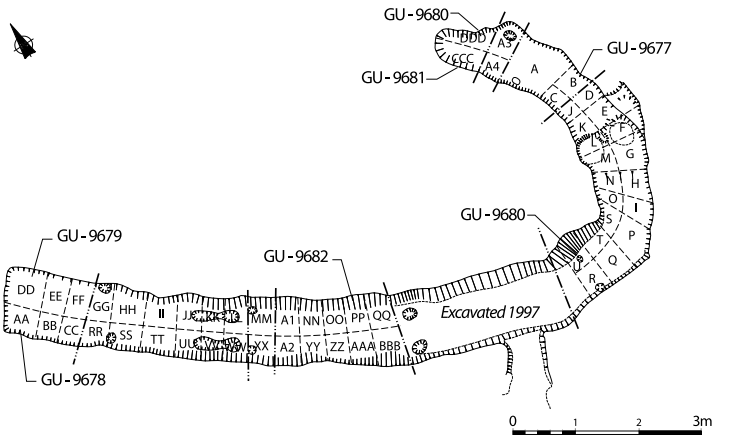
Sediments contemporary with the use of the souterrain have the potential to contain information about the type and distribution of activities in it. Direct evidence for the function of souterrains remains an elusive prize and sediments contemporary with use are worth investigating in detail. However, deliberate or natural backfills offer no potential for elucidating use, although they do have some bearing on the issue of termination of use and the nature of contemporary activities around the souterrain.

PALAEOENVIRONMENTAL SAMPLING OF THE SOUTERRAIN

SAMPLING STRATEGY

Mike Church

Past research into the souterrains of lowland Angus and Perthshire (Wainwright 1963; Barclay 1980; Watkins 1980a; 1980b; 1984; Armit 1999) has highlighted two research problems where the application of palaeoenvironmental techniques could provide valuable interpretative insight. The first involves investigating the site formation processes of the structures, specifically with regards to the question of deliberate dismantling and abandonment processes. Understanding the site formation processes directly influences our ability to answer the second research problem, which focuses on the function of the structures as a specific site class. A number of possible functions have been proposed, including animal shelters (Wainwright 1963), storage (Barclay 1980; Watkins 1980b; 1984; Armit 1999), areas for specialized activities such as metalworking or smoke-curing (Gilmour 2000) or a more ritual function (Hingley 1992), as suggested for the Cornish fogous by Cooke (1993). This section will address both of these research problems in turn through the integration of a number of palaeoenvironmental techniques applied to samples taken at Redcastle during both the 1997 and 1998 seasons.



ILLUS 10 Souterrain plan showing sample grid and location of radiocarbon samples

Evolution of the sampling strategy

The identification of the souterrain followed initial excavation of the structure along the side entrance and into the main passage. Kubiena samples (illus 8, section G) and a single bulk sample were taken from the basal layer immediately overlying the sands and gravels forming the fluvio-glacial material into which the souterrain was dug. Soil micromorphological analysis of this basal material (Carter 1998a) suggested these deposits represented a mix of topsoil with some anthropogenic material that had been dumped into the souterrain immediately after dismantling the wooden superstructure. A scan of the flot and residue from the bulk sample of this material indicated that carbonized remains, including charcoal and cereal parts, were present. A deposit (121) only a couple of centimetres thick was also identified in the thin sections at the interface between the basal infill and the underlying sands. The presence of frequent excremental pedofeatures from invertebrate activity suggested that the deposit might have represented in situ material relating to the use of the souterrain. Therefore, a detailed programme of sampling of these basal deposits was implemented in the 1998 season.

Interval samples (Jones 1991) from a 0.5sq m grid were taken from the lowest basal fill remaining after the initial trial trenching in 1997 (illus 10). Two samples were taken from each grid square; a bulk sample for flotation and a sub-sample for routine soil tests and pollen and fungal spore extraction. On excavation, only a very thin layer of context 121 could be identified and this was restricted to the central part of the souterrain (grid squares QQ through to XX, illus 10). Therefore, only small sub-samples were taken from context 121, and the basal grid used for the spatial analysis in Church & Oldham (below) relates to the lowest sampled deposit in each square. Further column samples were also taken (illus 8), including two tins from Section B to characterize basal lenses of burnt material and possible daub and a further tin from the base of Section H to assess the extent of context 121 and associated deposits identified by Carter (below).

The first research problem (assessing the site formation processes) was addressed through soil micromorphological analysis of the basal deposits at Section G by Carter and Sections B and H by Tams (2000). This analysis was complemented by basic soil tests of context 121 and the basal fills sampled on the grid basis (Church & Oldham below).

The second research problem focused on the function of souterrains as a specific site class. Previous research at Cyderhall, Sutherland, had shown the interpretative value of analysis of the pollen and carbonized remains from the basal fills (Boardman 1992; Moffat 1992). Only pollen analysis (Cressey below) was undertaken on the possible in situ deposit (context 121) due to the small volume of the samples taken. Pollen and carbonized plant analysis (Church & Cressey below) was undertaken on the interval samples from the basal fill.

SOIL MICROMORPHOLOGY OF SECTION G

Stephen Carter

A complex series of fills was identified in the excavated section of the main passage in 1997. These were tentatively interpreted in the field as representing the use, and the deliberate back-filling or natural infilling, of the passage. Two Kubiena tin samples were collected from the lower fills in Section G in 1997 for thin section analysis. Thin section analysis of sediments has the potential to determine their composition, origin and mode of deposition (Courty et al 1989) and may be able to distinguish between occupation deposits and backfill.

Methodology

Undisturbed blocks of sediment were collected in 8 × 5 × 5cm Kubiena tins from the basal sediment fills of the souterrain passage. Sample 002 was stratigraphically above Sample 001 (illus 8).

Sample 001 (K1)
Context 074 Dark brown silty sand
Context 121 Brown sand
Undisturbed sand (below floor of passage)

Sample 002 (K2)
Context 159 Windblown sand
Context 074 Dark brown silty sand

The Kubiena tin samples were resin-impregnated and sectioned using standard techniques (Murphy 1986) by the Department of Environmental Science, University of Stirling. The thin sections were described using the terminology and descriptive scheme proposed by Bullock et al (1985).

Results

After preliminary examination of the thin sections, both were divided into two zones for the purposes of description. These zones correspond, at least in part, with sediment contexts identified in the field:

Sample 001
0–6cm Contexts 074/121 (mostly context 121 but boundary not apparent between contexts)
6–7cm Natural sand

Sample 002
0–5cm Context 159 (subdivided into four distinct bands)
5–8cm Context 074

The thin section characteristics of these four zones are summarized in Table 3 and are described in greater detail below.

Mineral components The sediments vary in both the ratio of fine to coarse material and in the size and degree of sorting of the coarse material. Fine material (clay and silt) is rare to absent in context 159 and the natural sand, but is common in contexts 074 and 121. The coarse (sand-sized) grains are poorly sorted except in the natural sand, which is moderately sorted, and grain size is also larger in this sediment. In all cases the grains range from angular to sub-rounded, and mineralogy/lithology is a mixture of quartz grains and igneous and sedimentary rock fragments. A single fragment of fired sandy clay-silt, 10mm long, in context 074/121 is probably a fragment of pottery.

Organic components All sediments are dominantly mineral in composition and organic components are rare in all cases; they are effectively absent from context 159 and the natural sand. In contexts 074 and 121, both humified and carbonized residues are present. The humified residues appear to be vascular tissue but are highly altered; the carbonized residues include wood charcoal and peat fragments. In contexts 074/121, the fragments are larger (up to 5mm) than in context 074 where they do not exceed 500μm in length.

Fabric Sediment fabric, the relative arrangement of the different basic mineral and organic components, is random in all cases except context 159 where distinct banding occurs. This is caused by variable concentrations of fine mineral material with bands of more-or-less pure sand and bands with frequent fine mineral material.

Microstructure Variation in microstructure is caused by the varying abundance of fine mineral material. Single grain structures occur in the absence of fine mineral material, spongy structures have developed where it is common. The channel structure in contexts 074/121 is biological in origin.

Pedofeatures Pedofeatures, the physical or chemical products of soil processes, are only present in contexts 074/121 where invertebrate excrement is noted. Organo-mineral faecal pellets of enchytraeid worms form frequent loose infillings to channels 1–2mm in diameter.

Discussion

Sediment composition and origin The four sediments described in thin section may be divided into two groups on the basis of their composition. Context 159 and the natural sand are very dominantly sands with little or no fine mineral material. Contrastingly, contexts 074 and 121 are silty sands with minor organic component.

The natural sand sampled at the base of thin section Sample 001 is representative of the freely draining fluvio-glacial sands and gravels that

TABLE 3
Summary descriptions of thin sections from Section G

Thin section	*Mineral components*		*Organic components*	*Fabric*	*Micro-structure*	*Pedofeatures*
	Coarse material	*Fine material*				
Sample 001						
0–6cm Contexts 074/121	Common poorly sorted fine sand to fine gravel. Angular to sub-rounded grains. Pottery fragment	Common clay and silt-sized sediment with organo-mineral composition	Very few highly humified fragments and few fragments of wood charcoal and carbonized peat up to 5mm	Random	Spongy to channel	Excrement
6–7cm Natural sand	Very dominant moderately sorted medium to coarse sand. Angular to sub-rounded grains	Almost none	None	Random	Single grain	None
Sample 002						
0–5cm Context 159	Very dominant poorly sorted fine to coarse sand. Angular to sub-rounded grains	Ranges from almost none to frequent granules of clay and silt-sized organo-mineral sediment	Very few small carbonized fragments	Banded	Single grain to intergrain microaggregate	None
5–8cm Context 074	Common poorly sorted fine sand to fine gravel. Angular to sub-rounded grains	Common clay and silt-sized sediment with organo-mineral composition	Very few highly humified and carbonized fragments up to 500µm	Random	Spongy	None

underlie the Redcastle excavation area. The high degree of sorting is typical of fluvial sediments although the grain size of this sample is clearly only one of a variety of sorted sands and gravels at this site. Context 159 was identified in the field as a windblown sand, assumed to be a naturally deposited sediment derived from the eroding sides of the disused souterrain. Its composition supports a local subsoil origin, although its variable low silt content indicates a second source for a minority of

the sediment (probably local topsoil, see below). The distinct banding observed in context 159 suggests that it was deposited in a series of discrete events in rapid succession with a variable mix of subsoil (sand) and topsoil (silty sand). All of this sediment could have been eroded from the side of the souterrain and the lack of evidence for sorting in context 159 rules out transport over longer distances.

These sediments may be contrasted with the silty sands in contexts 074 and 121. Mineralogy and lithology of the sand fraction indicate that these are local sediments, and topsoil seems the most likely source for them. The presence of carbonized wood and peat, and in one case pottery, indicates a degree of human impact but it is not clear from the thin section evidence whether these anthropic components were present in the source soil or were incorporated during the formation of the sediment fills within the souterrain passage. The difference in fragment size (much larger in context 121) appears to be an inherited characteristic and therefore implies differences in the source of the anthropic inputs to contexts 074 and 121.

Sediment deposition The process of sediment deposition is only clear in one out of the three passage fills: context 159 is a banded sediment that accumulated as a series of thin, rapidly deposited layers within the passage. It is a fill that accumulated naturally as a result of erosion of sediment off the exposed sides of the passage, with variable contributions of subsoil and topsoil. It is therefore not a deliberately dumped fill and its presence confirms at least a degree of natural, rather than deliberate, infilling of the passage.

Both contexts 074 and 121 are random sediments and, on the basis of this fabric characteristic alone, could represent single accumulations of sediment (either natural or deliberate). They could also be the product of post-depositional mixing leading to the loss of diagnostic fabrics. This wide choice of sources offers no hope for the differentiation of in situ occupation deposits on the floor from post-abandonment passage fills. However, the frequent presence of excremental pedofeatures in context 121 (and not in context 074) may be relevant. Given the apparent similarities in composition of contexts 074 and 121, the clear evidence for invertebrate activity in context 121 alone is difficult to explain. Enchytraeids are widespread, abundant soil-ingesting worms and their distinctive organo-mineral faecal pellets are common in most acidic soils. They must have been active in context 121 after its deposition as the excrement is clustered in channels through the sediment. Their absence from context 074 suggests that enchytraeid activity stopped on or before the deposition of this sediment and therefore a significant time gap is implied between the deposition of contexts 121 and 074. Furthermore, this is consistent with the rapid deep burial of context 074, as such an event would inhibit invertebrate activity. Overall, the evidence for invertebrate activity in context 121 alone is consistent with its interpretation as a shallow deposit on the passage floor prior to its general infilling and context 074 as the first of a series of sediments that constituted that infilling.

Context 121 could be either a deliberately deposited floor of topsoil type sediment or the product of accidental transport and infiltration into the passage. In either case, there was sufficient time for context 121 to develop a soil fauna before the passage filled in. The absence in this context of pedofeatures indicative of compaction due to repeated trampling is noteworthy. Sediments can develop characteristic structures and textural pedofeatures as a result of trampling, but this does not happen in all situations so negative evidence cannot be used to indicate an absence of traffic in the passage (Courty et al 1989). Context 074 is also a topsoil-derived sediment and could either have been deposited deliberately or by natural processes. It was rapidly buried by context 159, a natural sediment derived from the sides of the passage, and so if context 074 was a deliberate dump there was apparently no attempt made to fill the passage before natural infilling processes took over. On balance, this observation would suggest that context 074 is also a non-deliberate fill.

SOIL MICROMORPHOLOGY OF SECTIONS B & H

Adrian Tams

Kubiena tin samples were taken from the lower deposits just within the main entrance of the souterrain at Section B (illus 8) and from Section H (illus 8) in the main passage for soil micromorphology, to help determine the formation processes that led to the deposition of the sediments.

Methodology

Three undisturbed blocks of sediment were collected in 8 × 5 × 5cm Kubiena tins from the basal sediment

TABLE 4
Summary description of thin sections from Section B

Thin section	*Mineral components*		*Organic components*	*Fabric*	*Micro-structure*	*Pedofeatures*
	Coarse material	*Fine material*				
K1	Common grains of quartz and feldspar. Rare hornblende. Angular to sub-rounded single mineral grains. Anthropogenic inclusions	Common clay and silt-sized sediment with organo-mineral composition	Carbonized organic fragments, with vesicular structure	Random	Chambers and channels	Excrement and coatings
K2	As above. Increased presence of anthropogenic inclusions	As above	As above	Random	Chambers and channels	Excrement and coatings

fills of the souterrain passage. Sample K2 was stratigraphically above K1, these lying in Section B (illus 8, Section B, K1 & K2); the third tin was taken from the base of Section H (illus 8, Section H, Tin 4). The contexts represented are:

K1
309 Dark brown silty sand fill
320 Yellow brown clay
319 Medium brown silty sand

K2
309 Dark brown silty sand fill
320 Yellow brown clay

Tin 4
347 Silty sand deposit (possible floor deposits)

The Kubiena tin samples were resin-impregnated by Dr F A Fitzpatrick, Department of Plant and Soil Science, University of Aberdeen (Fitzpatrick 1984; 1993). The thin sections were described using the terminology and descriptive scheme proposed by Bullock et al (1985).

Results

Section B, K1 and K2 Table 4 provides a summary of the micromorphological features seen in the two thin sections. Examination of the thin sections revealed that there was no layering of the deposits (309, 320 & 319) and a high concentration of anthropogenic inclusions was noted. These are characterized by complex mixing of organic and mineralogical material. Table 5 provides a summary of the micromorphological features of the inclusions in the sections.

Section H, Tin 4 Table 6 provides a summary of the features present in Section H of the souterrain. Thin section analysis revealed two layers of sediment: the upper layer lying from 0 to 6cm and a lower layer from 6 to 8cm. The upper layer represented context 347, while the lower layer represents the natural fluvio-glacial sands and gravels that underlay the excavation area.

Discussion

Sediment composition and origin The sediments described in sections K1 and K2 may be divided into

two groups on the basis of their composition. Contexts 309 and 319 are representative of a brown earth soil typical for the excavation area in the north-east of Scotland. Their physical composition is a silty sand with a mineralogy derived from the fluvio-glacial sands and gravels that underlie the excavation.

Context 320 was described in the field as a discontinuous layer of yellowish brown clay. In the thin sections, however, there did not appear to be a layer of this material, but fragments of it were encountered throughout the sediment composing contexts 309 and 319. The composition of these fragments is characteristic of daub material. Daub is described as being soil material, often including soil organic matter, fine charcoal, dung or any kind of refuse mixed with coarse temper and large plant fragments (Courty et al 1989). The presence of carbonized plant fragments is further evidence that there was an anthropogenic input into the formation of this daub and these fragments were carbonized before their inclusion within the daub material.

Sediment deposition There is a lack of layering or banding of sediments in the thin sections of K1 and K2. The random composition of the fabric is a possible indication that the sediments accumulated in a single event in the souterrain. However, the dominance of excremental pedofeatures and the channel microstructure suggest that the sediments have undergone considerable bioturbation after their deposition. Further evidence for this biological activity is the granular structure of the fine material, which is formed by ingestion by enchytraeid worms that dominate in the surrounding soils.

The characteristics of the deposits in Section B are similar to those found by Carter (below) in his analysis of souterrain deposits in Section G, but the subsequent mixing of the sediments has made it difficult to ascertain whether an original floor surface was present in the thin sections.

Section H Two layers of sediment were present in the thin section, an upper layer measuring 6cm in depth (representing context 347) and a lower layer

TABLE 5
Thin section summary of anthropogenic inclusions in Section B samples K1 and K2

Thin section	*Mineral components*		*Organic components*	*Ground-mass*	*Micro-structure*
	Coarse	*Fine*			
K1	Common single mineral grains of quartz and feldspar grains. One large sedimentary grain, 1.5cm diameter	Clay and silt-sized organo-mineral material. Yellow brown	Common frequent carbonized fragments of organic material. Possibly plant-derived	Random	Channels and chambers
K2	Common single mineral grains of quartz and feldspar. Fine sand-sized, sub-angular to sub-rounded. Moderately sorted. Sedimentary fragments up to 1cm diameter	Light brown organo-mineral material, with clay and silt-sized grains of quartz and feldspar Grey mineralogenic material, fine sand and silt-sized grains of quartz and feldspar	Random, rare carbonized fragments of organic material. Possibly plant-derived	Random	Channels, complex packing voids

TABLE 6
Summary descriptions of features present in Section H, Tin 4

Thin section	*Mineral components*		*Organic components*	*Ground-mass*	*Micro-structure*	*Pedofeatures*
	Coarse	*Fine*				
Tin 4, Layer 1	Common random grains of quartz, feldspar and sandstone minerals	Common clay and silt-sized sediment with organo-mineral composition	No coarse organic components	Random Porphyric	Chamber and channel	Excrement
Layer 2 Common	random grains of above mineralogy	N/A	N/A	N/A	Simple packing voids	N/A

of 2cm depth. The micromorphological features of the upper layer are characteristic of the brown earth soils of the area, which have been described above. The mineralogy is derived from the lower layer of fluvio-glacial sands and gravels which underlie the site. The only post-depositional process to have occurred is bioturbation by invertebrate activity. The fine organic material which composes the matrix of the soil is well decomposed by invertebrate activity. This is also indicated by the fine granular structure of the matrix, which is formed as the material is ingested and passed through the gut of enchytraeid worms. The sediments have been rapidly deposited, evident from the clear boundary between the soil composing the upper layer and the sand comprising the lower layer.

SEDIMENTARY AND SPATIAL ANALYSIS OF SOUTERRAIN BASAL FILLS

Mike Church & David Oldham

A range of routine soil tests was undertaken on two sets of deposits within the basal fill of the souterrain to elucidate site formation processes. The first set of samples came from the thin layer (context 121) identified by soil micromorphology (Carter above) at the very base of the souterrain deposits. The second set of samples came from the basal grid of the initial fills of the structure.

Laboratory methods

Three basic tests were undertaken for each soil sample: organic content, total and inorganic phosphates and basic mineral magnetic measurements. Organic content was measured following standard procedures (Hodgson 1976), based on the percentage dry weight lost on ignition at 550ºC. Soil phosphate estimations, including averaging and calibration, were undertaken following Hamond (1983) and expressed as organic and inorganic parts per million (PPM). Volumetric magnetic susceptibility (κ_{lf} and κ_{hf}) was measured on dried and sieved (2mm) soil at high and low frequencies using a Bartington MS2 susceptibility bridge, and the soil weighed. Mass specific magnetic susceptibility (χ with units of $\mu m^3 kg^{-1}$) and frequency-dependent susceptibility (κ_{fd} as a percentage) were then calculated, following Dearing (1994).

Results

Table 7 presents the organic content and mineral magnetic measurements for the routine soil samples taken from context 121. Table 8 presents the soil and archaeobotanical parameters for the basal grid of the lowest fills of the souterrain. All of the phosphate determinations were trace and so have not been shown. These trace levels may reflect a lack of phosphates during the accumulation of the basal fill of the souterrain. Phosphates are usually fixed in archaeological deposits through the incorporation of

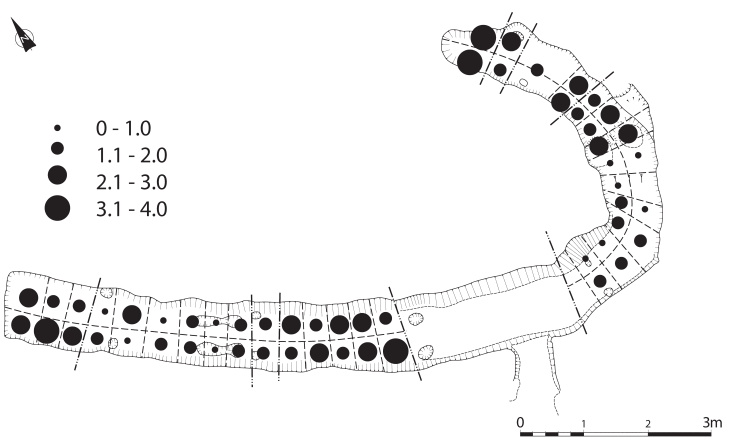
Table 7
Organic content for context 121 grid

Sample	*Context*	*Organic content (%)*	χ ($10^{-6}m^3kg^{-1}$)	κ_{fd}(%)
169	121 QQ	0.9	0.53	1.84
169	121 BBB	1.1	0.53	1.84
169	121 AAA	1.6	0.64	2.35
169	121 PP	1.0	0.48	1.43
169	121 OO	1.0	0.39	2.61
169	121 ZZ	1.0	0.48	1.43
169	121 NN	0.8	0.48	2.13
169	121 YY	0.8	0.37	1.82
169	121 A1	0.6	0.45	2.82
169	121 A2	1.1	0.46	2.74
206	121 MM	1.0	0.46	2.14
206	121 XX	0.8	0.46	2.14

human or animal waste or household rubbish. If this is accepted, the lack of phosphate enhancement within context 121 would preclude the presence of animals (cf Wainwright 1963). It also means that the material being dumped into the souterrain immediately after the dismantling did not include household waste but only burnt material (see Church & Cressey below). Alternatively, the lack of phosphates may relate to post-deposition leaching or chemical conversion as outlined by Hamond (1983) and White (1997), a possibility in the free-draining soils with a significant clay fraction that comprise the underlying drift geology.

In general, the organic content of all the samples was low, ranging from 0.6 to 1.6% in context 121, and 0.9 to 4% in the basal fills (illus 11). The slightly higher values in the basal fills reflects the incorporation of some organic material with the carbonized material as the higher organic contents generally correlate with those grid squares with higher concentrations of carbonized material (illus 11 & 12). These values are consistent with those recorded for the B horizons within the topsoil of the area, supporting the likely derivation of much of the basal fill from topsoil indicated by the soil micromorphology.

A good correlation is also observed between the higher concentrations of carbonized material and the mineral magnetic parameters (illus 13, 14 & 15). Essentially this is reflecting the presence of ash in the sediment from which significant carbonized material was recovered. This is confirmed by the correlation between increased χ and κ_{fd}, as the presence of wood ash in a deposit generally leads to higher χ and significant proportions of superparamagnetic



Illus 11 Souterrain plan showing organic content variation across basal grid (%)

TABLE 8
Basic soil and archaeobotanical data for basal grid

Sample	*Context*	χ ($10^{-6}m^3kg^{-1}$)	κ_{fd}(%)	*Grain/litre*	*QC/litre*	*Charcoal frags/litre*	*Organic content (%)*
144	333 DDD	1.60	6.61	27.4	34.3	23.5	4.0
145	333 CCC	1.74	6.34	28.2	33.4	28.3	3.9
185	319 A3	0.45	3.08	4.6	5.7	1.7	2.9
188	319 A4	0.46	1.52	4.6	5.7	4.4	1.3
120	319 A	0.66	3.96	2.3	4.2	0.6	1.4
131	319 B	0.58	3.66	3.1	4.1	2.4	2.4
132	319 C	0.79	5.51	1.1	1.4	0.0	2.1
165	319 D	0.59	3.41	1.3	2.8	0.0	1.5
166	319 E	0.60	3.33	0.0	2.0	0.5	2.1
167	319 J	0.57	3.53	0.3	5.5	0.0	1.6
168	319 K	0.52	2.56	3.0	6.0	0.4	1.4
193	354 F	0.33	2.33	0.6	0.6	0.4	2.3
193	354 L	0.56	3.37	0.6	0.6	0.0	2.3
195	157 G	0.49	1.39	0.0	0.0	0.0	0.9
195	157 H	0.50	1.33	0.0	0.0	0.1	1.1
195	157 I	0.41	2.90	0.0	0.0	0.0	1.0
195	157 M	0.47	1.39	0.0	0.0	0.1	1.0
195	157 N	0.45	1.49	0.4	0.6	0.0	0.8
195	157 O	0.45	3.03	0.1	0.1	8.2	1.1
149	157 S	0.54	1.19	14.2	14.6	0.2	1.4
150	157 P	0.53	2.25	0.0	1.9	0.0	1.3
151	157 T	0.58	1.08	0.0	0.0	0.0	0.9
152	157 Q	0.46	2.90	0.0	0.0	0.0	1.4
153	157 U	0.54	3.30	0.0	0.1	0.0	0.9
154	157 R	0.61	3.30	0.1	0.1	8.2	1.1
162	74 QQ	1.27	6.08	10.6	13.7	7.9	1.8
169	74 BBB	1.00	6.62	9.6	12.1	1.0	4.0
162	74 PP	1.50	6.25	10.5	19.2	2.5	3.0
162	74 AAA	0.75	5.00	0.3	0.4	2.3	3.0
162	74 ZZ	0.45	2.27	0.5	1.3	0.0	2.0
162	74 OO	0.32	0.00	0.5	1.3	1.1	2.5
162	74 NN	0.35	2.56	0.5	1.3	0.0	2.0
162	74 YY	0.53	3.45	0.5	1.3	0.3	2.8
182	347 A1	0.86	5.15	0.3	0.3	0.8	2.6
182	347 A2	0.71	4.65	0.8	1.5	1.0	1.9
205	74 MM	0.58	4.49	0.5	0.6	0.0	1.9
205	74 XX	0.80	5.00	0.3	0.6	0.5	1.9
156	74 LL	0.66	4.17	0.4	0.8	0.3	1.9
157	74 WW	0.74	4.21	1.0	2.4	0.1	1.8
163	334 KK	0.48	2.74	0.0	0.1	0.1	1.0
164	334 VV	0.47	0.00	0.2	0.5	0.1	0.9
170	334 JJ	0.56	2.70	0.1	0.3	0.5	1.6
171	334 UU	0.63	5.26	1.1	1.4	0.2	1.8
173	334 II	0.41	1.64	0.6	0.8	0.0	0.9
174	334 TT	0.58	3.66	0.9	1.3	0.2	1.5
176	334 HH	1.03	4.76	0.6	0.9	0.2	2.3
178	334 SS	0.36	1.89	0.1	0.1	0.3	1.0

TABLE 8
Basic soil and archaeobotanical data for basal grid (*cont*)

Sample	*Context*	*χ ($10^{-6}m^3kg^{-1}$)*	*κ_{fd}(%)*	*Grain/litre*	*QC/litre*	*Charcoal frags/litre*	*Organic content (%)*
178	334 GG	1.20	5.51	0.0	0.0	0.3	0.9
177	334 RR	1.10	4.69	0.5	0.6	1.7	1.6
141	334 FF	0.80	5.69	0.1	0.1	2.2	1.9
142	334 CC	0.77	6.19	0.3	0.4	4.3	2.1
139	334 EE	0.72	3.57	0.4	0.5	0.6	1.8
140	331 BB	1.04	6.67	5.6	7.1	1.7	3.8
138	331 DD	1.33	5.71	2.2	3.5	2.2	2.3
137	331 AA	1.36	6.05	7.8	13.5	4.3	2.2

grains, indicated by the relatively high κ_{fd} (McClean & Kean 1993; Linford & Canti 2001; Peters et al 2001). The values from context 121 are generally low, plotting within the range of the natural subsoil. This indicates that little or no ash or household rubbish was incorporated into the sediment. Three main points of ash input into the souterrain basal fills are indicated by clear enhancement at the northern entrance and western end of the structure, with further incorporation of ash and carbonized material in context 074 towards the middle of the structure. The implications of the positions of this dumped material are discussed below.

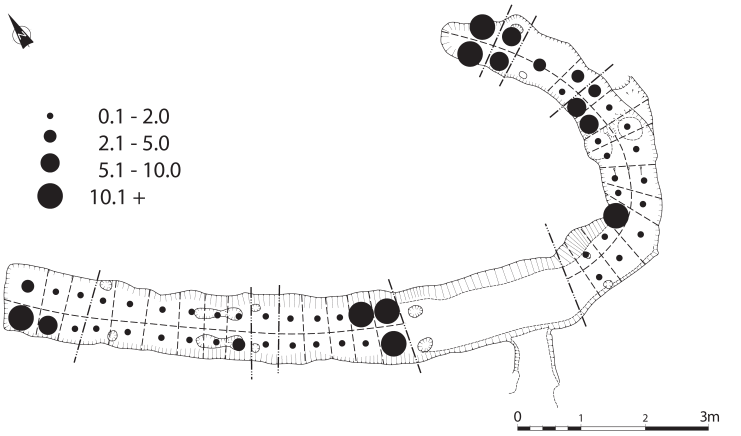
POLLEN ANALYSIS

Mike Cressey

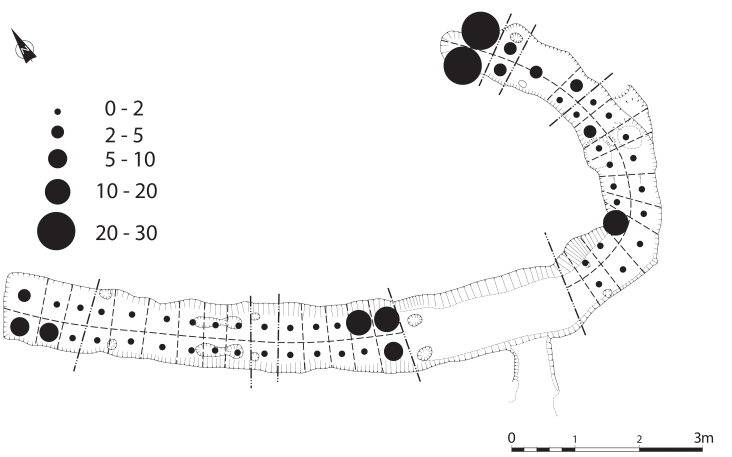
A pilot study by Clarke (2000) suggested that pollen was preserved in the basal layers and additional counting was recommended in order to achieve a statistically meaningful number of pollen counts. Soil micromorphology by Carter (above) has demonstrated that context 121 represented a possible in situ floor deposit relating to the final use of the souterrain or of a closure episode with the removal of the souterrain's superstructure. The aim of the present study was to try and identify the presence of any pollen types indicative of stored products, such as cereals or other farm produce. Also, though environmental reconstruction based on pollen analyses alone is problematical, when used in conjunction with other palaeoenvironmental techniques the results may provide useful evidence for local environmental conditions adjacent to the site.

Methodology

The pollen samples were extracted from sub-samples taken from a series of grids placed across the lowest fills of the souterrain (illus 10). Samples were taken from quadrants DDD and CCC (context 333) located within the main entrance of the souterrain. Pollen



ILLUS 12 Souterrain plan showing quantifiable component concentration per litre across basal grid



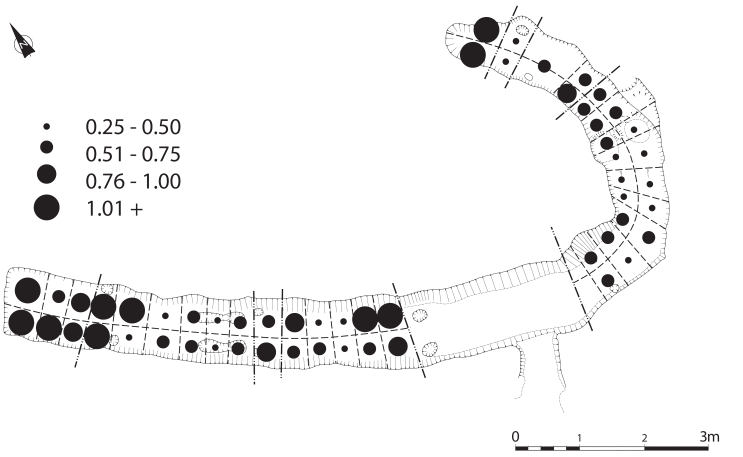
ILLUS 13 Souterrain plan showing grain concentration per litre across basal grid

samples PP, AAA and OO (context 121) were taken from the central part of the main passage. Sample DD (context 331) was taken from the terminal. The samples were processed using standard preparation techniques following Moore et al (1991, 43–5). Table 9 lists the taxa identified and their relative frequencies. Micro-charcoal was present in all samples, with only fragments greater than 100μm recorded. Four classes of pollen preservation were recorded: corroded, crumpled, degraded and split. Where possible, counts were made up to 200 grains. There was insufficient pollen in samples OO and PP to achieve this number of counts.

Results

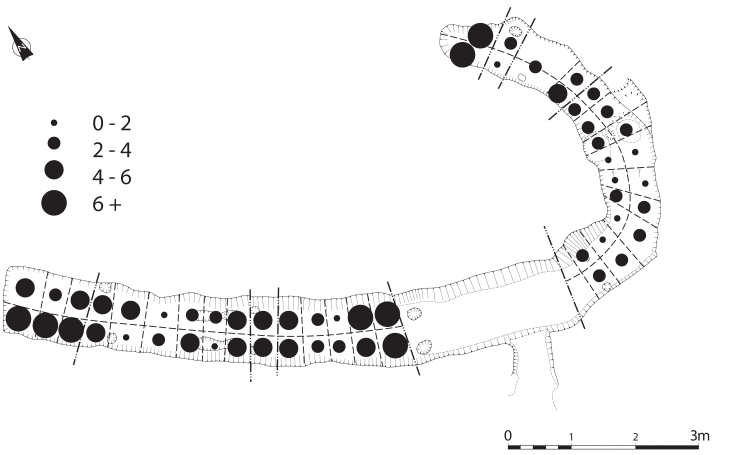
Samples DDD & CCC (main entrance) Arboreal taxa are represented by *Alnus* (alder), *Betula* (birch) and *Pinus* (pine), this latter species attaining 5.9% in sample DDD. In the shrub category, Coryloid types, including *Corylus avellana* (hazel), are highest in sample DDD (13%). Within the same sample, *Calluna vulgaris* (heather) attained 16.5%. *Hedra helix* (common ivy) is present in trace amounts (0.4%) only in sample CCC. The herbaceous taxa are dominated by Poaceae (grasses) at 31.5% and 33.8% in samples DDD and CCC, respectively. Lactuceae type pollen, possibly representing *Taraxicum officinale* (dandelion), is also high at 37% and 15.2% in samples DDD and CCC, respectively. Nine other herbaceous pollen types are present and are all below 10%: these include *Plantago lanceolata* (ribwort plantain), *Plantago* undifferentiated, *Ranunculus* (acrid or creeping buttercup and including marsh marigold), Rosaceae undifferentiated [cinquefoil types, including possibly *Potentilla anserina* (silverweed), *Pot erecta* (common tormentil), *Filipendula* (meadowsweet) and Scabious (Devil's bit)]. Spores from ferns and mosses are low in frequency (<1.5%) and are represented by *Filicales*, *Polypodium* and *Sphagnum*.

Samples OO, PP & AAA (centre of main passage) Arboreal taxa are represented in these samples by alder and birch, with *Fraxinus* (ash) present only in sample OO. Hazel is present in all three samples but highest in sample AAA (3.4%). Heather pollen attains 28% in sample OO, a figure that is high in comparison to the other five samples (<18%). Grass pollen is



ILLUS 14 Souterrain plan showing χ (units of $10^{-6}m^3kg^{-1}$) variation across basal grid

highest in sample PP with 72%; samples OO and AAA attain 39.5%. Other herbaceous pollen is represented by 12 types. Caryophyllaceae pollen (chickweed/campion family) is present in all three samples. Lactuceae pollen is highest in sample AAA at 26.3%. Pollen of ribwort plantain, buttercup, Rosaceae, *Anthemis* (corn chamomile), Devil's bit and Umbelliferae type pollen (saxifrages and dropworts) are present only in sample AAA; all are in low amounts. *Urtica* (common nettle) is present only in sample OO (1.3%). Spores from *Filicales*, *Polypodium* and *Sphagnum* are present in samples OO and AAA.



ILLUS 15 Souterrain plan showing κ_{fd} (%) variation across basal grid

Sample DD (terminal) Arboreal taxa are represented by only low amounts of pine and alder (0.5% and 1.4%, respectively). Hazel and heather pollen are also low in frequency (0.5% and 0.9%, respectively). Herbaceous pollen is represented by grasses (7.8%) and Lactuceae (dandelion), which is extremely high at 79.8%. Ribwort plantain, buttercup and corn chamomile are the only other herbs represented in this sample and all are low in frequency.

Interpretation of the results

The results show that there is variability in the distribution of certain pollen types within the three main sampling areas. Firstly, pine appears to be more concentrated and highest in frequency just within the main entrance in comparison to the central main passage including grids OO, PP and AAA and the terminal (grid DD). It is likely that the entrance passage was more exposed to aerial pollen than the middle and end of the main passage. Pine pollen can travel over great distances and stands of pine may have also been present locally. Birch and hazel pollen are low in frequency but present in all three main areas within the souterrain. These species are also well represented within the charcoal assemblage (Church & Cressey below), suggesting that birch and hazel woodland was growing in close proximity to the site. The presence of heather suggests that acid heath lay close to the site. The herbaceous pollen also suggests that heath, pasture and agricultural land lay close to the site. Disturbed ground indicators are represented by pollen of ribwort plantain, fat-hen/goosefoot and the chickweed/campion family (Keeble Martin 1972), and all suggest that agricultural fields were locally present. These plants would have thrived along the margins of the fields where soils had been cultivated and left fallow. Other environments are represented by taxa reflecting meadow and damp grassland, perhaps the river floodplain: these include the grasses (Poaceae), Cyperaceae (sedge family) and Lactueae (dandelion). Grasses and the Lactuceae are the predominant taxa within the sample locations. The latter pollen type dominates the terminal sample with 79% of the total pollen sum. This is an exceptionally high percentage and its presence may indicate that the floor of the souterrain was perhaps covered in litter, either deliberately or accidentally, or this high percentage was derived from turf thrown or fallen in during the collapse of the souterrain. Alternatively, the high incidence of Lactuceae pollen may be an artefact of pollen preservation within all six samples. This type of pollen was seen to be exceptionally well-preserved in comparison to the other pollen types.

There are no indicators within the pollen assemblage to suggest stored products such as cereals. Within the Poaceae assemblage, none of the pollen grains had annuli diameters of 8–10µm or greater, which normally implies major cultivated cereal species (Anderson 1979; Moore et al 1991). In a previous pollen study from floor deposits at the Cyderhall souterrain, Sutherland, hemp and cultivated flax (*Linum usitatissimum* L) was recorded along with sheep liver fluke ova and whip worm, suggesting that

TABLE 9
Pollen

Sample quadrant *Context* %	*DDD* *333* %	*CCC* *333* %	*OO* *121* %	*PP* *121* %	*AAA* *121* %	*DD* *331* %
Trees						
Pinus	5.9	0.4		0.7	1.5	0.5
Alnus		1.5		1.4	0.5	1.4
Fraxinus			3			
Betula	1.2		1.3	2.1		
Shrubs						
Coryloid type	13	0.8	1.3	1.4	3.4	0.5
Calluna vulgaris	16.5	0.8	28	18.1	5.9	0.9
Hedra helix		0.4				
Ferns						
Pteridium		1.1				
Herbs						
Poaceae	31.5	33.8	39.5	72	39.5	7.8
Cyperaceae		0.4				
Caryophyllaceae	2.4	0.4	7.6	7.6	2.0	
Carduceae type	4.3	0.8				
Chenopodiaceae	2.4	3.2				
Rumex	2		3.8		0.5	
Saxifragia						
Compositae liguliflorae						
Lactuceae	37	15.2	7	10.4	26.3	79.8
Plantago lanceolata		1.9			1.5	0.5
Plantago indet		8.4			0.5	
Rubaceae						
Ranunculus		0.8			0.5	0.5
Rosaceae undif	0.4				1.0	
Filupendula	0.4			0.7		
Anthemis type		2.3			5.4	1.8
Alchemilla type		0.8				
Scabiosa	1.6	3.4			1.5	
Umbellefrae indet				0.5		
Urtica			1.3			
Spores						
Filicales	1.2		1.9			
Polypodium undif	0.4	0.8			4.4	2.8
Sphagnum		0.8	3.0		0.5	0.9
Pollen preservation						
Corroded	1.2		19.0		7.3	
Crumpled	18.6	1.9	1.2	37		17
Degraded	7.0	3.8	8.9		4.8	3.8
Split	18.6				2.4	0.4
Microscopic charcoal	16	104	12	6	59	34
Total pollen including spores	254	263	157	143	205	210
Total taxa	17	23	13	13	20	16
Concentration (grains per cu cm)	71710	63856	10850	51059	20233	59288

the floor had been soiled by faecal material (Moffat 1992). No such evidence was present within the Redcastle souterrain floor deposit and the general cleanliness of the souterrain floor is supported by very low soil phosphate levels (Church & Oldham above).

There are a number of factors that might be considered regarding the distribution of pollen within the Redcastle souterrain. Firstly, during construction and roofing the souterrain would have received pollen, and continued to do so through the open passages. The comings and goings during its use and closure would also have led to pollen deposition. The introduction of plant material, such as hay, to protect stored farm produce is another mechanism for the introduction of pollen into the souterrain. Returning to the issue of roofing, it seems plausible that turf cut from meadows could have resulted in the presence of some of the herbaceous taxa identified. The high incidence of Lactuceae in the terminal sample (DD) and elsewhere cannot have been derived from wind transportation alone. If we accept that the Lactuceae survival is not an artefact of differential preservation, then two other possibilities emerge to account for its high frequency: either roofing turf became incorporated within the floor deposit during the closure of the souterrain, or the floor was littered with hay derived from adjacent grassland that was rich in this species.

CARBONIZED PLANT REMAINS

Mike Church & Mike Cressey

The analysis was undertaken on the basis of two sets of samples: 51 interval samples from the basal grid and 11 samples from the post-holes within the souterrain floor.

Laboratory methods

The bulk samples were processed using a flotation tank (Kenward et al 1980) with the residue held by a 1mm net and the flot caught by 1-mm and 0.3-mm sieves. All the flots and residues were dried and sorted using a low-powered stereo/binocular microscope at ×15 to ×80 magnification. All macrofossil identifications were checked against botanical literature and modern reference material from collections in the Department of Archaeology, University of Edinburgh. Charcoal identifications were made on 60% of the samples, randomly chosen, following van der Veen & Feiller (1982). Up to ten fragments were identified from each sample due to time constraints. The identifications were made using a binocular microscope at magnifications ranging between ×10 and ×200, generally on transverse cross-sections on charcoal measuring between 4 and 6mm. Asymmetry and morphological characteristics were recorded (available in archive). Nomenclature follows Stace (1991), with ecological information taken from Schweingruber (1990), Clapham et al (1989) and *Flora Europeae* (Royal Botanic Garden Edinburgh 1998).

Results

Table 10 presents the charcoal and the carbonized plant macrofossils recovered from the basal grid and post-holes. The total counts from each group of deposits are given, as well as the ubiquity scores for each species in each group. The ubiquity score is expressed as a percentage of the total sample population (n = 51 and 11 in the basal grid and post-holes, respectively) in which the specific macrofossil type was recovered, following the methodology of Popper (1988). Ubiquity counts are not given for the charcoal due to the identification of only 60% of the samples. The identifications for each sample can be consulted in the site archive.

Taphonomy

The soil micromorphology and mineral magnetic analysis provided useful information on the formation processes of the two carbonized assemblages. Sections through the post-holes showed that they were filled with material similar to those sampled in the basal grid. Therefore, the carbonized material in the post-holes is likely to have been mixed with the largely topsoil-derived sediment that was dumped into the souterrain immediately after the dismantling of the superstructure. The assemblage represents a mix of poorly preserved grain and hardier plant parts, such as the smaller culm bases and rhizomes. This is consistent with the type of assemblage that would be produced from a household fire, perhaps burning wood and turf that could introduce the smaller culm bases and rhizomes into the assemblage. Carbonization and then the spread of ash from household fires are acknowledged as being one of the principal charring mechanisms recognized in British archaeobotany, coupled with discard from crop-processing accidents (cf Hillman 1981; Jones 1984; 1996; van der Veen 1992).

Some of the samples from the basal grid are similar in their composition and probably

TABLE 10
The carbonized remains from the basal grid and post-holes

Charcoal	*Common name*	*Basal grid*		*Post-holes*	
		Total counts	*Ubiquity (%)*	*Total counts*	*Ubiquity (%)*
Alnus sp	Alder	1F (0.28)			
Betula sp	Birch	68F (26.89)			
Betula sp	Birch roundwood	6F (1.34)			
Corylus sp	Hazel	130F (20.61)		16F (1.43)	
Corylus sp	Hazel roundwood	9F (0.35)			
Corylus avellana L	Hazel nutshell	1F (0.04)			
Quercus sp	Oak	27F (1.72)		1F (0.06)	
Rosaceae undiff	Rosaceae	8F (0.4)			
Rosaceae undiff	Rosaceae roundwood	1F (0.05)			
Salix sp	Willow			2F (0.29)	
Total charcoal fragments (>4mm)		**2756**		**48**	
Grain					
Hordeum sp	Barley grain	348	52.9	21	54.5
H naked	Naked barley grain	14	15.7	0	0.0
H naked symmetric	Straight naked barley grain	8	11.8	0	0.0
H naked asymmetric	Twisted naked barley grain	6	7.8	1	9.1
H hulled	Hulled barley grain	1102	52.9	19	45.5
H cf hulled	cf Hulled barley grain	159	17.6	2	9.1
H hulled symmetric	Straight hulled barley grain	435	41.2	13	54.5
H hulled symmetric	Straight hulled barley spikelet	46	11.8	0	0.0
H hulled asymmetric	Twisted hulled barley grain	750	54.9	14	45.5
H hulled asymmetric	Twisted hulled barley spikelet	86	13.7	0	0.0
Avena sp	Oat grain	17	11.8	0	0.0
T *spelta* L	Spelt wheat grain	2	3.9	0	0.0
T *aestivo-compactum* L	Bread wheat grain	1	2.0	0	0.0
Cereal indeterminate	Cereal grain	637	62.7	19	63.6
Grain total		**3611**		**89**	
Chaff					
Hordeum sp	Barley rachis	37	7.8	0	0.0
H sp	Barley basal rachis	10	3.9	0	0.0
H *vulgare* L	Six-row barley rachis	59	19.6	2	9.1
H *vulgare* L	Six-row barley basal rachis	9	9.8	0	0.0
H *distichon* L	Two-row barley basal rachis	1	2.0	0	0.0
H *distichon* L	Two-row barley rachis	9	3.9	0	0.0

TABLE 10
The carbonized remains from the basal grid and post-holes (*cont*)

Charcoal	*Common name*	*Basal grid*		*Post-holes*	
		Total counts	*Ubiquity (%)*	*Total counts*	*Ubiquity (%)*
H sp	Barley spikelet base	35	3.9	1	9.1
H *distichon* L	Two-row barley spikelet	1	2.0	0	0.0
Avena sativa L	Oat floret base	0	0.0	1	9.1
Cereal/monocotyledon (>2 mm)	Culm node	34	21.6	2	9.1
Cereal/monocotyledon (>2 mm)	Culm base	45	21.6	3	18.2
Chaff total		**240**		**9**	
Wild species					
Brassica cf *rapa* L	Wild turnip seed	1	2.0	0	0.0
Brassica/Sinapis spp	Cabbage/mustard seed	7	7.8	1	9.1
Bromus spp	Brome grain	76	27.5	8	18.2
Calluna vulgaris (L) Hull	Ling heather capsule	8	9.8	0	0.0
Carex spp (trigonous)	Sedge trigonous nutlet	0	0.0	1	9.1
Chenopodium album L	Fat-hen seed	28	17.6	1	9.1
Chenopodium/Atriplex spp	Goosefoot/orache seed	9	11.8	0	0.0
Chrysanthemum segetum L	Corn marigold achene	6	7.8	0	0.0
Eleocharis palustris (L) Roemer & Schultes	Common spike-rush nutlet	3	5.9	1	0.0
Galeopsis tetrahit L	Common hemp-nettle nutlet	2	3.9	0	0.0
Persicaria lapathifolia (L) Gray	Pale persicaria nutlet	1	2.0	0	0.0
Persicaria maculosa Gray	Redshank nutlet	7	9.8	0	0.0
Plantago lanceolata L	Ribwort plantain seed	11	13.7	1	9.1
Poaceae undiff (large)	Grass grain	23	15.7	0	0.0
Poaceae undiff (medium)	Grass grain	15	19.6	0	0.0
Poaceae undiff (small)	Grass grain	61	31.4	1	9.1
Polygonum aviculare L	Knotgrass nutlet	3	5.9	0	0.0
Polygonum spp	Knotgrass nutlet	16	17.6	0	0.0
Ranunculus spp	Buttercup achene	1	2.0	0	0.0
Ranunculus repens L	Creeping buttercup achene	1	2.0	0	0.0
Rumex acetosa L	Common sorrel nutlet	1	2.0	0	0.0
Rumex acetosella L	Sheep's sorrel nutlet	1	2.0	0	0.0
Rumex obtosifolius/crispus L	Broad-leaved/curled dock nutlet	4	3.9	1	9.1
Rumex spp	Dock nutlet	1	2.0	0	0.0
Spergula arvensis L	Corn-spurrey seed	5	7.8	0	0.0
Stachys spp L	Woundwort fruit	1	2.0	0	0.0
Vicia/Lathyrus spp	Vetch/pea seed	7	9.8	0	0.0
Indeterminate pericarp	Pericarp	0	2.0	0	0.0
Indeterminate	Seed/fruit	28	25.5	6	27.3

TABLE 10
The carbonized remains from the basal grid and post-holes (*cont*)

Charcoal	*Common name*	*Basal grid*		*Post-holes*	
		Total counts	*Ubiquity (%)*	*Total counts*	*Ubiquity (%)*
Indeterminate (trigonous)	Seed/fruit	0	0.0	0	0.0
Monocotyledon (<2 mm)	Culm node	42	33.3	5	27.3
Monocotyledon (<2 mm)	Culm base	309	35.3	28	63.6
Indeterminate (>2 mm)	Rhizome	69	39.2	8	45.5
Indeterminate (<2 mm)	Rhizome	279	62.7	17	63.6
Wild total		**1026**		**79**	
Total QC		4877		177	
Grain proportion (%)		74.0		50.3	
Chaff proportion (%)		4.9		5.1	
Wild species proportion (%)		21.0		44.6	

reflect a similar taphonomy. However, the three concentrations of carbonized material in the basal grid correlate with a marked enhancement of mineral magnetism that indicates the direct input of ash and carbonized material at the main entrance, the centre of the main passage and the western terminal of the souterrain. Most of the carbonized plant material came from these three points, with grain and cereal byproducts dominating each concentration. The presence of whole spikelets and rachis internodes suggests that the assemblage may represent the carbonized remains from a winter storage product in the spikelet form or even whole ears, to ensure longer preservation and greater resistance to damp, fungus and rodents.

Illus 16 presents the preservation of the cereal grains from the two groups of samples, following the preservation indices outlined by Hubbard & al Azm (1990). There are six preservation classes: Class P1 represents perfectly preserved grain, while class P6 represents severely degraded grain, precluding even genus identification. The grain from the post-holes is relatively badly preserved, which is consistent with the interpretation of carbonization on household fires. However, the grain from the basal grid is better preserved, reflected in the presence of less hard plant parts such as chaff (Boardman & Jones 1990) and weed seeds (Wilson 1984). The carbonization conditions for this assemblage would involve lower temperatures and perhaps a reducing environment (Boardman & Jones 1990). These conditions could have been created during an accident in the crop-processing cycle, such as the parching stage for hulled barley (Hillman 1981), or within conflagration horizons of organic structures that were left to smoulder (cf Church 2000). The presence of daub associated with the concentration of carbonized crop debris at the main entrance hints at the redeposition of material derived from the latter process.

Charcoal

Only 19 fragments were identified from the post-holes and these were all small pieces of slightly degraded timber, again consistent with redeposited material from household fires. The assemblage was dominated by hazel (*Corylus* sp), with a few fragments of willow (*Salix* sp) and oak (*Quercus* sp).

A total of 250 fragments were identified from the basal grid and again the assemblage was dominated by relatively small fragments of timber, with some roundwood and a single hazel nutshell (*Corylus avellana* L). Hazel and birch (*Betula* sp) were the most numerous taxa, with a significant number of oak fragments, some Rosaceae undifferentiated and a single fragment of alder (*Alnus* sp). One of the hazel fragments in Sample 149 (context 157, Grid S) displayed the characteristic heel of coppiced wood, indicating that coppicing and woodland management was undertaken in the wider landscape. All of the species could have been gathered from local woodland in a variety of habitats, though secondary

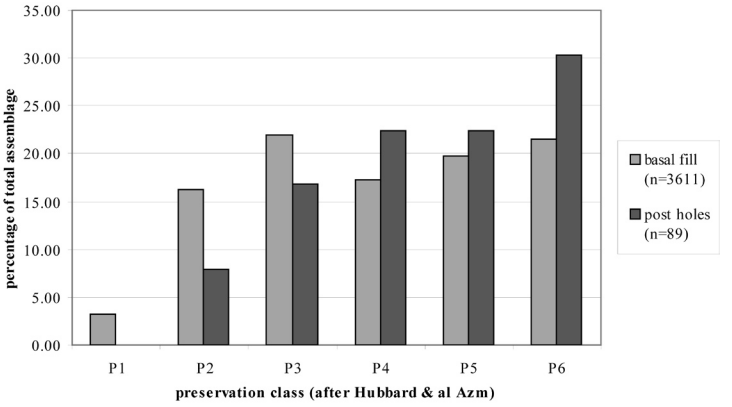
woodland species dominate. Unfortunately, no pollen diagrams have been produced from lowland Angus covering the later prehistoric periods, a function of the truncation and disappearance of suitable sites stemming from the intensive agriculture of the 19th and 20th centuries (Coles et al 1998).

Cultivated plants

Only 89 cereal grains were recovered from the post-holes and many of these were severely degraded, reflecting the unfavourable preservation environment of the household fires. Nearly all of the identifiable grain was hulled barley (*Hordeum* sp), with only a single straight grain of naked barley recovered from context 352. The recovery of asymmetric grains and a couple of rachis internodes indicated the presence of six-row barley (*H vulgare* L). A single floret base of cultivated oat (*Avena sativa* L) was also recovered, though the absence of any oat grain suggests this may have been a weed contaminant of the barley crop rather than a crop in its own right. The remaining chaff consisted of a single barley spikelet base and a few larger culm nodes and bases.

A total of 3611 grains and 240 chaff fragments were recovered from the basal grid. Most of these were recovered from the three concentrations of dumped ash. As suggested above, the relative proportions weighted in favour of grain in most of the samples and the presence of whole spikelets and rachis internodes suggests that the assemblage may represent the carbonized remains from a winter storage product in the spikelet form or even whole ears. The identifiable grain was totally dominated by barley with less than 1% oat and two grains of wheat, one each of bread wheat (*Triticum aestivo-compactum* L) and spelt (*T spelta* L). The oat and the wheat almost certainly represent weeds of the barley rather than cultivated crops. Where further identification was possible, nearly all of the barley was hulled, with only the occasional naked grain. These could have stemmed from very small-scale experiments in growing the naked variety or represent what is, in effect, weed contaminants of a few naked plants in the hulled crop. It may also represent a phenomenon noted by Hillman (quoted in Holden & Boardman 1998), by which a small proportion of hulled grain does not fuse to the enclosing lemmas and paleas when the growing season has been shortened by early frost, drought or excessive rain. This results in a small proportion of the grain from the hulled crop resembling the naked variety.

A relatively large number of rachis internodes were preserved, reflecting the probable composition of the barley assemblage in spikelet form prior to carbonization and the favourable preservation conditions during charring. Sixty-eight rachis internodes of six-row barley and ten of the two-row species (*H distichon* L) were recovered and the ratio of symmetric to asymmetric hulled grain was 1:1.74. Both of these ratios indicate a dominance of the six-row species (87%) in the overall barley assemblage. The identification of two-row barley in the Scottish Iron Age is rare (Dickson & Dickson 2000), a function of the relative rarity of the preservation of significant numbers of rachis internodes (cf Church 2000). The human choice behind the mix of species is unknown, though it may reflect an equal emphasis on the production of straw as well as grain for the two-row species. The remaining chaff consisted of some culm nodes and culm bases of greater than 2mm diameter that could have derived from cereal straw. The presence of culm bases indicates harvesting by uprooting (Hillman 1981), a strategy that maximizes the straw yield but can lead to erosion in friable soils such as those encountered around Redcastle. Hulled six-row barley is the dominant cereal in assemblages dating from the Iron Age and Romano-British periods in Scotland (Boyd 1988; Dickson & Dickson 2000).



ILLUS 16 Bar chart of grain preservation from the basal grid and post-holes

Wild components

The wild components are dominated by small culm nodes, bases and rhizomes and seeds of plants that could have grown as weeds of the barley crop. Again, most of the components were recovered from the three concentrations of dumped ash. The small culm nodes, bases and rhizomes could have derived from a number of sources. Firstly, they could represent grass gathered either deliberately as hay or accidentally as part of the weed assemblage incorporated during the harvesting by uprooting. Alternatively, they could represent the burning of turf as part of the superstructure of the souterrain or as fuel for the parching of the grain that led to the carbonization of the assemblage (Dickson 1998). The presence of some species relating to wetter ground or heath, such as ling heather (*Calluna vulgaris* L Hull), sedge (*Carex* spp), common spike-rush (*Eleocharis palustris* L R & S), pale persicaria (*Persicaria lapathifolia* L Gray), sheep's sorrel (*Rumex acetosella* L) and woundwort (*Stachys* spp), may indicate turf cut from highly organic soils, the best turf for fuel (Carter 1998b). Alternatively, the presence of these plants may represent wetter parts of the barley fields, in the case of the common spike-rush, or deliberate gathering of plant material, for example the heather, for structural components of the souterrain.

The large majority of the wild components indicated growth in free-draining, nutrient-rich soils, the optimum soils in Angus that represent some of the best cultivatable land in Scotland. The assemblage included significant proportions of brome (*Bromus* sp), fat-hen (*Chenopodium album* L), grasses (Poaceae undiff.) and ribwort plantain (*Plantago lanceolata* L), and some seeds of wild turnip (*Brassica rapa* L), cabbage/mustard (*Brassica*/*Sinapis* spp), corn marigold (*Chrysanthemum segetum* L), common hemp-nettle (*Galeopsis tetrahit* L), redshank (*Persicaria maculosa* Gray), knotgrass (*Polygonum aviculare* L), buttercups including the creeping buttercup (*Ranunculus repens* L), common sorrel (*Rumex acetosa* L), docks including the broad-leaved/curled dock (*Rumex obtusifolius*/*crispus* L), corn-spurrey (*Spergula arvensis* L) and vetch/pea (*Vicia*/*Lathyrus* spp).

Comparison to other sites

Radiocarbon dating of cereal grains from the concentrations of plant remains in the basal grid indicate that the souterrain began filling in from the late first to early third centuries cal AD. There are only a few published sites with contemporary plant assemblages in the north-east of Scotland. These include Wardend of Durris, Aberdeenshire (Boardman 1995), and Culhawk Hill in Angus (Rankin 1998). Both sites contained relatively low concentrations of plant remains and the cultivated plants included grains of hulled and naked six-row barley and oat, with some flax and emmer wheat also identified from the Wardend of Durris. These remains came from a variety of generic occupation context types from domestic settlements and so represent the full range of crop types exposed to household fires compared to the specific crop assemblage recovered from Redcastle.

A number of contemporary assemblages have been recovered from excavations undertaken as part of the wider Angus Field School. In summary, small assemblages derived from the spread of material from household fires were recovered from a later prehistoric enclosed settlement at Ironshill East (Church 2003), Mains of Edzell (Church & Cressey 2003) and Newbarns (Church 2004). The concentrations of all carbonized plant material were low, with the composition weighted towards grain in most samples. The cultivated species included six-row hulled barley with a little wheat, both emmer (*Triticum dicoccum* L Schubl) and spelt (*Triticum spelta* L). The basal fills from souterrains from three sites have also been sampled, including Ironshill East and Dubton (Church 2002). Both had timber as the dominant structural component, though only the two souterrains from Dubton were excavated fully with interval sampling of the basal fill. The plant assemblages from the basal fills were very similar to the Redcastle samples, with much lower concentrations of carbonized material than at Redcastle, including the post-holes, suggesting that most of the material was burnt waste from household fires mixed with topsoil infill. A significant proportion of hulled barley and oat were recovered from the Dubton souterrains, associated with a weed assemblage of both well-drained and more marginal habitats. Preliminary analysis of samples from a stone- and timber-lined souterrain at Hawkhill (Church *in* Rees, forthcoming) identified another relatively small assemblage, indicating the interpretative value of the three concentrations with large numbers of carbonized plant remains in the basal fill at Redcastle.

SUMMARY AND DISCUSSION OF PALAEOENVIRONMENTAL ANALYSES

Mike Church

The main findings from the sedimentary analysis can be summarized as follows:

1 Soil micromorphology from Section G identified a very shallow deposit (context 121) that may be associated with the use of the souterrain. It could represent a deliberately laid floor of topsoil-type sediment, or the accidental transport and infiltration of material into the structure. It only appeared discontinuously within the central part of the structure and had a low organic content as well as trace phosphate and magnetic enhancement.
2 Most of the basal fill represented a mix of probable topsoil and burnt material that accumulated immediately following dismantling of the wooden superstructure of the souterrain. Though no direct evidence for deliberate backfilling was identified, it is likely that this mix of material was dumped by human action before natural infilling of the unconsolidated sands and gravels from the side walls of the souterrain.
3 The basal fill had a relatively low organic content and trace phosphate enhancement. Three areas of magnetic enhancement and increased frequency of carbonized remains at the main entrance, centre and terminal of the souterrain represent the incorporation of ash into the basal fill. Soil micromorphology of the burnt lenses in the main entrance indicates the presence of daub associated with the burning, which may have been part of the superstructure of the souterrain.

The main findings from the pollen and archaeobotanical analysis of context 121 and the basal fill can be summarized as follows:

1 The pollen from context 121 and the basal fill at the main entrance and western terminal represented a complex mosaic of habitats and taphonomy. In general, arboreal pollen is low in comparison to herbaceous pollen, which may have been derived from turf within the roof, floor litter or from the immediate environment.
2 The pollen and charcoal from the basal fill point to the presence of mixed woodland in the wider landscape, with emphasis on hazel and birch. Hazel coppicing was practised.
3 The carbonized plant macrofossils in the basal fill can be viewed as two groups.
   a The first group comprised a mix of topsoil and low frequencies of carbonized plant remains from household fires that were found in the post-hole fills and some of the grid samples with lower concentrations of carbonized material.
   b The second group comprised three concentrations of carbonized material correlating with the concentrations of ash indicated by the sedimentary analysis. Most of the carbonized plant macrofossils were recovered from these three areas and consisted of grain and some cereal parts. The proportion of grain and the presence of whole spikelets and rachis internodes suggested that the assemblage may represent the carbonized remains from a winter storage product of hulled barley in the spikelet form or even whole ears. The associated wild components consisted of weed contaminants from good cultivatable soils, with hints of wetter conditions and heath, perhaps derived from the burning of turf as a fuel or from the souterrain superstructure.

Returning to the initial research questions, it is clear that only context 121 represented possible in situ accumulation of material relating to the occupation and use of the souterrain. It could also represent material that had seeped through the roof and/or a timber floor during occupation. The remainder of the post-hole and basal fills represented a mix of topsoil and some limited anthropogenic material, except for three concentrations of burnt material incorporated into the fill of the main entrance, the middle of the main passage and the western terminal. No direct evidence for deliberate backfilling was identified but it is likely that the material within the souterrain accumulated immediately following dismantling of the wooden superstructure, with dumping of the material by humans the most plausible explanation. A sequence of subsoil- and topsoil-derived deposits then filled the souterrain, though detailed analysis was not undertaken of these so their formation processes are unknown.

The interpretation of the pollen and sedimentary evidence from context 121 was equivocal. However, the lack of phosphate and magnetic enhancement within the deposit raises doubts over the use of the structure for keeping animals (cf Wainwright 1963) or associations with metalworking or smoke production

for preserving meats or fish (cf Gilmour 2000). The pollen evidence indicated a mix of habitats and possible taphonomic pathways, though the dominance of herbaceous pollen may indicate floor litter or turf derived from the roof. Further, structural evidence may be inferred from the association of daub with the concentration of burnt material in the main entrance. This material included: hazel and birch charcoal that may have been part of a wattle-and-daub structure; possible evidence for turf in the form of small culm parts and rhizomes, with hints of damper ground from species such as heather; and significant quantities of hulled barley grain and chaff. Indeed, the three concentrations of burnt material may represent a form of structured deposition, as envisaged by Armit (1999), within the immediate post-dismantle fills of souterrains at key points of the structure including liminal positions such as the entrance.

This form of structured deposition may indicate the importance of the souterrain for arable production and storage. In this context, it is interesting to note the presence of whole spikelets and rachis internodes in the three concentrations that may represent the carbonized remains from a winter storage product in the spikelet form or even whole ears. The product was a mix of six- and two-row hulled barley that was grown in the better soils of the area, judging by the weed contaminants. Therefore, if the grain product represented aspects of the material stored in the souterrain, the people who controlled or owned the souterrain also cultivated the better land in the area and may therefore have been of high status (cf Barclay 1980; Watkins 1980a; 1984; Armit 1999).

In summary, the palaeoenvironmental evidence from the basal fills from Redcastle has allowed insights into the site formation processes of the souterrain but have only provided indirect or negative evidence for its function. As suggested by Watkins (1980a), Barclay (1980) and Armit (1999), the optimum archaeological evidence for assessing questions of souterrain use and abandonment would be the in situ remains of a burnt down souterrain, a discovery yet to be made in the lowlands of Angus and Perthshire.

ARTEFACTS FROM THE SOUTERRAIN AND ASSOCIATED PIT

The find spots of artefacts mentioned in the text are shown on illus 17.

NATIVE POTTERY

Catherine McGill

The later prehistoric pottery assemblage from Redcastle consisted of 45 sherds weighing *c* 380g. The sherds were recovered mostly from within the souterrain fills, with the remaining sherds scattered across the site in pits and ditch fills. A few sherds of modern white glazed pottery were recovered from a pit (098), the upper fill of the main souterrain passage (028) and the ditch of SB1 (context 005), demonstrating the disturbed nature of at least the top few centimetres of these deposits. No joining sherds were recovered. In general, the assemblage from Redcastle fits comfortably with the assemblages from most of the other Angus souterrains.

The assemblage was analysed using the pottery recording system recommended by the Prehistoric Ceramics Research Group (PCRG 1997). The sherds were assigned fabric types after macroscopic examination and were weighed to the nearest whole gram. Each was assigned a form type, with further detailed variables recorded where appropriate. Apposite parallels were identified for the forms represented. The analysis included a measurement of wear, as employed by Lelong (1993) and Swift (1996). This is measured on a scale of 1 (not worn) to 5 (very worn) and can aid in isolating residual elements in an assemblage. Table 11 presents a summary catalogue of the findings.

Fabrics

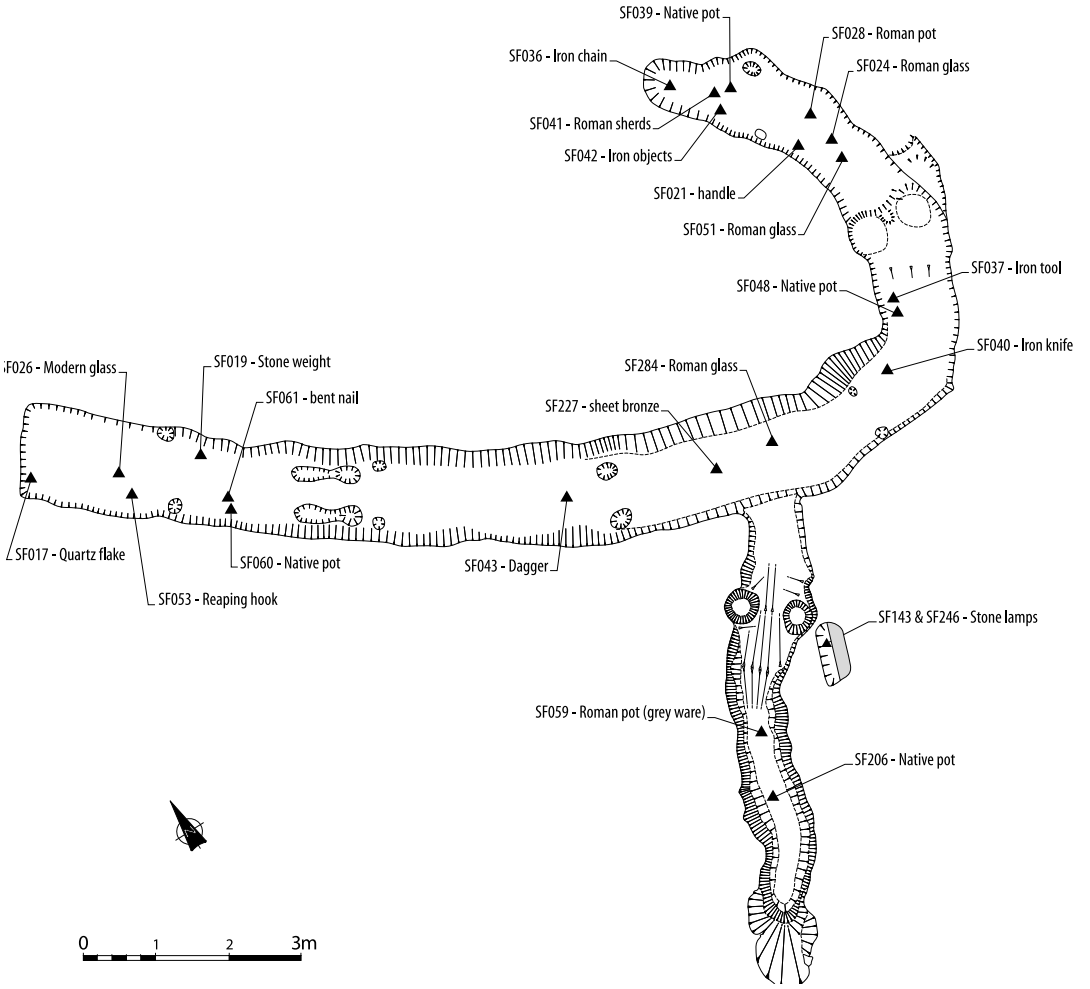
Six fabric types were identified:

Fabric 4 Very fine, sandy and micaceous clay, the exterior half of which is dark buff and interior half black. The fabric is soft, with a chalky texture and a fine fracture.

Fabric 5 Sandy and micaceous clay, with an orange exterior, grey core and black interior. Hard with a fine sandy texture and an even, fairly fine fracture. Very few dark sand-derived grits present, well sorted and less than 1mm across.

Fabric 6 Fine, sandy and micaceous clay. The core is black and the interior and exterior are unevenly coloured with buff, orange and black patches. Hard, with a fine sandy texture and a fairly fine fracture. Very few dark sand-derived grits present, well sorted and less than 1mm across.

Fabric 7 Fine, sandy clay, exterior half black, interior half grey. Hard, with a fine sandy texture and a fairly



ILLUS 17 Souterrain plan showing location of artefacts

fine fracture. Very, very few dark sand-derived grits present, well sorted and less than 1mm across.

Fabric 8 Fine, sandy clay, exterior half orange, interior half black and orangey buff patches. Hard, with a fine sandy texture and a fairly fine fracture. Very, very few dark sand-derived grits present, well sorted and less than 1mm across.

Fabric 9 Sandy clay, orange throughout, hard with a sandy texture and an uneven fracture. Few sand-derived grits, moderately well sorted and angular measuring 1–2mm across.

All fabrics were sandy, as might be expected in an area with a sand subsoil. Fabric 6 was the commonest on the site, with 22 of the 45 sherds formed from it. Of these, all but six came from contexts within the souterrain itself. Fabrics 4, 5 and 8 only occurred in the souterrain.

Form

A total of five rim forms (RF) were identified in the assemblage from Redcastle, of which there was an MNV of only one of each. These are described below. Although half of the rim forms are constructed from Fabric 6, not enough rim sherds survive to allow the secure identification any relationships between rim form and fabric. No bases survived in sufficient condition or extent to allow their profiles to be reconstructed.

TABLE 11
Pottery catalogue

Context	*SF no*	*Fabric*	*Type*	*Wt/g*	*Size*	*Treatment/Residues*	*MNV*	*Wear*	*Illus no*
Souterrain side entrance									
027	206	5	1 ?base, 3 body	56	70mm max, 5–9mm thick	Wet-smoothed int/ext, soot-type residue int	1–2	3	18
027	025, 163	4	3 body	7	40mm max, 5–6mm thick	Wet-smoothed int/ext, thin encrusted residue	1–2	3	
049	046	5	1 body	8	42mm max, 6mm thick	As SF 206, same vessel?	1	3	
Souterrain main entrance									
028	014, –	6	7 body	61	40mm max, 8–12mm thick	Slight burnishing ext, thin encrusted residue int	1	3	
028	086, 131, –	7	1 angled, 3 body	25	43mm max, 6mm thick	Wet-smoothed ext, soot-type deposits int/ext	1	3	
028	035, 086	8	2 body	6	22mm max, 4–7mm thick	?Wet-smoothed int/ext, int soot-type deposits	1–2	2	
028	102	5	1 body	5	34mm max, 7mm thick	Slight burnishing ext, thin encrusted residue int	1	3	
333	039	6	1 rim (RF E)	57	100mm max, 7mm thick	Wet-smoothed int/ext, residue below rim ext	1	2	18
Souterrain main passage									
074	157	8	1 body	2	22mm max, 3–4mm thick	Very slight residue int	1	3	
154	060	6	2 body	18	50mm max, 9mm thick		1	3	
156	048	6	1 rim (RF B), 1 body	80	95mm max, 11mm thick	Wet-smoothed ext/int, sooting below rim ext	2	2	18
158	020, 158	6	1 rim (RF C), 2 body	9	43mm max, 4–5mm thick	Some sooting ext	1	2	
309	023	6	1 base	6	30mm max, 8–10mm thick	None	1	3	
Pit 029									
029	134, 141, 222, 225	6	4 body	114	70mm max, 11mm thick	Pale cream slip in patches ext, residues int on 2 body sherds	1	1–2	
029	141	7	1 rim (RF A)	17	60mm max, 10mm thick	Small residue patch on rim 18	1	3	18
SW ditch of SB5									
034	–	6	1 ?rim	2	22mm max, 9mm thick	Wet-smoothed int/ext, slight residue int	1	3	
Ditch 255									
255/280	011	9	1 rim (RF D), crumbs	1	18mm max, 4mm thick	None	1	3	
280	–	9	5 body	10	30mm max, 5mm thick	None	1	3	

RF A Context 029. Fabric 7. Vessel circumference narrows slightly to join with rim, no intervening neck. The rim is everted in a straight line terminating in a rounded end. Diameter is large, 200–300mm.

RF B Context 156. Fabric 6. Round-bodied pot, curving inwards to everted, slightly convex rim with no intervening neck. Very tip of rim slightly flattened. Body 11mm thick, narrows at join to rim to a minimum of 4mm. Diameter *c* 180mm.

RF C Context 158. Fabric 6. Thin, upright and slightly everted with a rounded rim. 4–5mm thick. Not enough survives to estimate diameter.

RF D Context 255/280. Fabric 9. Plain, upright form with rounded rim. Wall very thin, 3–4mm. Not enough survives to estimate diameter.

RF E Context 333. Fabric 6. A shouldered vessel with a short curving neck leading to a slightly everted rounded rim, creating a roughly S-shaped profile. Diameter fairly small, 100–140mm, and wall *c* 8mm thick.

Construction, surface treatment and decoration

All sherds were handmade. In many cases it was not possible to identify the specific method of construction, but where it was possible, the vessels had been coil-constructed.

Twenty-four sherds had been wet-smoothed on both the interior and exterior prior to firing, and four additional sherds had just been smoothed on the exterior. Twelve sherds appeared to have been rubbed in the leather-hard stage with a damp cloth or something similar until the smaller clay particles came to the surface, creating a fine façade (as described by Halliday 1988). Neither of these processes is uncommon in prehistoric Scotland and neither has been proved to be chronologically sensitive. The treatment is probably partly aesthetic and partly functional – smoothing seals many small holes and gaps around larger inclusions, presumably rendering vessels more watertight when applied to the interior of the vessel. This might tentatively imply that the examples where the wiping is only on the exterior are not purely functional pieces, although the presence of very thin encrusted residues on the interior of the relevant sherds does not support this perspective.

Five sherds from Pit 029, which also contained stone lamps, had a thin applied layer of clay on the exterior which had been fired to a pale cream colour. This only survived in discrete patches.

No obvious relationships between finish or decoration and fabric or context can be identified, and indeed if any were present it would not be possible to be confident of them due to the small number of sherds involved.

Residues and vessel function

Small, thin patches of encrusted residue occurred on the interior of just over half the sherds. Four of these sherds had additional external encrustations. Whether these were derived from residue or sooting is unclear. Five sherds had only small areas of external encrustations. None of these residues constituted a large enough sample to allow either residue analysis or radiocarbon dating. The presence of burnt residues on such a significant proportion of this assemblage would support a domestic interpretation for the vessels' function.

Wear

As stated above, a measurement of wear (1 to 5) was taken for each sherd. This, with due attention being paid to the relative softness of different fabrics and the presence of any applied finishes such as slips or burnishes, can aid in isolating residual components of the assemblage.

In general, the assemblage was fairly unabraded, with most sherds of both hard and soft fabrics having a wear value of 2 to 3, implying they had been deposited in these contexts soon after breakage.

Parallels, dating and discussion

Of the five rim forms identified in the assemblage from Redcastle, four are of the types of everted vessel, normally constructed from a sandy fabric, which are common from souterrain sites and from other Roman and immediately post-Roman sites in Scotland. Close parallels for forms A, B, C and E come from the souterrain entrance and the paving to the north of it at Hurly Hawkin (Taylor 1982, vessels HHA 191 and 205), overlying the nearby souterrain at Hawkhill Area 1 (Rees, forthcoming, SF 1 and 2), in the souterrain at Ardestie (Wainwright 1963), the upper levels at Traprain (Curle 1915, eg 441; Nisbet 1974, eg 1967:281) and in disturbed contexts in association with samian ware at Loanhead of Daviot (Kilbride-

Jones 1936). As with most of these examples, despite the obvious southern influences in their forms, these particular vessels are not wheel-made and are hence likely to be of local construction, not necessitating any direct contact with the Roman world itself. This, and the lack of apposite radiocarbon dates, make precise dating of these forms impossible at present. Carlungie and Ardestie souterrains, and Hurly Hawkin broch and souterrain, have all been tentatively dated to late first to second century AD (Wainwright 1963; Taylor 1982) on the basis of the presence of artefact types such as samian ware, amphorae and Roman brooches, all of which have been found in association with these pot forms, so this can be forwarded as an equally tentative date for the Redcastle assemblage. The radiocarbon dates from the souterrain also support this dating.

Rim Form D is upright, but with a rounded rim. This form is distinctive in being very thin-walled, with a maximum thickness of only 4mm. This type of vessel is known in the Neolithic (for example, a similar vessel is listed as Neolithic in the Loanhead of Daviot cremation cemetery assemblage; Kilbride-Jones 1936), commonly burnished, but it cannot be said to be diagnostic of this period, for example appearing in an organically tempered fabric at Broxmouth (Cool 1982). Neither of these forms can be assigned to a particular period with any confidence.

Perhaps fitting into the Roman Iron Age are the sherds with the applied clay finish from context 029. A similar application is documented in the Roman period assemblage from the upper contexts at Traprain (Nisbet 1974).

As stated above, around half of the ceramic assemblage was found in the souterrain. The majority of these sherds came from the upper fills, although there were no rims from these contexts. Seven sherds came from secondary fills (contexts 154, 158, 309 & 333). These included Rim Forms C and E. Rim Form B came from primary fill (context 074) and can be related to the functional life of the souterrain. As both the form from the primary deposits and the two from the secondary deposits are datable to the same general period, there is no evidence that the souterrain was in use for a long period of time. However, considering the lack of precise dating currently possible for the forms, this cannot be viewed as anything more than a possibility.

Pit 029 contained Rim Form A, the sherds with the applied clay layer and the stone lamps, all of which suggest a broad contemporaneity with souterrain-related activity. Although Rim Form D, which occurs in Pit/Ditch 255/280, cannot be clearly associated with this period, it does not mean that this pit/ditch derives from a different phase of activity.

In summary, there is no unarguable evidence that any vessels in the Redcastle assemblage do not date to the first few centuries AD. This suggests that the assemblage relates principally, perhaps even in total, to the period of activity on the site represented by the souterrain. No pottery can be related directly to the construction of the round and square barrows. The sherds which are linked to the destruction of these features, the infilling of the ditches, are largely highly abraded, suggesting they were residual at the time of their deposition. This picture is perhaps what would be expected from a site where the primary phase of activity represented is dominantly domestic, even if there were related rituals within this, and the secondary funerary. The similarity in both date and wear between sherds from the primary, secondary and final fills of the souterrain suggest, if not that the souterrain itself had a short life, that it was infilled soon after it went out of use, before even the soft Fabric 4 sherds could be abraded. It is possible that the people who constructed the funerary monuments were not even aware of the presence of the souterrain beyond noticing the occasional sherd while they dug.

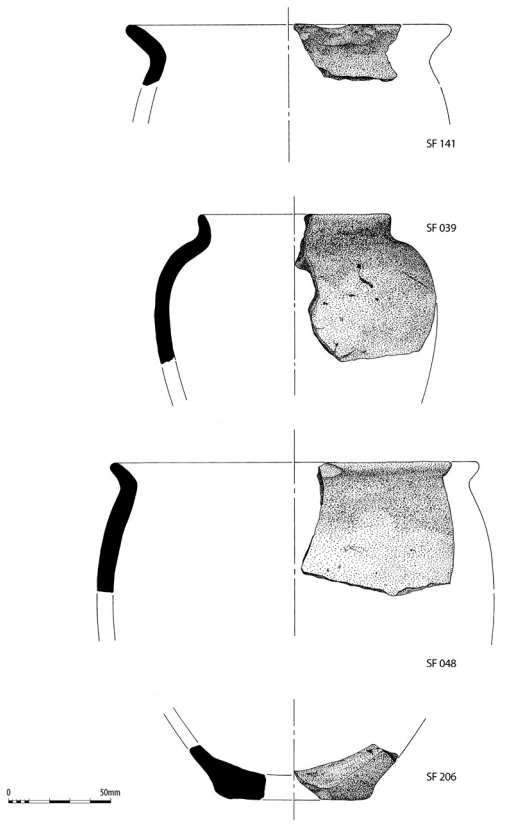
Catalogue of illustrated later prehistoric pottery (illus 18)

SF 141 Fabric 7. 1 rim, 17g, 60mm max extent, 10mm thick. Small encrusted patch on rim. MNV 1, wear 3. RF A. Pit 029, beside souterrain side entrance.

SF 039 Fabric 6. 1 rim, 57g, 100mm max extent, 7mm thick. Wet-smoothed on interior and exterior, encrusted residue below rim on exterior. MNV 1, wear 2. RF E. 100–140mm diam. Context 333, souterrain main entrance.

SF 048 Fabric 6. 1 rim, 1 body, 80g, 95mm max extent, max 11mm thick. Wet-smoothed on exterior and interior. Slight sooting below rim on exterior. MNV 2 (body 6mm thick, rim 10mm thick), wear 2. RF B, diam *c* 180mm. Context 156, souterrain main passage fill.

SF 206 Fabric 5. 1 ?base, 3 body sherds. 56g, 70mm max extent, 1 sherd 5mm thick, rest 9mm. Wet-smoothed interior and exterior. Internal soot-type residue in small patches. MNV 1–2, wear 3. Context 027, souterrain side entrance.



ILLUS 18 Later prehistoric pottery: SF 141, 039, 048 & 206

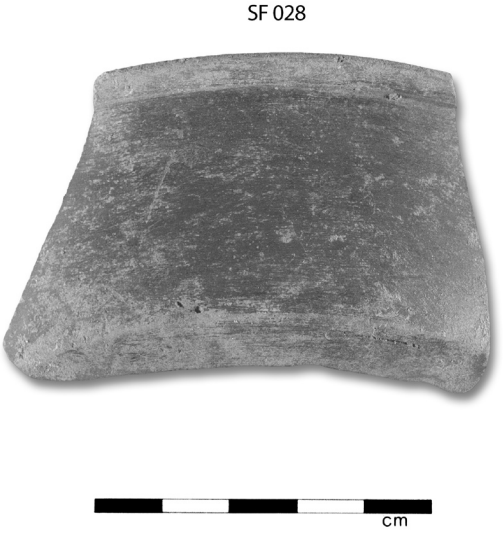
ROMAN POTTERY

Gordon Thomas

SF 059 (not illustrated) Greyware base sherd of an open-mouthed ?globular or round-bodied vessel with a flat base. Base diameter 70mm; wall thickness 5.5mm. The fabric is a smooth, hard dark grey matrix with tiny micaceous inclusions. The surface is well-smoothed and hand-burnished to a dull glossy dark grey finish. Carbonized food residue can still be seen adhering to the interior in patches. This vessel is in a typical form, fabric and finish for the coarse Greywares which are fairly commonly found on second century AD sites of the Roman period in Scotland. This sherd was recovered from Fill 027 of the side entrance to the souterrain (illus 17).

SF 028 (illus 19) Sherd of part of the rim and body of a vessel in Dr 18/31 form. Part of the sharp carination and rolled rim are preserved in a form and size which suggests a mid second century AD date. Rim diameter 170mm; wall thickness 5–7.5mm. The fabric is a very smooth, soft and uniformly light grey material with no inclusions or internal structure in evidence. The fractures of the sherd are well-smoothed in keeping with the softness of the fabric and antiquity of the break. There is a very fine, coated surface in a dull black finish that has been well and regularly smoothed or burnished to give a uniform surface treatment. Wear on the rim has exposed the underlying lighter grey fabric of the vessel in places. This sherd was recovered from the fill of the soutterrain (context 309) close to its main entrance (illus 17).

This is a classic samian shape with the type of detailing, form and finish expected of the Central Gaulish samian industry of the mid-second century AD. The angle of the carination and the depth of the bowl are typical of form Dr 18/31 at this time. However, the grey colour of the sherd is slightly perplexing and must be explained. Under the normal conditions of samian manufacture, an oxidizing atmosphere produces a characteristic red/orange fabric and surface finish. This is not the case with the Redcastle sherd which appears to have been produced under reducing conditions, giving a grey and black appearance. The uniformity in tone of the fabric and surface finish suggest that the grey and black colours are not the result of an accidental burning. There is no gradation of tone across the section, neither is there a slightly pinkish tone to the interior core as would be expected in any post-manufacture burning.



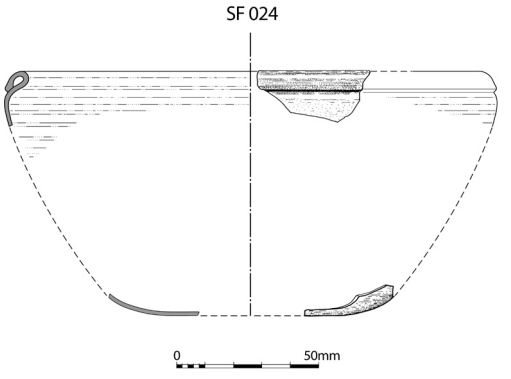
ILLUS 19 Roman pottery: SF 028

Similarly, the uniformity of the black colour across both the interior and the exterior surfaces shows no sign of mottling or grading as would be expected in such a burning. Accidental firing at temperatures higher than the manufacture conditions may well produce a more uniform appearance to the sherd but some degree of vitrification or damage would be in evidence.

It would seem that the appearance of the vessel may be a deliberate result of the manufacturing process. We are, therefore, left with one of two intriguing conclusions. The possibility of this sherd being an imitation samian product of the London Ware industries of first and second century Britain is an attractive proposition. However, this particular form is not known to have been produced there and so, barring any evidence to the contrary, this source must be discounted as a possibility. Alternatively, we should perhaps be considering this vessel as being an unusual product of the central Gaulish samian pottery industries, perhaps even a waster. In this case, its presence on an Iron Age site in Scotland is all the more remarkable.

Discussion

These two sherds are indicative of the range of Roman artefacts and goods finding their way onto Iron Age sites in Scotland during the first and second centuries AD. The Greyware sherd is of a coarse domestic vessel used primarily in cooking or temporary storage. The Dr 18/31 bowl, on the other hand, would, in a Roman context, be regarded as a fine ware vessel for use at the table or for display. Despite its black appearance, it would still have been a quality vessel. Both high status and ordinary domestic vessels are, therefore, represented. The shapes and fabrics of both vessels fall quite happily within a mid-second century AD time range.



ILLUS 20 Roman glass: SF 024

ROMAN GLASS

Dominic Ingemark

A total of at least 33 fragments of Roman glass were found during the excavation of the souterrain. Although the material was strongly fragmented – as is often the case on native sites – it could be positively identified as belonging to two vessels: a greenish-brown tubular-rimmed bowl of Isings form 44b and a colourless cylindrical cup of Isings form 85b (Isings 1957).

The tubular-rimmed bowl (illus 20, SF 024) was broken shortly after it reached Redcastle, and one may assume that the owner was very disappointed. The sherds show virtually no wear, and have internal cracks as a result of improper annealing when it was manufactured. Eight fragments of the bowl were found in the fill of the main entrance of the souterrain (illus 17), suggesting that it was broken nearby.

The strong fragmentation of the cylindrical cup shows that it was exposed to heat for a short period of time and then hastily cooled off. However, whether it was dropped in a hearth by accident, or was deliberately destroyed, is impossible to know. Although some 25 or more fragments of the cup were found, these were so minute that only a very small fraction of the vessel was preserved, in contrast to the tubular-rimmed bowl. This could imply that the sherds ended up in the souterrain only after the vessel was broken, or that the inhabitants managed to sweep together most of it.

The two vessels could – at least in theory – be contemporary, as the earliest finds of cylindrical cups in Britain have been found together with the latest known finds of tubular-rimmed bowls elsewhere. But it might be suggested that the two vessels reached the site on different occasions as the latter type was 'out of fashion' when the production of the former type started.

The deep tubular-rimmed bowl (illus 20)

The characteristic and easily identifiable tubular rim is found on both deep bowls (Isings 1957, form 44) and shallow bowls (ibid, form 45) of the first and second centuries, as well as on deep bowls of the fourth century. Isings' form 44b – to which the

Redcastle find belongs – has a broad vertical tubular rim, the rim edge folded out and down.

Bowls of this type occasionally have a rim that is rolled-in, forming a double fold. The bodies of the bowls are cylindrical or slightly concave, with a smoothly rounded or sharp angle between the body and base. The bases are horizontal with an applied vertical or diagonal base ring. The bodies can be plain or have optic-blown diagonal or vertical ribs, which sometimes extend to part of the base (Cool & Price 1995, 94–5). The rim diameter of the vessels varies from *c* 100 to 250mm (Price & Cottam 1998, 78). The Redcastle example appears to have been plain and was about 150–200mm in diameter.

Tubular-rimmed bowls were manufactured in both strong colours and common blue-green glass, the latter being the most common. Colourless vessels are known, but are rare finds. Strong colours such as deep blue, purple and vessels with marvered-in opaque dots belong to the Neronian period; whereas colours such as yellow-brown, yellow-green and blue-green were produced in both this period and until the third quarter of second century AD (Price 1996, 382). Bowls of this type date from AD 60–65 to 160–170. The latest known examples were found in Harlow, Felmongers, Essex in a deposit dated to AD 160–170 (Price 1987, 202). The Redcastle bowl is greenish-brown, and thus it cannot be given a closer date than the timespan mentioned above.

What function these vessels may have had in a Roman context is not clear, but it may be suggested that they were used for serving or presenting foodstuffs. Whether or not the bowls retained this function in a native context is hard to tell. Large, deep tubular-rimmed bowls have been found on two other native sites in Scotland: a brown vessel was found in Hyndford Crannog, Lanarkshire (Ingemark 2003), and a bowl of the same colour in Torwoodlee, Selkirkshire (Harden 1951, 113). Bowls of this type have been found on several Roman sites in northern Britain: Newstead, Vindolanda, Corbridge, Castleford and York. In the rest of Britain, tubular-rimmed bowls are very frequent finds.

The cylindrical cup

Isings (1957) form 85b is a low cylindrical cup, with a thick fire-rounded rim. The body has a straight or slightly concave side. The base is slightly convex, and in most cases it has a characteristic double base-ring which makes it easily identifiable. The outer base-ring is tubular and pushed-in, whereas the inner base-ring is an applied thick trail. In the centre of the underside of the base there is often a pontil-scar. The cups vary in size, the rim diameters normally ranging from 70 to 140mm, the height from 60 to 100mm (Price & Cottam 1998, 99–101). The diameter of the Redcastle example is unknown. The vast majority of finds are in good quality clear, colourless or greenish colourless glass, as here at Redcastle. However, finds of cups in common blue-green glass have been made. At the Roman fort at Newstead, Scottish Borders, fragments of deep blue cups have been unearthed. These, however, seem to have been very rare indeed (Cool & Price 1995, 63).

There are several variations of this type, both plain and decorated. The single most common variant is the plain so-called Airlie-type, the name derived from a grave find in Airlie, Angus. A second, relatively rare variation is the painted Jesendorf type (Schuldt 1948–9, 225). The name derives from a grave-find in Jesendorf, Mecklenburg, Germany. No intact vessel with painted decoration has been found within the Roman Empire. However, there are a number of grave-finds from Free Germany and Scandinavia. The motifs are either from the arena with depictions of *venationes* (animal hunts), *munera gladiatoria* (gladiatorial fights), or more peaceful motifs such as birds.

Ten non-Roman sites in Scotland have yielded finds of some 11, possibly 12, cylindrical cups with fire-rounded rims and base rings. This makes it one of the most common types found on native sites. Four or five cups (two or three of which are lost) came from graves. Airlie (Davidson 1886, 136) and Kingoldrum (Chalmers 1854, 191), both in Angus, are situated relatively close to each other. In addition to these, there are grave finds from Hallowhill, Fife (Stuart 1867, viii; Proudfoot 1996, 420–2), and Westray, Orkney (note by Dr J Anderson in Davidson 1886, 138). All the grave finds were of the plain Airlie-type. Examples are known from settlements at Clickhimin, Shetland (Hamilton 1968, 143–4); Dun Mor Vaul, Tiree (MacKie 1974, 148–9); Dunollie, Oban, Argyll (Alcock & Alcock 1988, 131–2); Leckie Broch, Stirlingshire; and Traprain Law, East Lothian. The Leckie cup is of a rare type, with so-called snake-thread decoration, and one of the cups from Traprain Law was of the Airlie type. The remainder were of the painted, Jesendorf type. Thus roughly half of the finds in native contexts were decorated, which stands in contrast to the finds made within Roman Britain. In this latter area, literally thousands of the Airlie-type

cups have been found, in comparison to a mere 30-odd decorated cups.

The earliest securely dated finds from Roman Britain are from a rubbish pit in Harlow, Felmongers, Essex, and are dated to AD 160–170 (Price 1987, 192). The latest finds come from an occupation layer dated AD 235 to 250/260 in Vindolanda, Northumberland (Price 1985, 207), and graves in the Roman cemetery of Brougham, Cumbria, dated AD 220/230 to 270/280 (Cool 1990, 170). There is no reason to believe that the date of the finds from native sites in Scotland should differ radically from these dates, with one exception: the Dunollie find – a painted cup of Jesendorf type – was kept as an heirloom for several hundred years, which underlines the high value these objects had in native societies. Cylindrical cups are very common finds on Roman military sites in northern Britain, and it is likely that they reached the native sites via these (Ingemark 2003).

In Roman contexts, these cups were used for drinking wine. For example, an engraved cup from Trier, Germany, says 'BIBAMUS', 'let us drink' (Kisa 1908, 648, figs 257 & 257a; Fremersdorf 1970, 61), and Anton Kisa put forward the idea that the painted letters 'DVBP' on a cup found in Varplev, Zealand, Denmark, should be read: D(a) V(inum) B(onum) P(ie), that is 'cheers' (Kisa 1908, 824). It may well be that these vessels had a similar function in a native context, either for drinking wine, or more probably for drinking fruit beer. Fruit beer resembles wine in colour and has a high alcohol content, making it a good substitute for wine (Ingemark 2000a; 2000b).

SF 024 (illus 20) **and SF 033, 041 & 051** (not illustrated) Eight fragments of bowl, greenish-brown glass. Tubular rim, edge bent out, down and in. Rounded change of angle to the lower body. Base flat with a slightly raised rib running diagonally; optic-blown (?). Some bubbles, many internal cracks. Very little sign of wear. Rim diameter *c* 150–200mm. Contexts 028, 309 and 333, souterrain, lower fill in main entrance (except SF 033, from upper fill of main passage) (illus 17).

SF 284 (not illustrated) Twenty-five+ base fragments of cup, colourless with a green tinge. Remains of a tubular base ring. Strongly fragmented as a result of being exposed to heat for a short period of time, then hastily cooled. Context 158, windblown sand fill of main passage of souterrain (illus 17).

METALWORK

Fraser Hunter

Copper alloy

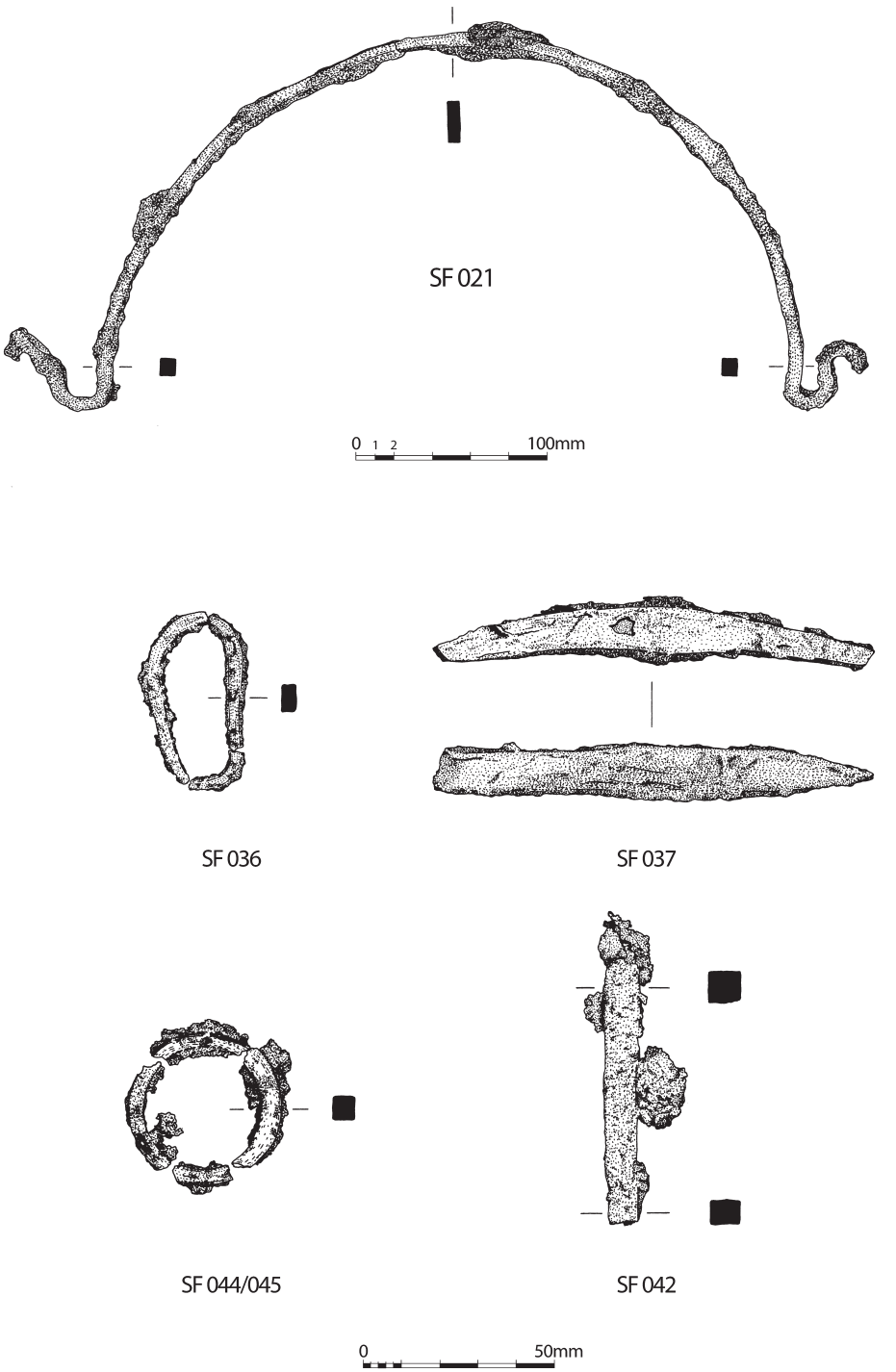
SF 227 (not illustrated) Six fragments of relatively thick bronze sheet, with no surviving original edges. The largest two join to form a flat triangular fragment, bent somewhat at one corner. In the absence of any clues as to original shape, assessing likely function is difficult. The fragments are too thick and too flat for a vessel, and are more likely to come from some form of mount. Non-destructive X-ray fluorescence analysis showed it is an unleaded tin bronze, an ideal alloy for sheet-working. 60 × 39mm (largest two joining fragments). T 1–1.5 mm. Context 121, souterrain, basal layer (illus 17).

Iron

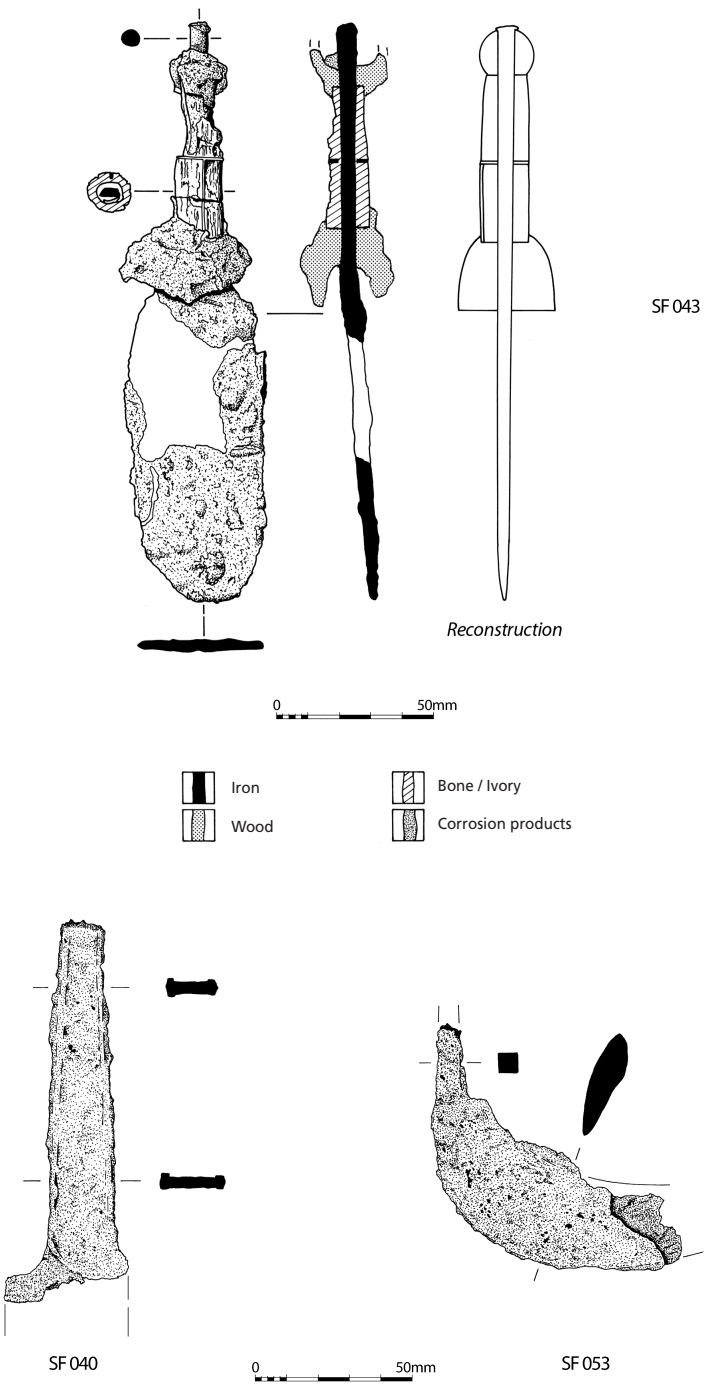
In general, the iron is heavily corroded, with often only the outer surface surviving over a largely hollow corroded core. There is little visible surface detail, although further conservation would reveal more.

SF 021 (illus 21) Vessel handle. Semicircle forged from a rectangular-sectioned rod (max 21mm W × 9mm T), tapering to a square section (9mm) at the terminals; one is recurved into an S, the other is a simple upward curve which flares out slightly towards the end. It probably matched the other terminal originally but was damaged, perhaps in the process of removing it from the vessel. The handle is intact (four joining pieces) but slightly asymmetrical, perhaps from damage. A sub-circular flat protrusion on top is a corrosion blister. Distance between terminal curves (ie vessel diameter) 395mm. Compare a smaller, more arched example from the Blackburn Mill hoard (Piggott 1953, 42, B10).

In a Scottish context, the most likely vessels with such a handle would be bronze cauldrons: while the largest of these would be suspended from chains (Manning 1983), the diameter is remarkably close to the smaller globular cauldrons (MacGregor 1976, nos 301–3, 306–7). The other possibility is that it derived from an organic vessel such as a stave-built bucket, as known from burials in southern England. However, these are typically no more than 300mm in diameter (Stead 1971), although Fitts et al (1999, 40–43) suggest fragments from the Melsonby, North Yorkshire hoard may derive from a larger vessel and quote other parallels. This expands the distribution of



ILLUS 21 Metal artefacts: SF 021, 036, 037, 042 & 044/045



ILLUS 22 Metal artefacts: SF 043, 040 & 053

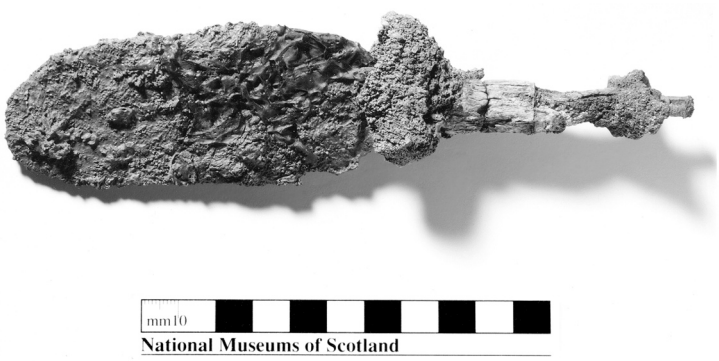
the type markedly northwards and suggests handles of the Redcastle size could be used for such vessels. Whether bronze or wooden, vessels of this size carry connotations of status, as seen by their presence in votive offerings (for the cauldrons) and rich burials (for the buckets). L 460mm, H 190mm. Context 309, souterrain, lower fill in main entrance (illus 17).

SF 036 (illus 21) Chain link, a pointed oval slightly waisted on one side. Section varies from *c* 4.5mm square to rectangular (7×4mm). Three joining fragments. L 48mm, W 25mm. Context 333, souterrain, lower fill in main entrance (illus 17).

SF 037 (illus 21) Unidentified tool, thickened at the centre and slightly curved longitudinally. One side is 56mm long, tapering to a thin slightly angled end. The other, 62mm long as it survives, is virtually parallel-sided and markedly curved longitudinally. The working edge is broken off; the blade is 11mm wide at this point and the underside is slightly channelled from forging the edge.

The loss of one working edge makes it difficult to be sure what this tool was, and indeed it is unclear how it was even mounted. The thinner arm is too sharp to be a tang as it would split the handle, and should be seen as an edge. The thickened centre may have been designed as a hand-hold for a double-edged tool, perhaps padded with cloth or leather. This implies it was a fine tool used on soft material such as leather; given its size and the two sharp edges, it could only be used with hand force, not struck.

However, it is hard to parallel, making it difficult to suggest a more definitive interpretation. L 118mm, W 17mm, T 14mm. Context 309, souterrain, middle fill in main entrance (illus 17).



ILLUS 23 Photograph of dagger: SF 043 (© *Trustees of the National Museums of Scotland*)

SF 040 (illus 22) Handle from a heavy knife. Tapering rectangular-sectioned bar, the edges slightly raised in places from forging and the end thickened to retain an organic grip. It expands into a blade which has snapped just below the handle, with a slight step up to the back and a more pronounced step down to the blade edge. The handle is thickest in the middle, tapering towards both ends. Its size suggests this was a substantial knife. L 120mm. Handle L 100mm, W 21mm, T 7mm. Blade W 40mm as it survives. Context 159, souterrain, fill of main passage.

SF 042 (illus 21) Nail, square-sectioned, tip lost. Head details confused by corrosion, but appears to be a square head now at an angle to the shaft and curved round it, presumably from hammering. L 81mm, shank 9×8mm, head *c* 17×14mm. Context 333, souterrain, lower fill in main entrance (illus 17).

SF 043 (illus 22 & 23) Dagger. The tang is rectangular-sectioned (8 × 3mm); at the end it is circular, expanding slightly to hold the pommel. The poorly-preserved blade (W 44mm × T 4mm) has sloping shoulders; it is double-edged and flat, without any thickened midrib. It appears to have been reworked after breakage, as the upper part has parallel edges while the end has been reshaped into a slightly asymmetrical rounded point.

Corrosion has preserved rare traces of the organic hilt, which has three components: a guard and pommel of wood aligned cross-grain to the tang, and a bone grip. Owing to degradation, the wood species could not be identified (R McCullagh, pers comm). The guard is domed, and flattened in section (H 22mm, T 22mm, W min 40mm); although only partly preserved, it appears to be straight rather than campanulate and to end in line with the blade edge. The grip, 47mm long, comprises two equal tubular sections of bone, slightly sub-circular in section (15 × 14mm) reflecting the shape of the original material. It is decorated by a thin (0.5mm) iron disc separating the sections and an inlaid iron strip 1mm wide running down the middle of the lower section. The tang runs through the natural cavity in the bone, which is packed with a fibrous material to make it more secure. This comprises two-ply Z-twisted fibres, probably of vegetable origin (Clydesdale 1999, 14). The pommel is only partly preserved; the surviving lower part suggests it was originally either globular or a flattened sphere some 20mm H and at least 25mm D.

The size of the handle, and particularly the grip, indicates this is a dagger rather than a sword; sword grips are typically over 70mm long, with tangs/handles some 100–140mm long (eg MacGregor 1976, nos 143, 145–6, 151–2, 158; Stead 1991, 66–74). The flat blade is consistent with this identification, as a short dagger does not require as strong a blade. There is a considerable variety in the lengths of dagger blades (eg Jope 1961, although mostly much earlier than this example; Stead 1991, 71); Scottish examples are rare, but there are some from Lochlee, Ayrshire (Munro 1882, 125–6), and a very small one from Balloch Hill, Argyll (Peltenburg 1982, 192, fig 18.115).

Existing sword typologies tend to rely on the decorative copper-alloy portions or on blade shape for classification, making it difficult to categorize the Redcastle example. Organic hilts find parallels from Atlantic Scotland (Rynne 1983) and must originally have been widespread. They are particularly suitable for daggers, which are unlikely to be receiving the same force of blow as a sword, and therefore a bone or (as in this case) wooden guard would provide perfectly adequate protection. Discs of iron or bronze are common features on organic handles (most clearly Stead 1991, 70–1 & fig 54; also Piggott 1950, fig 11 nos 1, 5; MacGregor 1976, 157). Decorative metal

inlays also find parallel (eg Stead 1991, 70, R25). The straight hilt end is typical of the late Iron Age, becoming current in the first century BC/AD (Stead 1991, 64–5), while the overall shape, with a domed guard and an expanded, perhaps spherical, pommel is reminiscent of swords and scabbards of Piggott's Group IV (1950, 17–21), typical of northern England and southern Scotland; Redcastle lies at the edge of the distribution (MacGregor 1976, map 13). Most of these weapons have lost their organic components, but the few examples with an all-metal or predominantly-metal hilt give the original shape (eg Boon 1974; MacGregor 1976, nos 143, 145, 158). This is the first example of a Group IV-type weapon with an entirely organic hilt. Context 074, souterrain, primary post-occupation fill (illus 17).

SF 044 & 045 (illus 21) Two joining square-sectioned (4.5mm) curved rod fragments, making up around 50% of a ring some 40mm in external diameter. No discernible wear marks to suggest function. Context 074, souterrain, primary post-occupation fill.

SF 053 (illus 22) Reaping hook, *c* 120mm long (measured in plane of tang), intact but with the tang and tip now detached and fragmentary. The tang can be reconstructed as approximately square-sectioned (8 × 6mm), some 64mm long with the end narrowed and upturned to retain the handle. The blade is a maximum of 28mm wide, with a back *c* 4.5mm wide; it steps down into the tang on the inside only. Surviving blade chord length is 65mm, but the blade curve and the surviving tip suggest an original length of *c* 95mm. The surviving blade shape indicates it curved to just over 90° to the tang, and was not heavily recurved (Rees 1979, fig 158, type IIa).

This is a typical Iron Age and Roman harvesting tool, with Scottish parallels from Traprain Law and Newstead (Rees 1979, 450–61, 650, 652–4). The fact that this type continued in use once the more efficient balanced sickle was developed from the first century BC suggests it may have had additional functions, such as gathering or splitting small roundwood. Context 074, souterrain, primary post-occupation fill (illus 17).

SF 061 (not illustrated) Bent nail? Three joining fragments of a tapering square-sectioned rod, lacking the head and bent through 180°. The taper suggests this is most probably a bent nail. 45 × 30 mm as curved; straight length *c* 80mm; section 6mm. Context 154, souterrain, fill of main passage (illus 17).

Discussion

Although small, the Redcastle ironwork (illus 21 & 22) is an important assemblage – well-contexted Iron Age iron objects are distressingly rare in Scotland, giving every assemblage a disproportionate significance. There are individual pieces of considerable interest within this material. Most notable is the dagger (SF 043), a rare item in any event, which is made more interesting by the exceedingly unusual survival of the organic hilt. Attempts have been made above to compare it to other Iron Age weaponry, and it fits well as a previously unknown aspect of local traditions of sword manufacture, linked to the Group IV swords. The handle (SF 021) is also an unusual find, its size pointing to the presence of a substantial vessel (probably a bronze cauldron) on the site. In terms of our understanding of the Scottish Iron Age, both these items would generally be classed as artefacts of some status. Given the general rarity of tools, the unidentified (indeed apparently unique) double-edged tool (SF 037), while hard to interpret, is a valuable addition to a small corpus.

It is worth considering the assemblage as a whole in terms of functional categories (Table 12). While it is unwise to draw wide-ranging conclusions from so few objects, a number of points are clear. The

TABLE 12
Functional categories represented in the metalwork

Tool	*Weapon*	*Fixture/fitting*	*Vessel*	*Uncertain*
SF 037 unidentified	SF 043 dagger	SF 036 chain link	SF 021 handle	SF 227 bronze sheet
SF 040 knife		SF 042 nail		
SF 053 reaping hook		SF 044/045 ring		
		SF 061 ?nail		

sparsity of nails confirms the emerging pattern that nails are rare in the Iron Age except on a few highly unusual sites, in contrast to their abundance in the Roman period (Hunter 1998, 366–7). The building of a timber souterrain did not apparently require nails. The preponderance of tools, fixtures and fittings is an everyday assemblage; for instance, the tools give evidence for agricultural activities, typical tasks in the Iron Age daily round. As discussed above, the dagger (SF 043) and the vessel handle (SF 021) stand out as unusual finds. It is also noteworthy that most of the artefacts were broken or incomplete when deposited (or in the case of the dagger SF 043, had been reused). They are best seen as objects which had reached the end of their useful lives and were discarded – only a wider study of the souterrain fills could suggest whether there was any deliberate patterning to this beyond casual rubbish deposition.

Two finds stand out as potentially different from this pragmatic picture of rubbish disposal. The reaping hook (SF 053), although now in pieces, is the only object which appears to have been intact when deposited. It is tempting to link this to theories about the wider significance of such agricultural tools as symbols of the agricultural cycle and therefore of the fertility on which the community's wealth depended – such tools were often deliberately buried as propitiatory offerings (Hingley 1992, 23–4, 38–9; 1997, 13–15). It is thus possible that it was deliberately deposited during the initial abandonment of the souterrain – an offering in a belief system which viewed it as symbolic of agricultural fertility, perhaps to bring luck in future harvests. This would be especially appropriate if the function of souterrains as stores for agricultural produce is accepted. There are admittedly few parallels for this in other souterrains, although few have been fully excavated to modern standards, but the small iron hoe from the entrance passage at Ardestie may be noted (Wainwright 1963, 132, no 18).

The other find of interest is the handle (SF 021), which appears to have been deliberately removed from its vessel with one terminal bent in the process and the whole handle slightly distorted. This could of course be for prosaic reasons. However, it is noteworthy that all the cauldrons found in votive deposits in north Britain lack their iron fittings, and it has been argued that the deliberate removal of the iron fittings represented the end of the vessel's life before it was offered to the gods (Hunter 1997, 119). Perhaps this is the residue of this process, with the cauldron removed for deposition elsewhere as part of the ceremonies connected with the souterrain's abandonment.

These speculations about the souterrain's fate must remain essentially unprovable. The main value of the Redcastle assemblage is in adding to the wider picture of Iron Age ironwork – a topic which merits renewed attention as the database is gradually augmented.

COARSE STONE OBJECTS

Adam Jackson

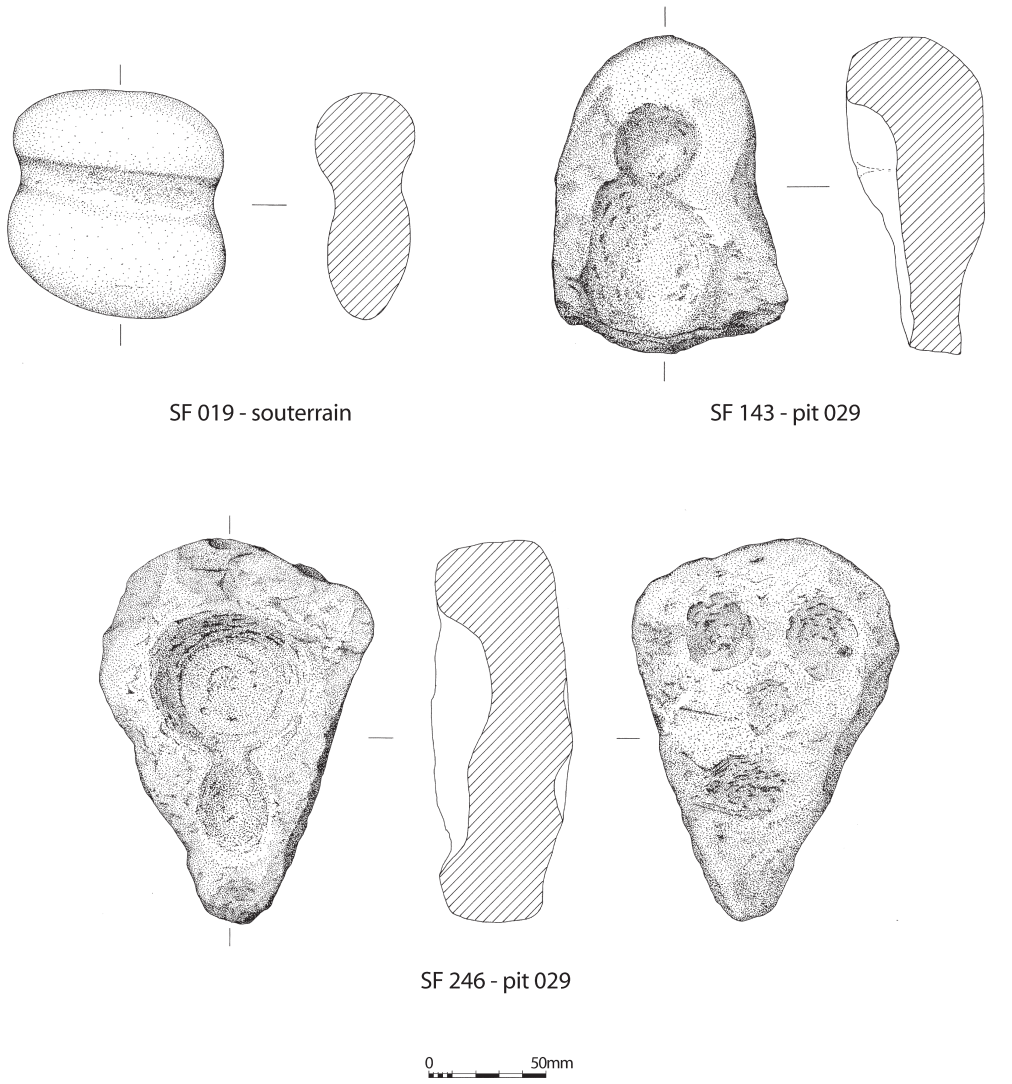
Stone lamps

Two stone lamps (illus 24, SF 143 & SF 246) were recovered from Pit 029, some 2m south of the souterrain and adjacent to its side entrance (illus 17). Both were originally of roughly triangular form with flattish uneven bases. One (SF 143) was broken, the other (SF 246) complete. Two adjoining depressions on one side create an asymmetrical 'figure-of-eight' shape, creating the lamp. Notably, the underside of one (SF 246) has four neatly pecked circular depressions suggesting the depiction of a human face.

On a broad level, the Redcastle finds can be viewed within the Iron Age stone cup/lamp tradition (there is confusion in the classification of lamps, cups and ladles). Examples have been recovered from a number of Iron Age sites, particularly in eastern and north-eastern Scotland, the Northern Isles and other areas of Atlantic Scotland (Steer 1956, 243–6; Close-Brooks 1972; Ralston & Inglis 1984; Sharples 1998). Steer (1956, 245) suggests that lamps of this form generally date from the immediate pre-Roman Iron Age until the second to third centuries AD. However, Stevenson disagreed, suggesting none were pre-Roman (Taylor 1990, 33).

While these are useful for discussion, the Redcastle examples differ from many of these finer-made lamps being different in form, manufacture and perhaps function. Briefly, the larger hole was for the burning of oil while the smaller hole was a wick rest (Hedges 1987, 79). Parallels are known from other Iron Age sites, for example, Kettleburn, Caithness (Anderson 1883, 212); Clickhimin, Shetland (Hamilton 1968, 41, 115); and Finavon, Angus (Childe 1935, 75). The best comparisons are the examples from Gurness, Orkney (Hedges 1987, 220, figs 2.58–60).

These examples illustrate that lamps of this type have a general north-eastern and northern Scottish distribution running from Tayside, through the Highlands to the Northern Isles. As regards date,



ILLUS 24 Stone artefacts: SF 019, 143, 246

the examples from Gurness, Kettleburn, Finavon and Clickhimin cover a long time period, for example, the lamps from Clickhimin were found in Iron Age farmstead, fort, broch and wheelhouse levels, suggesting that these functional pieces have a long Iron Age tradition. However, at Redcastle, the close association of the pit to the souterrain which contained Roman material and produced radiocarbon dates points towards their use in the Roman Iron Age.

SF 143 (illus 24) Fragmentary stone lamp made of coarse-grained grey sandstone. Consists of two adjoining pecked depressions forming an oval cup and a circular wick rest. Exterior rough-pecked to shape with flattened base. Some evidence of secondary burning in cup, on the base and at break. L (fragmentary) 133mm; W (fragmentary) 112mm; T/H 63mm; diameter of smaller wick rest 40mm; depth of cup 42mm; weight 836g. Context 029, pit adjacent souterrain (illus 17).

SF 246 (illus 24) Stone lamp made of fine-grained sandstone. Consists of two adjoining circular depressions forming a cup and wick rest pecked in a roughly triangular-shaped stone of naturally occurring form. The flattened underside has four circular pecked depressions that appear to form a human face. These comprise three depressions of equal size laid out with one for the mouth at the triangular apex and two for the eyes at the widest end. The shallow fourth depression is centrally placed as for a nose. There is some evidence of burning and of polishing at the neck of the join between the cup and wick rest. L 163mm; W 122mm; T/H 55mm; diameter of cup 74mm; depth of cup 32mm; weight 989g. Context 029, pit adjacent souterrain (illus 17).

Line sinker

A single line sinker was recovered from context 308, one of the upper fills of the souterrain main passage (illus 17). Line sinkers of similar form are known from other Scottish Iron Age sites, with the best parallels from Jarlshof, Shetland (Hamilton 1958, 12–13, plate XXXIV). At Jarlshof, line sinkers were recovered from Viking period levels, although it is unlikely that such items were confined solely to this period.

SF 019 (illus 24) Asymmetrical chert cobble with longitudinal groove. Probably naturally occurring form that has been utilized as weight or line sinker. L 98mm; W 96mm; T 43mm; width of groove 18mm; depth of groove 6mm max; weight 506g. Context 308, souterrain main passage, upper fill (illus 17).

RADIOCARBON DATING

A total of seven samples from the souterrain were submitted for AMS radiocarbon dating (Table 13). Six of these dates were obtained from carbonized barley grains recovered from wet-sieving samples from the basal grid (illus 10), and the seventh date (GU-9683) was from a grain recovered from the fill of post-hole 338 (illus 6). At a 2-sigma calibrated range, it is clear that the souterrain was used and abandoned sometime within the first–fourth centuries AD.

DISCUSSION OF THE SOUTERRAIN

The souterrains of 'Southern Pictland' (Wainwright 1963) are one of the most characteristic Iron Age features of some parts of eastern lowland Scotland. Their celebrity undoubtedly stems from a continued fascination with the subterranean nature of their construction, coupled with the continuing debate over their function. The Guardianship sites at Carlungie, Ardestie and Tealing in Angus continue to attract visitors and students keen to understand these enigmatic features.

TABLE 13
Radiocarbon dates from the souterrain

Lab code	*Context*	*Sample material*	*Years BP*	$\delta^{13}C$	*Calibrated age (AD)*	
					1-sigma	*2-sigma*
GU-9681	333 (CCC)	Grain: *Hordeum* sp	1845 ± 45	–22.5	90–240	60–320
GU-9682	074 (PP)	Grain: *Hordeum* sp	1885 ± 55	–23.4	60–220	0–260
GU-9679	331 (DD)	Grain: *Hordeum* sp	1760 ± 50	–24.1	210–380	130–390
GU-9678	331 (AA)	Grain: *Hordeum* sp hulled	1845 ± 45	–24.2	90–240	60–320
GU-9680	333 (DDD)	Grain: *Hordeum* sp	1885 ± 50	–22.2	60–220	10–250
GU-9683	338	Grain: *Hordeum* sp	1815 ± 50	–22.9	120–260	70–340
GU-9677	319 (B)	Grain: *Hordeum* sp hulled	1895 ± 50	–23.8	50–210	0–240

All dates calibrated using OxCal v3.10 (Bronk Ramsey 1995; 2001).

There have been numerous excavation reports describing the standard Angus souterrain with their stone-walled, curving passages and their possible uses. The most recent overview by Armit (1999) covers the current state of our knowledge of souterrain studies so well that it would be pointless to go through the details once again here. Rather this discussion will focus on the unusual example at Redcastle.

In plan, the Redcastle souterrain looks very like a standard Angus example; sharply curving from a narrow entrance and with another narrow side entrance giving access to the main passage. The major difference of course is it is not built of stone. There is no carefully laid flagstone floor, no well-built, slightly corbelled drystone walls and no huge capstones covering the roof. The evidence suggests that the passage, cut into the natural sands and gravels, had an internal timber framework for supporting the roof and doors. The excavation at Redcastle identified a number of different phases in the life of the souterrain: construction, use, abandonment and infilling.

Construction

Construction of the souterrain must have been relatively straightforward, as the sandy gravel subsoil is very easy to dig into. The upcast material from this process must have been piled close by and may have formed a bank around the structure, perhaps helping to support the roof. The upright posts for the roof may have been hammered into the soft subsoil, as no major pits around the posts were apparent. It is assumed that the sides of the main passage at least would have been lined, either with wattle and daub or planking. The four pairs of vertical posts could either have held such planking in place or had boards attached to them. Lumps of daub were recovered from the fill of both the main passage and the side entrance, although the most notable concentrations were at the main entrance and at the step down into the main passage. A large lump of clay, possibly daub or caulking, was recovered from outside the main doorway of a souterrain at Ardownie near Monifieth, Angus (Rees & Anderson, forthcoming). Perhaps the doorways into these souterrains, being the area most exposed to the weather (wind and light), were sealed off with wattle-and-daub construction around the doorframe.

Unfortunately, there were no indications to suggest how any timber lining would have been built and whether or not there was a wooden floor. The lack of nails suggests that, as on many other Iron Age sites, good carpentry joints were employed where necessary (see Hunter above) or the timbers were lashed together. It is likely that the vertical timbers would also have supported the roof, although there were again no indications to suggest whether the roof was flat or pitched. The pairings of posts along the passage do, however, suggest the vertical timbers were joined by cross braces either at the top, bottom or both. It should be noted that no evidence for cross braces was found on the floor of the passage. Any structure would have to have been relatively strong if it were to carry the weight of a turf roof as suggested by Cressey (above).

Redcastle is not the first timber souterrain to have been excavated, although it is probably the best example and looks most like the stone ones in plan. Wainwright (1963, 186) identified a partially timber-walled souterrain at Fithie, while Watkins (1980) excavated a series of shallow-ditched features at Dalladies. The latter site showed evidence of timber, wattle and stone lining and the excavator classed these curving hollows as ‘proto-souterrains’.

The discovery of the souterrain at Redcastle was a surprise, as it did not show clearly on the aerial photographs (illus 2). With hindsight, however, the outline of the feature can indeed be discerned. Armit (1999) has already mentioned that the number of known souterrains has increased greatly in the last 20 years as a result of aerial photography. So numerous are souterrains that they can now be considered as standard features on lowland, unenclosed, settlement sites in Angus and do not appear to have been restricted to elite groups or settlements. The chance discovery of further souterrains not identified on aerial photographs, such as at Redcastle and Ironshill East, only emphasizes their widespread distribution in this area. There are, in fact, another two possible souterrains in the same field at Redcastle on the opposite side of the old stream channel (illus 1 & 2) and there could be others hidden among the remaining cropmark blotches.

The souterrains at Newmill, Ardestie and Carlungie were associated with above-ground structures. The cropmark at Redcastle shows a darker area outside the main entrance to the souterrain, towards the edge of the raised beach. It was thought this might represent a deeper deposit of soil masking a structure. However, no major deposits were located during topsoil stripping and there was no evidence, such as post-holes or ring-grooves, to suggest there had been a structure. It is certainly possible that ploughing could have removed all traces of a house on the site, especially as the roundhouse excavated at Hawkhill had no earthfast

components other than the scoop it sat in. However, the possibility that there never was a structure cannot be ruled out. The souterrain could easily have been associated with the houses clearly visible on the aerial photographs to the north-west.

The few stones discovered in the fill of the main entrance could have been derived from paved features, now destroyed, which could have originally formed structures similar to those at Ardestie and Carlungie. Isolated areas of residual paving have also been found outside souterrains at West Grange of Conon, Hawkhill, Dubton and Auchlishie (A Rees, pers comm).

Use

The function of souterrains is hotly debated. Arguments have been put forward for their use as animal shelters (Wainwright 1963), refuges, workshops (Gilmour 2000) or ritual centres. The favoured explanation is for storage, although here the debate is over what kind of agricultural produce was stored. Watkins (1980) and Armit (1999) prefer the interpretation that grain was stored. Others such as Barclay (1980) feel that the cool conditions would be suited for the storage of meats and dairy produce. The difficulty remains in recovering archaeological evidence for such processes.

Many of the investigated souterrains in Angus were either cleared out or backfilled when they were originally found; many were uncovered during the agricultural improvements of the 19th century. Thus, few have been subjected to modern excavation techniques and post-excavation analyses. Following the initial discovery and excavation of the side entrance and part of the main passage at Redcastle in 1997, it was evident that some of the basal deposits may have related to the use of the souterrain. It was therefore decided to sample and undertake a range of palaeoenvironmental and soil analyses which might shed some light on the makeup of the lower fills and the function of the souterrain (Church et al above). Subsequent excavation at another souterrain, Shanzie, also in Angus, used a similar sampling method for the entire length of the main passage (Coleman & Hunter 2002).

The only surviving deposit that might relate to the use of the interior of the souterrain was the thin layer (context 121) extending along the central portion of the main passage (illus 6). Soil micromorphology of context 121 showed that worm activity was only present in the lowest fill and that this could therefore represent an in situ floor deposit. There was, however, no evidence of compaction which one might expect of a floor deposit. Perhaps the souterrain was kept incredibly clean or only used for a very short period of time. Alternatively, perhaps there was a raised wooden floor that has left no surviving evidence.

Pollen analyses from this context in the centre of the main passage revealed a high concentration of grass pollen and dandelion but nothing to indicate cereals. It is possible that the souterrain was used to store grass/hay as fodder for animals or that straw was thrown on the floor. The lack of compaction on the base of the souterrain does not suggest that the floor was heavily used and it seems more likely that the pollen derived from a collapsed turf roof. The storage of hay for fodder requires a great deal of room and, given the narrowness of the entrances, it seems unlikely this was the function of the souterrain.

The presence of charred grain in the lower fills of the souterrain and in context 121 could be used to argue that the structure was used to store processed crops. However, this might be misleading as the greatest concentration of burnt grain, visible during excavation (illus 6), was in the deep deposit (context 074) immediately above context 121 (illus 8, section G), which is more likely to have accumulated during the abandonment phase. It is likely that the seeds within context 121 and Post-hole 338 which were used for radiocarbon dating (GU-9682 & GU-9683, respectively) were derived from material associated with the abandonment phase.

The evidence that two vertical posts (335 & 355, illus 6) were either inserted or pulled out while the roof was still in situ suggests that the souterrain was repaired at some point and may have been in use for a considerable period of time.

At Redcastle, the discovery of the two stone lamps in Pit 029 immediately adjacent to the doorway of the side entrance must surely be connected to the use of the souterrain, which would have been extremely dark in the interior.

The only artefactual remains that were clearly associated with the lowest fill (context 121) were the fragments of sheet bronze (SF 227, illus 17), which might have formed part of an ornamental mount, although the iron reaping hook (SF 053, illus 17 & 22) was also found very close to the base of the souterrain. The vast majority of the other artefacts were recovered from the upper fills in the abandonment and infilling phases. This contrasts with the evidence from Shanzie souterrain where most of the artefacts were found in

the primary fill above the stone floor and within 10m of the entrance (Coleman & Hunter 2002, 84). In this case, the excavators felt that the artefacts had most likely been washed into the main passage, with only some being lost during use (ibid, 86). The evidence from Shanzie appears to suggest that most of the primary deposit and the artefacts therein had washed in from an adjacent settlement after the souterrain had gone out of use.

Abandonment

The excavated evidence at Redcastle suggests that the souterrain was partially dismantled after it was abandoned, as the timber posts appear to have been pulled from their positions and were not left to rot in situ. Salvaged timber components could either have been reused in other structures or used as firewood. In this phase, larger numbers of artefacts found their way into the deposits, especially at the main entrance where they appear to have been mixed with collapsed structural remains of daub from around the doorway. In the main passage, soil micromorphology concluded that context 074 had been deposited as a single dump. This contained many charred seeds and seems to have been waste material from a nearby settlement, and it is likely that most of the artefacts were also deposited in this manner. The soil tests along the base of the souterrain also identified three areas which appear to have contained dumps of ash from domestic hearths. It seems likely therefore that, immediately after the souterrain was dismantled, the open ditch was used for disposing of domestic rubbish. There is no clear evidence that any of the material had a particular significance or was deliberately deposited as part of a ritual act of closure. However, the possibility that some of this material could have been deposited as an element of ritual abandonment cannot be ruled out, especially the inclusion of some of the artefactual material such as the dagger. Perhaps only the iron vessel handle (SF 021), found leaning against the side wall, might be considered a deliberately placed deposit.

Infilling

Although the upper deposits within the fill of the souterrain were not subjected to detailed analyses, the evidence visible in the sections (illus 8) and from limited soil micromorphology on context 159, indicates that the majority of the infill consists of a mix of subsoil (sand) and topsoil (silty sand). It is likely that the sandy lenses derived from erosion of the sides of the souterrain and would explain the splayed profiles of the sides (illus 9). There is therefore no evidence to suggest a single episode of deliberate and complete infilling. Some of the material may have been discrete dumps of domestic waste, which included some artefacts such as the iron dagger (SF 043) and the line sinker (SF 019), or alternatively these artefacts could have fallen in from topsoil as the sides eroded. The recovery of a shard of post-medieval green bottle glass from within the upper fill at the terminal indicates that, even in the last 200 years, there was a slight depression marking the line of the souterrain. This picture of gradual in-filling is also paralleled at Shanzie where there was clear evidence of reuse within the partly in-filled main passage 700–800 years after it was initially abandoned and 18th/19th-century bottle glass was found in the fill where the roof slabs had collapsed (ibid, 98).

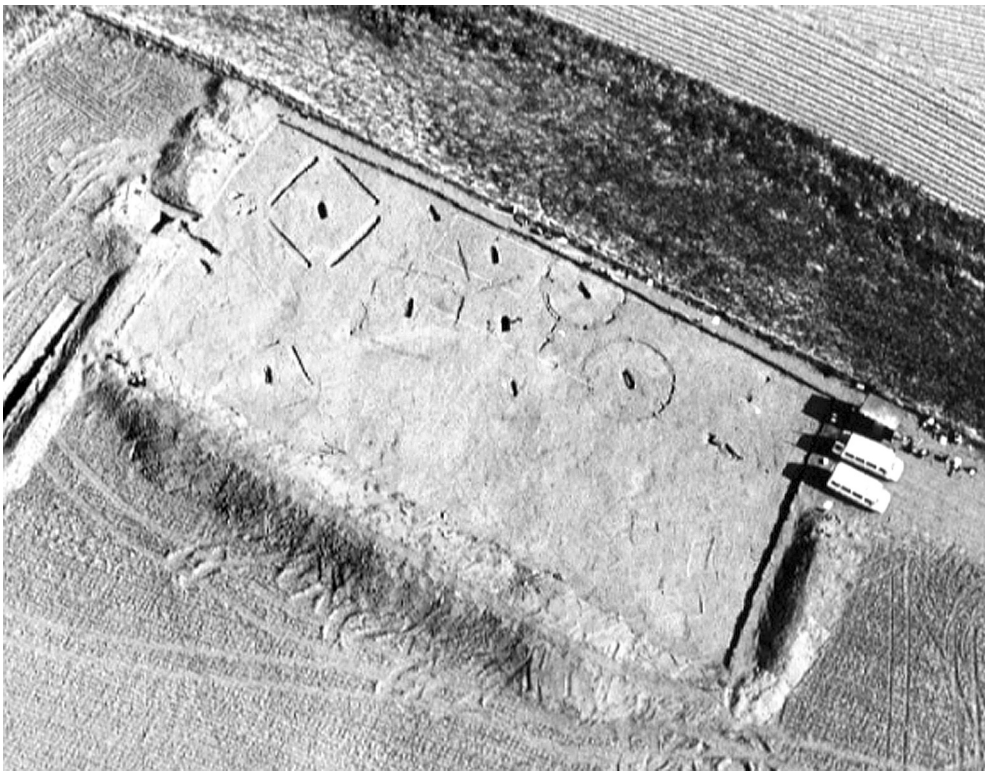
Dating

Unfortunately, there is nothing to suggest when the souterrain at Redcastle was constructed. The artefacts from its fill and the radiocarbon dates suggest that it was abandoned by the fourth century AD. However, the dating of the Roman glass within the souterrain may provide a better understanding of the chronology. The Isings 44b vessel, which was relatively un-abraded, was found associated with collapsed structural deposits in the main entranceway and has a date range of AD 60–170. The other vessel, an Isings 85b, was found in the main passage and dates from AD 160–260. If these vessel fragments were incorporated into the fills of the souterrain during or shortly after the process of abandonment then, on current dating evidence, they were probably deposited in the period of overlap between AD 160 and 170. Armit (1999) argued for a 'souterrain abandonment horizon' between the late second and early third centuries AD as a direct result of socio-political changes in the area following the withdrawal of the Roman army from the Antonine Frontier. Certainly, from the dating evidence of the Roman artefacts, the evidence from Redcastle does not contradict this suggestion. Attractive as this argument is, the difficulty has been the need to tie down the dating from radiocarbon dates and artefacts to a 30-year period. The possibility that the Isings 85b glass cup at Redcastle could date as late as the mid-third century AD should advise caution over too quickly accepting the 'souterrain abandonment

horizon' model, and other authors have already voiced doubts about its applicability (Coleman & Hunter 2002, 97). It remains possible that both glass vessels were retained for a considerable time before being deposited in the souterrain at a slightly later date, although this does seem unlikely.

The radiocarbon dates from Redcastle form a very tight group falling in the first four centuries AD. These dates match quite well with the recently published dates from Shanzie and Dubton in Angus. Those from Shanzie (Coleman & Hunter 2002, 84) produced 2-sigma calibrated date ranges from 210 BC to AD 60 (GU-9714), AD 0–60 (GU-9716) and AD 20–350 (GU-9713). The timber souterrain at Dubton produced a 2-sigma calibrated date range of AD 23–214 (AA-39950; Cameron 2002, 68). More recently, another timber-lined souterrain has been part investigated at Ironshill East (McGill 2003). This site, excavated as part of the Angus and South Aberdeenshire Field School, was located outside a palisaded enclosure and contained a Romano-British trumpet brooch of the late first–late second centuries AD. Excavations at Hawkhill, another Field School site, located a souterrain adjacent to a stone-built roundhouse (Rees, forthcomimg). The souterrain there had been partially stone-lined and may either have been robbed or part-reveted with timber.

It is clear, however, that the datable Angus souterrains flourished and were then abandoned during the first part of the first millennium AD, but whether this is attributable, directly or indirectly, to the movements of the Roman army is debatable. There are a number of changes evident in the archaeological record at this time marked by the appearance and disappearance of site types, such as the change from roundhouse to rectilinear structures and the appearance of highly decorated symbol stones. It is possible that the abandonment of souterrains may be connected in some way with the socio-political changes which saw the first historical mention of the Picts in the late third century AD. That there were indeed changes in society at this time is reflected in the



ILLUS 25 Photograph of 1997 excavation area from the air (AAS/97/11; Moira Greig, Aberdeenshire Archaeology Service)

appearance of small cemeteries containing square- and round-ditched graves. Like souterrains, these barrows form a readily identifiable site type of which there is a marked concentration in north-eastern Scotland and they have been considered to be Pictish.

BARROW CEMETERY

INTRODUCTION

Excavation of the main trench (illus 1) at Redcastle was focused to examine the cluster of enclosed graves visible on the aerial photograph (illus 2) between the old stream channel and the edge of the raised beach.

A large trench was excavated in 1997 and located the remains of five square barrows, two round barrows and three unenclosed graves (illus 3 & 25). These burials were found to concentrate in the north-eastern part of the trench, with the two round barrows forming the southern portion of the cemetery. Another round barrow (RB3) is visible on the aerial photograph (illus 2) on the western side of the old stream channel and remains unexcavated. Six further burials were discovered in 1998 when the trench was extended to the north (illus 3), primarily to examine the souterrain (see above). These graves were located in the eastern half of the site; four were very close to the fence line of the modern field, from which we may infer that here has been a degree of erosion along the edge of the raised beach terrace.

SQUARE BARROWS

Square Barrow 1 (SB1)

SB1 was the largest and best preserved of the square barrows (illus 3). It measured *c* 10m by 10m over its defining ditches, which varied between 0.6 and 1.0m wide (illus 26). The shape defined by the ditches was in fact more of a parallelogram than a square. Interestingly, the central grave was not aligned parallel to the ditches but lay diagonally and slightly to the north of the centre. The ditches were all approximately 7m long and were up to 0.3m deep. There were breaks at the corners leaving causeways 1.1–1.2m wide. The western ditch (005) of SB1 cut an earlier pit (067) the date of which, in the absence of any diagnostic artefacts, remains unknown. Another pit (007) was located to the north-east of the grave

ILLUS 26 Photograph of SB1 prior to excavation

but whether it is contemporary with the barrow is unclear, although on the basis of the characteristics of the other barrows this seems unlikely.

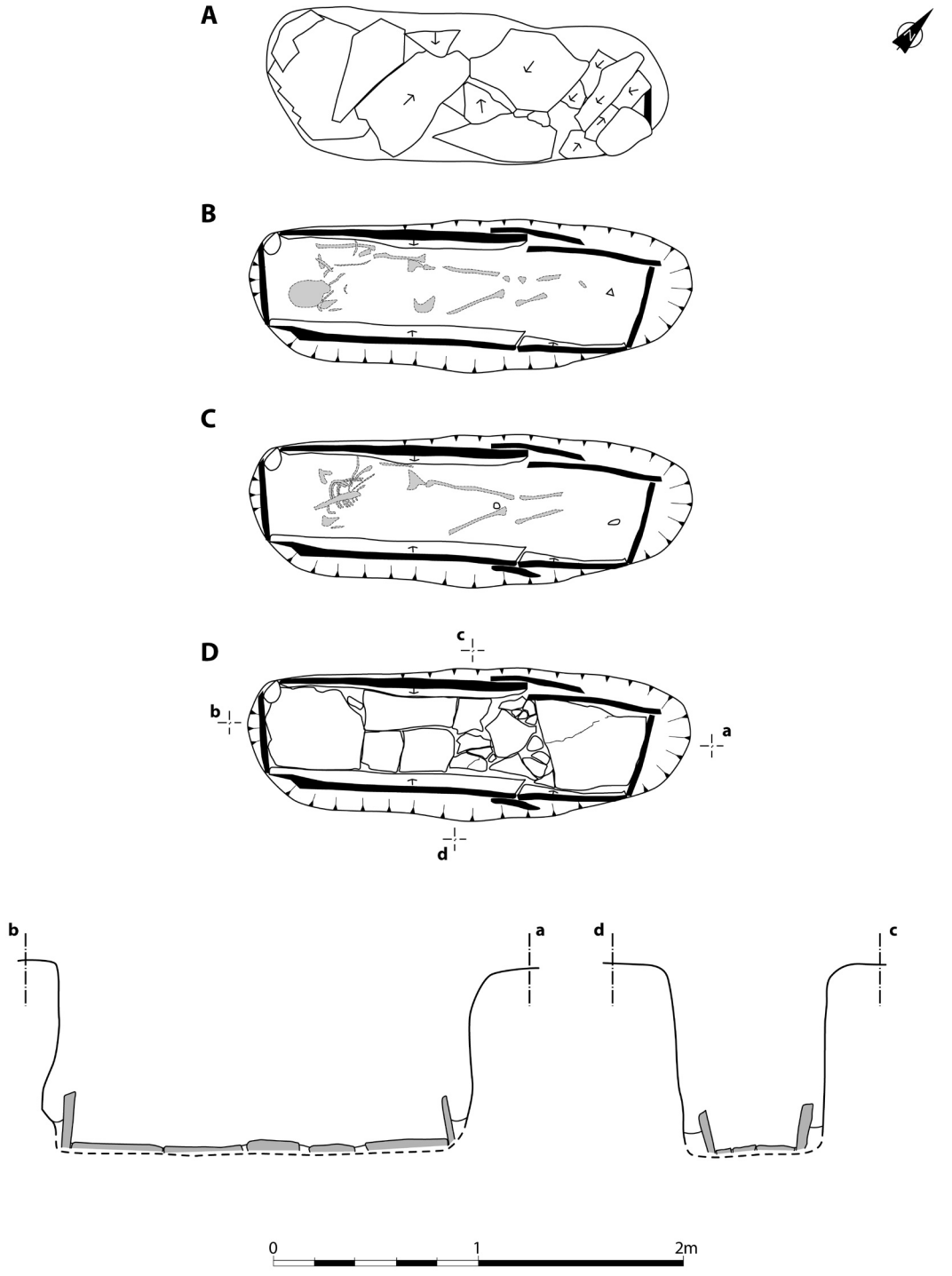
The lower fill of the ditches consisted of gravel, probably originally cast up from their quarrying. Through examination of the upstanding cemeteries at Garbeg and Whitebridge, it can be argued that the material excavated from the ditch would have been used to form both low external banks and a central mound over the grave. In the upper fill of all the ditches there were large numbers of rolled pebbles that must have been brought up from the beach, as they are larger than any pebbles within the surrounding gravel. It seems most likely that these pebbles had once formed a low cairn over the central grave, perhaps similar to the cairns at Lundin Links (Greig et al 2000) and that the pebbles were subsequently spread by a combination of natural erosion and agricultural activities into the partially infilled ditch.

The upper fills of the grave SB1 consisted of backfilled sands and gravels, which at times proved difficult to define. Unlike most of the other graves, the capstones were not close to the surface and these were eventually located at a depth of *c* 0.6–0.7m. These proved to be large slabs, especially towards the south-west end. It was readily apparent at the time of excavation that the underlying cist had not filled up and voids were clearly visible. On removing the central capstones, parts of a long bone (femur) and pelvis were exposed. Looking underneath the capstones at the south-west end, the skull was seen to be intact and the capstone had to be carefully removed with a rope.

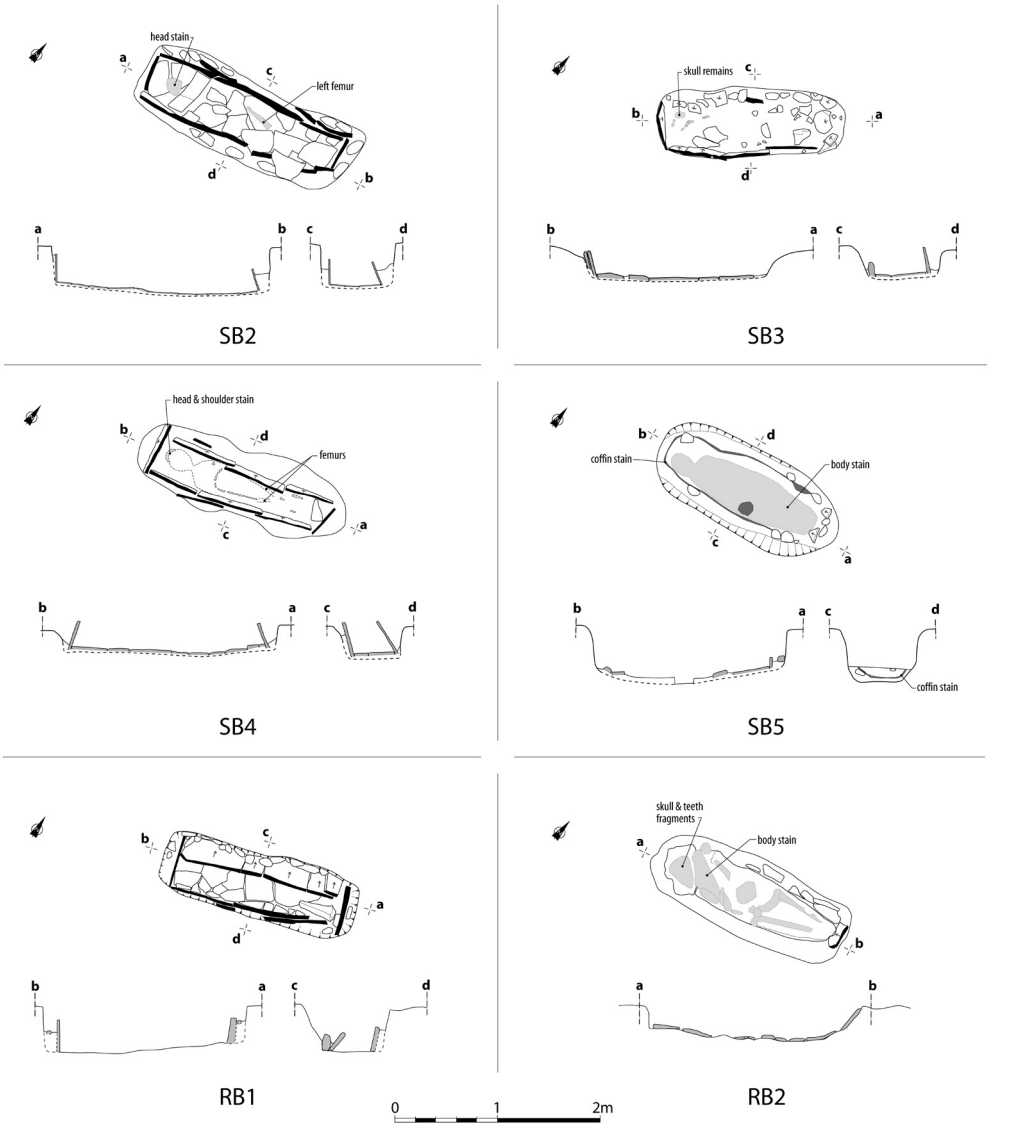
ILLUS 27 Photograph of skeletal remains in SB1

The burial was fully extended with the head slightly inclined to the right (illus 27). In general, the skeleton in SB1 was well-preserved, although the right-hand side had suffered more. The remains included: complete skull; left and right collar bones; left humerus and possibly radius; left part of pelvis; left femur, knee cap and tibia. The upper portion of the spine and left side of the rib cage were relatively well-preserved but only small fragments of the right ribs survived. Part of the right tibia and fibula also survived but in a less well-preserved state than those of the left side. None of the smaller hand and foot bones had survived.

The construction of the cist was noticeably more massive than any of the other burials; not only were the capstones larger but so were the side slabs (illus 28). The sides consisted of two slabs, of which the south-western on both sides was the longest, around 1.3m long. Where the two side slabs met,



ILLUS 28 Plans and profiles of SB1



ILLUS 29 Plans and profiles of RB1, RB2, SB2–5

they overlapped slightly and there was a small slab behind protecting the join. Although constructed of such large slabs, the depth of the actual cist was very shallow, only being 0.2–0.25m deep, and must have given very little clearance over the body. There was remarkably little packing material behind the side slabs. A large beach pebble blocked a gap between the base of the side slab and the end slab at the western corner. Although the end slabs were set near-vertical, the side slabs all sloped backwards to the sides of the grave pit.

The grave cut was aligned south-west to north-east, and was 2.1m long by 0.7–0.8m wide. It was cut down vertically through compact natural gravel but appears to have expanded slightly towards the base where the natural sand was looser. The large base slabs were placed directly onto the subsoil base of the grave cut, which was *c* 1m deep from the surface.

Square Barrow 2 (SB2)

SB2 was slightly smaller than SB1, measuring *c* 8.5m by 9m over the ditches (illus 3). Its ditches appear to have been more heavily truncated than SB1, especially those to the north (Ditch 011) and south (Ditch 016). The best-preserved ditch was the eastern one (Ditch 012), which appears to have cut across an earlier feature (013), although the fills were too homogeneous and the cut too shallow to be able to determine the precise relationship. Only the gaps in the north-west and south-east corners could be measured and both were *c* 1.2m wide. A number of beach pebbles were also found in the fill of Ditch 012, although not as many as were found in SB1.

The central grave in SB2 was aligned WSW/ENE. The cut measured *c* 2.6m long by 0.7–0.8m wide (illus 29). The capstones were fragmented and many tilted downwards into the silty sand fill of the grave. The side of the cist consisted of three slabs, with smaller slabs behind the joins. The skeletal remains were poorly preserved, with only a slight head stain and the decayed remains of the left femur being recovered.

Square Barrow 3 (SB3)

The full extent of SB3 could not be determined (illus 3). Only the south-western ditch (020) was clear, although a narrow linear feature (021) may have formed the south-eastern ditch. It is unfortunate that neither the north-eastern nor the north-western ditches survived, as these, especially the former, might have provided a direct relationship with the entrance passage into the souterrain. It is likely that because the natural subsoil at this point begins to slope downwards into the former stream channel, the features were subject to more severe plough truncation. This may also have been the case with the missing north-west ditch of SB4 (see below).

The central grave in SB3 was aligned south-west/north-east (illus 29). The capstones were only apparent at the south-west (head) end and may never have covered the full length of the grave (1.9m). The upright slabs that had formed the north-west (left) side had fallen inwards. The crushed remains of a skull, facing north-westwards, were located at the south west end and were lifted *en masse*. Almost nothing else survived of the rest of the skeleton.

Square Barrow 4 (SB4)

SB4 consisted of the remains of three ditches, the preservation of which decreased to the north-west, slightly downslope (illus 3), and there was no trace of the north-western ditch itself. Where preserved, the width of the barrow over the ditches was *c* 7m. In contrast to SB1, the central grave was set parallel to the side ditch (024) and perpendicular to the end ditches (023 & 025).

The central grave in SB4 was aligned south-west/north-east. The cut measured *c* 2.1m long by 0.7–0.8m wide (illus 29). The capstones were clearly visible close to the surface and the south-western one had been clipped by the topsoiling machine and fragmented during preliminary site clearance. Those at the north-eastern end had settled slightly lower and were better preserved. The sides of the cist consisted of three slabs, with a single smaller slab behind, and the north-western side had collapsed inwards. The skeletal remains were poorly preserved, with a slight head and shoulder stain and the decayed remains of the left and right femurs.

Square Barrow 5 (SB5)

SB5 consisted of two ditches (031 & 034) and the residual remains of two others (illus 3). It appears that this barrow was a little smaller than SB4, about 6.5m across, and the central burial was aligned south-west/north-east, parallel to the side ditch.

The cut measured *c* 1.9m long by 0.8m wide (illus 29). Only two large capstones were found at the north-east (feet) end of the grave and two smaller stones at the north-west side. This grave was clearly different from all the other graves because it did not contain a stone-lined cist. Instead the body appears to have been placed within a wooden coffin that left a dark organic stain which was recorded in plan and section. Within the fill of this coffin, a slight body stain of head and shoulders and left and right femurs was visible. The coffin appears to have been packed around the edge with beach pebbles, especially towards the north-east end. The base of the grave pit was partially covered with stone slabs, which were concentrated at the head end.

ROUND BARROWS

Round Barrow 1 (RB1)

Two-thirds of RB1 were exposed at the eastern side of the excavation area (illus 3). This round barrow was *c* 8m in diameter, with a ditch 0.5m wide and 0.2m deep. The fill of the ditch on the north-west quadrant contained a large number of beach pebbles.

The central grave in RB1 was aligned south-west/north-east. The cut measured *c* 1.95m long by 0.6–0.7m wide (illus 29). The grave was carefully covered with large capstones along its full length and some of these tilted down slightly into the grave fill. The sides of the cist consisted of two large slabs (which had subsequently cracked). The north-west side had collapsed inwards and the beach pebble packing behind was clearly visible. The skeletal remains were very poorly preserved and not even a body stain was visible, although tooth fragments were recovered from the south-west end.

Round Barrow 2 (RB2)

RB2 was located to the south-west of RB1 and was *c* 8.5m in diameter with a ditch 0.3–0.4m wide and up to 0.1m deep (illus 3). The north-western side of the ditch was extremely truncated.

The central grave in RB2 was aligned south-west/north-east. The cut measured *c* 1.9m long by 0.65–0.8m wide (illus 29). No capstones were visible prior to excavation but they were quickly revealed and found to be fragmented, tilting downwards into the grave fill. The sides of the cist each consisted of three to four slabs that had fallen inwards, although the north-west side had fallen in more than the south-west. The skeletal remains were poorly preserved, with a slight body stain consisting of head, pelvis and leg stains. Fragments of skull and teeth were recovered from the south-west end. The base of the grave was lined with stone, and the largest slab was located at the south-west (head) end.

UNENCLOSED BURIALS

Grave 030 (G030)

Grave 030 was located close to the eastern limit of the trench between SB1 and SB5, and was orientated south-west/north-east (illus 3). None of the capstones were visible on the surface following topsoiling, and the uppermost fill of gravel, once it had dried out, proved difficult to see. Beneath this upper gravel, the capstones were virtually intact and it was clear from the voids between that the grave had not silted up. On removing the capstones, the back portion of a skull was visible at the south-western end. The fragile remains of the left femur and knee cap were located, while stains of the right leg were found underneath a collapsed side slab. The sides of the cist were constructed with four sandstone slabs, slightly overlapping, with beach pebble packing behind (illus 30). The shape of the cist tapered slightly from the shoulders towards the head end and the feet end.

Grave 100 (G100)

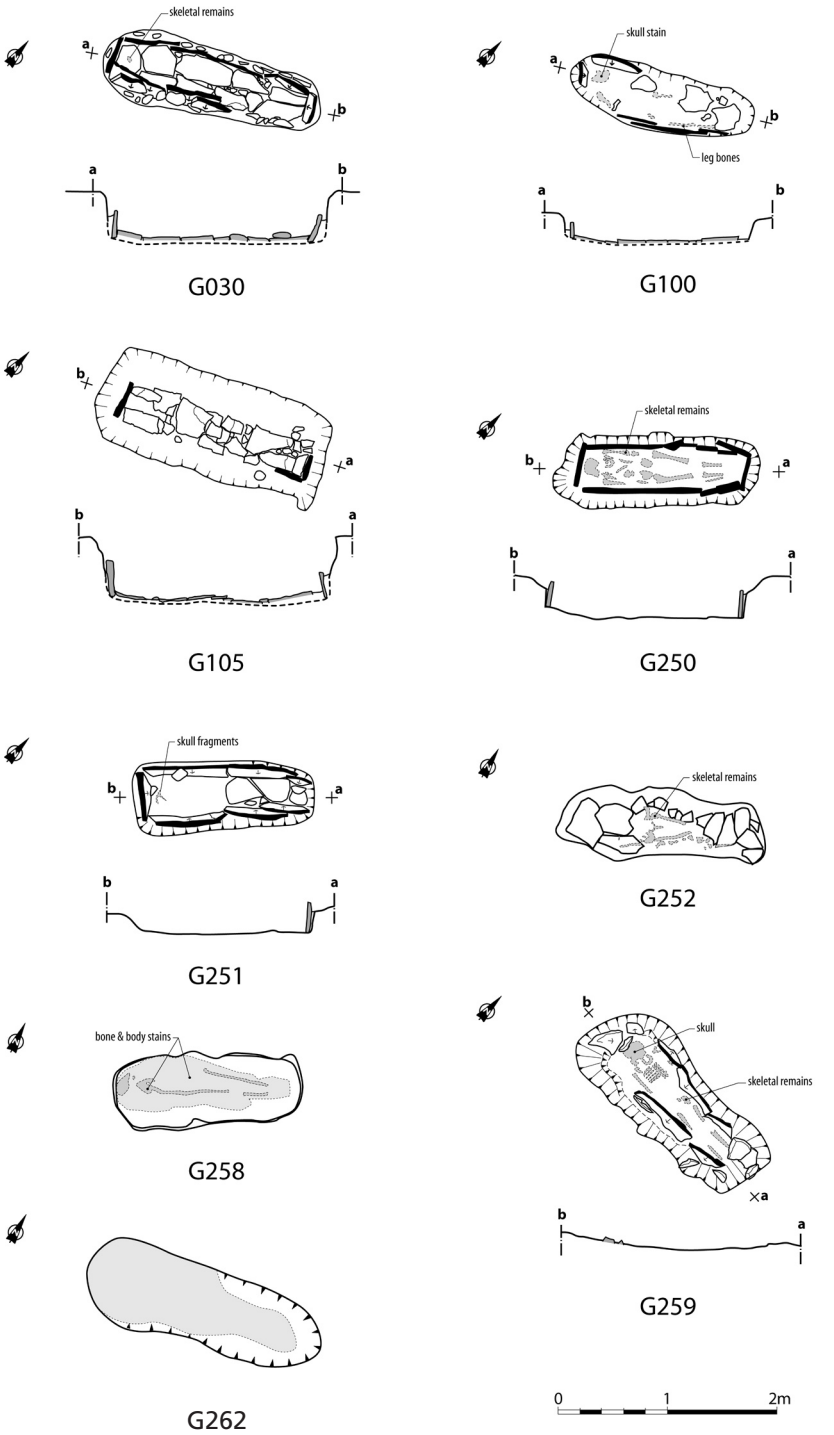
Grave 100 was located to the north-west of RB2 and was orientated south-west/north-east (illus 3). The remains of a linear feature (308), *c* 2m to the south-west, were suggestive of the ditch of a square barrow, the rest of which may have been completely removed by ploughing. This grave was noticeably smaller than many of the others, being 1.8m long by 0.6m wide. After topsoiling, the capstones at the south-west end were immediately apparent; many were broken and tilted downwards into the grave fill. The north-eastern end of the north-western side had collapsed inwards (illus 30). The surviving south-eastern side consisted of five thin sandstone slabs slightly overlapping and the floor of the cist was covered in similar sandstone slabs. The skeletal remains within this grave consisted of a slight skull stain at the south-west end, and traces of the leg bones at the other. The original outline shape of the cist may have tapered towards the feet.

Grave 105 (G105)

Grave 105 was located between RB1 and SB2, and was orientated south-west/north-east (illus 3). Upon initial excavation, the grave cut was thought to be 1.7m long by 0.9–1m wide but further investigation revealed that the north-east end had been backfilled with gravel and that the full length of the grave was 2.1m (illus 30). There appear to have been few, if any, capstones, and on both sides of the grave the side slabs had collapsed inwards forming a tent-like arrangement. The bases of these slabs were packed along their outer edge with rounded beach pebbles. These side slabs had to be removed before the excavation of the grave fill could proceed. The skeletal remains consisted of a head and shoulder stain and traces of the leg bones. This grave pit was noticeably deeper than many of the others, being up to 0.6m deep.

Grave 250 (G250)

G250 lay to the north of SB1 (illus 3). The grave cut was aligned SSW/NNE, and was 1.9m long by 0.65m wide by 0.4m deep. The top of this grave was well sealed by two layers of thick sandstone slabs. Once



ILLUS 30 Plans and profiles of unenclosed graves

these were removed, the outline of the side and end slabs forming the cist were apparent. This was a well-built cist almost rectangular in shape with only a slight taper at the feet end. Even with the well-sealed capstones, soil had percolated down into the grave and filled it to the top. Upon excavation, however, the remains of a relatively well-preserved skeleton were uncovered including the fragmented remains of a skull at the south-west end and the lower jaw immediately below it. Other bones recovered included parts of the clavicles, ribs, left and right humeri, femurs, tibiae and even part of the right fibula. The base of the cist consisted of a layer of sandstone slabs (illus 30).

Grave 251 (G251)

The remains of G251 were located east of G250 and measured 1.9m long, south-west/north-east, by 0.65–0.85m and 0.25m deep (illus 3). The capstones were fragmented and many tilted downwards into the silty sand fill of the grave. The sides of the cist consisted of two large slabs with smaller ones on either side of the feet, although there was no end slab (illus 30). The only major piece of bone to survive, apart from a few fragmentary teeth, was the top of the skull, which lay on the basal slabs at the south-western end of the grave.

Grave 252 (G252)

When the remains of G252 were initially located at the eastern limit of the excavation area, it was thought that the flat sandstone slabs represented the capstones, as was the case with G250. However, once the grave was cleaned up, it was readily apparent that these, in fact, were the basal slabs and that the south-western end of this feature had been completely destroyed by ploughing. Only the lower part of the skeleton survived, with parts of the pelvis, femurs and tibias being recovered. These appear to have survived because of their proximity to the fence line, whereas the upper half of the body had been completely destroyed.

Grave 258 (G258)

Grave 258 was located against the eastern limit of the excavation area (illus 3). It measured 1.75m long, south-west/north-east, by 0.6m wide and 0.15m deep. This grave was similar to G262 because it was not lined with stone. Once again, because there was no cist, none of the skeletal remains survived. However, a very clear body stain with darker lines indicating the location of a number of the long bones and the skull was present (illus 30).

Grave 259 (G259)

Grave 259 was located in the north-eastern corner of the excavation area and was aligned WSW/ENE (illus 3). The cut measured *c* 2.1m long by 0.7–0.8m wide. The capstones were missing and the grave had obviously been severely disturbed by ploughing, with many of the side slabs having been knocked inwards. Surprisingly, despite this disturbance, once the fill of the grave was excavated, skeletal remains were recovered. These included the crushed remains of the skull at the south-west end, parts of the right humerus, the right rib cage and the upper portion of the spine (illus 30). Parts of the right and left clavicles were also found. The middle portion of the skeleton was less well-preserved, with only a fragment of the pelvis. Parts of both the right and left femurs and tibiae were recovered, although nothing remained of the feet. The base of the cist was lined with sandstone slabs.

Grave 262 (G262)

Grave 262 was the northernmost burial on the excavation site (illus 3). The cut measured *c* 1.95m long by 0.6–0.7m wide and 0.25m deep. It was unlined and this lack of grave slabs probably resulted in the complete decay of the skeletal remains (illus 30). Only a dark body stain survived to show that the grave had originally contained an inhumation and, of this, only the legs appeared with any clarity at the north-east end.

HUMAN REMAINS

Laura Sinfield

The excavations at Redcastle uncovered 16 graves – five square barrows, two round barrows and nine unenclosed graves. These were identified post-excavation as follows, listed by age, with sex estimation in brackets (see also Table 14):

Young adult (approx age 20–35) – female SB1 & G259; ?female SB3 & G252; ?male G250

Middle adult (approx age 35–45) – ?female G030; unsexed RB2

Unaged adult (age range unknown) – unsexed SB2, RB1, G100, G251

Unknown age – unsexed SB4, SB5, G105, G258, G262

Pathological evaluation was not possible on nine of the burials, owing to the poor preservation, but the teeth showed no signs consistent with childhood systemic illness. One burial (SB1) showed two congenital malformation anomalies which would not have affected the individual in life, although they would have altered her appearance to a certain extent.

Preservation

Preservation of the skeletal remains at Redcastle was poor, with five producing either nothing at all except a soil stain (SB5 & G258) or bone or dental fragments so small it could not be established whether the individual was adult or juvenile (SB4, G105 & G262). This is seen quite often in remains from sandy burial sites. Three burials yielded dental fragments only (SB2, RB1 & G100). Two burials produced fragmented bones and teeth (SB3 & RB2). Five graves yielded complete or semi-complete bones and teeth (SB1, G030, G250, G252 & G259), of which SB1 was almost complete in the upper body. It is significant that the single best-preserved skeleton was within the deepest grave, which had not filled with sand or silt in the intervening centuries; this void would have assisted preservation of the bones and teeth. Also significant is that one of the two burials present only as stained soil (SB5) also showed organic stains in the soil interpreted as the remains of a wooden coffin – it is known that wrapping of corpses in clothing or

TABLE 14
Summary of skeletal remains

No	*Enclosed?*	*Grave type*	*Preservation*	*Sex*	*Age*	*Radiocarbon dates*
SB1	Square barrow	Stone cist	Skeletal remains	F	20–35	OxA-8140 OxA-8141
SB2	Square barrow	Stone cist	Skeletal remains	?	Adult	OxA-10162 OxA-8142
SB3	Square barrow	Stone cist	Skeletal remains	?F	20–35	OxA-8383
SB4	Square barrow	Stone cist	Body stain	?	?	–
SB5	Square barrow	Wooden coffin	Body stain	?	?	–
RB1	Round barrow	Stone cist	Teeth	?	Adult	OxA-8412
RB2	Round barrow	Stone cist	Teeth	?	35–45	OxA-8144
RB3	Round barrow	?	Unexcavated	–	–	–
G030	Unenclosed	Stone cist	Skeletal remains	?F	35–45	OxA-10163 OxA-10167 OxA-8413 *OxA-8143*
G100	Unenclosed	Stone cist	Body stain and teeth	?	Adult	–
G105	Unenclosed	Stone cist	Body stain	?	?	–
G250	Unenclosed	Stone cist	Skeletal remains	?M	20–35	GU-9674
G251	Unenclosed	Stone cist	Skull frags	?	Adult	–
G252	Unenclosed	Stone cist	Skeletal remains	?F	20–35	GU-9675
G258	Unenclosed	Unlined grave	Body stain	?	?	–
G259	Unenclosed	Stone cist	Skeletal remains	F	20–35	GU-9676
G262	Unenclosed	Unlined grave	One bone frag	?	?	–

other textiles retards decomposition, whilst placing a body in a coffin accelerates decomposition (Janaway 1996). Obviously, an archaeological timescale is involved at Redcastle, but it seems likely that the complete disappearance of all body tissues of SB5 indicates a coffin, rather than a textile wrapping, because the former would have accelerated the initial rate of decomposition. This is supported by the archaeological remains, which suggest a wooden coffin rather than textile wrapping.

One further point is that the dentition has undergone (or is in the initial stages of undergoing) a particularly unusual process of post-mortem change. In most of the burials, the burial environment has destroyed all traces of hard tissue in the teeth except for the enamel, leaving a hollow enamel 'cap' with no dentine present, or in some few cases, very little dentine, and that of a crumbling nature. Dr David Whittaker (Reader in Forensic Dentistry, Cardiff) has emphasized the infrequency of this particular change.

Age and sex estimation

The ageing and sexing techniques used in this study follow Bass (1987) and Buikstra & Ubelaker (1994). Ageing methods included dental eruption and attrition, epiphyseal fusion and cranial suture closure. Sexing methods mostly used cranial morphology, as clear pelvic fragments were only present in two burials (SB1 & G252).

Of the six individuals for whom enough remained to estimate sex, only one (G250) presented with typical male features. SB1 and G259 were assigned female sex (F) on the basis of eight skeletal sexing elements, whilst SB3, G030 and G252 were assigned to possibly female (?F) because not enough sexing elements were present to assign sex confidently.

None of the skeletons that could be assigned an age group were juvenile. Those that consisted of dental fragments only (SB2, RB1 & G100) could not be assigned a particular age group, but as all fragments could be confidently recognized as remnants of the permanent rather than juvenile dentition, all three have been designated simply as 'adult'. Of those which could be aged more closely, five were 'young adult', a category ranging from 20 to 35 years of age. Of these, four skeletons (SB1, G250, G252 & G259) were at the younger end of this category whilst SB3 was at the older end. Two skeletons are present in the 'middle adult' category (35–45 years). Both of these (RB2 & G030) could be more closely aged to around 35–40 years. Height was only estimated for two burials (SB1 & G250), as few had surviving long bones intact.

It is not feasible in this case to comment much on the overall health of this population because so many of the burials are incomplete to a greater extent, and even the best is incomplete to a lesser extent. However, the overall dental health is surprisingly good (Table 15), with SB1 possessing a dentition which would be remarkably good in a 25-year-old woman of the current decade. None of the teeth in any burial showed any enamel hypoplasia, which is usually interpreted to indicate systemic illness in childhood. In four cases (SB1, SB3, RB2 & G030), third molars or wisdom teeth were present; these teeth are sometimes congenitally absent and it may be possible at a later date to use this feature to compare populations of this period and district.

The most complete skeleton, from burial SB1, is described below. The other skeletons were poorly preserved and the findings from their examination are listed in Tables 15–17 and in the archive report.

Burial SB1

This partial skeleton was in the largest and deepest grave, which has undoubtedly contributed to the good preservation of the skeleton and differs markedly from the other burials at this site. The remains are those of an adult female, probably aged between 20 and 25 years at the time of death, but not more than 35. Both cranial and the single remaining pelvic element strongly indicate female sex. Overall, the skeleton is slight and gracile, further consistent with a female individual. The dimensions of the left radius, with some calculations from the fractured femora, resulted in a stature estimation of approximately 159cm (5ft 2in).

She possessed an extraordinarily fine dentition, with only very slight anterior crowding on the lower jaw. No major dental pathology was observed. The lower left central incisor (31) is slightly malformed, being almost circular in occlusal view. Neither this morphological anomaly nor the crowding is visible from a face-on view. There is an overbite measuring *c* 4.5mm and a minor diastema or gap between the upper central incisors. The upper and lower dental arcades fit together well, with all teeth in occlusion.

The facial shape is very long and narrow. This is partly due to the premature closure of the sagittal suture and both left and right portions of the lambdoid sutures. There is a noticeable difference in both shape and size of the eye sockets. This is due to

TABLE 15
Dental preservation

SB1	18	17	16	15	14	13	12	11	/	21	22	23	24	25	26	27	28
	48	47	46	45	44	43	42	41	/	31	32	33	34	35	36	37	38
SB2	–	–	–	–	–	–	–	–	/	–	–	–	–	–	–	–	–
	–	–	–	–	–	–	–	–	/	–	–	–	–	–	–	–	–
SB3	18	17	–	15	14	–	–	–	/	–	–	23	–	25	–	27	28
	48	47	–	–	44	–	–	–	/	–	–	33	34	–	–	37	38
RB1	–	–	–	?	34	–	–	–	/	–	–	–	–	?	–	–	–
	–	–	–	–	–	–	–	–	/	–	–	–	–	–	–	–	–
RB2	18	17	16	15	14	13	12	11	/	–	–	23	24	–	–	27	28
	48	47	46	45	44	43	42	41	/	31	32	–	34	35	36	37	38
G030	18	17	–	–	–	?	12	11	/	–	–	?	–	25	26	–	28
	48	47	46	45	44	43	42	41	/	–	–	–	34	35	–	–	–
G100	–	–	–	–	–	–	–	–	/	–	–	–	–	–	–	–	–
	48	–	–	–	–	–	–	–	/	–	–	–	–	–	–	–	38
G250	18	17	16	15	14	13	–	–	/	–	–	–	24	25	26	27	28
	48	47	46	45	44	43	42	–	/	–	–	33	34	35	36	37	–
G259	–	17	–	15	14		–	11	/	21	–	23	24	25	26	–	28
	48	47	46	45	44	43	–	–	/	31	–	33	–	–	36	37	38

the left zygomatic bone being malformed. There is no morphological change, but it has not developed correctly and has thus caused the left orbit to develop as smaller and rounder than the right; the lower margin of the left orbit is some distance above that of the right. The cheekbone is also less prominent on the left side. This may have caused a problem in life with the vision of the left eye, but it is likely that the brain would have compensated for this, and it would not have proved a major problem. Both the premature cranial suture closure and the undeveloped zygoma are classed as isolated congenital malformation anomalies. These must have been caused during fetal life, probably from an illness of the mother's during pregnancy.

It was not possible to measure any of the burials other than SB1 (Table 16). Post-cranial measurements were not taken as nearly all bones were fragmented or partial.

A cranial index of 63 indicates an extremely dolichocephalic head. The height/length index of 75 indicates a higher skull than average (70–74.99), but only just. This conflicts with the height/breadth index of 120, which indicates an extremely high skull, the average being 92–97 according to Bass (1987). The fronto-parietal index of 81 indicates 'broad', which is unfortunately not defined further by Bass (ibid) or Buikstra & Ubelaker (1994). Similarly, the Cranial Module (designed to give an 'approximate numerical value for the size of the skull') is of little use as no comparative data for the value of 137.6 are available in these sources.

The orbits are visibly uneven, although the orbital measurements and indices show almost no difference. If the measurements are taken in exact horizontal and vertical planes (a spirit-level was used) then the differences are quite clear. The smaller eye socket is caused by a malformed zygoma. Thus we have an individual with an extremely high, narrow head and orbits which are not level, and these bony changes are likely to have had some effect on her appearance in life.

RADIOCARBON DATING OF THE BURIALS

Following the first season of excavation in 1997, eight samples were sent for AMS dating. These all seemed to fit well with the expected date range but one anomaly was immediately apparent as the two samples from Grave G030 – OxA-8143, a sample of bone, and OxA-8413, a sample of tooth – did not match, even closely. Subsequently, it was discovered early in 2001 that a small proportion of the graphite targets at the Accelerator Laboratory at Oxford had been contaminated by a solvent during 2000 and many dates were re-examined, especially those which were suspected of contamination. A further three dates were then obtained – OxA-10162, OxA-10163 and OxA-10167 from re-sampling the material used for OxA-8142, OxA-8143 and OxA-8413, respectively. This appears to indicate that OxA-8143 (shown in italics in Table 17) does not represent the true date of the burial very well and should probably be ignored. OxA-8413, OxA-10163 and OxA-10167 provide a better age estimate. Following the second season of excavation in 1998, a further three samples from three burials were sent for dating. In total, therefore, 14 dates were obtained from nine burials (Table 17). The results clearly show that the cemetery at Redcastle was in use during the period that is considered in north-east Scotland to have been Pictish, around AD 300. The Picts are traditionally dated from their first mention by Eumenius in AD 297, to AD 850 when the MacAlpin dynasty had been established.

STABLE ISOTOPE ANALYSIS

Stable isotope analysis can be used for palaeodietary reconstruction and has become more pronounced in recent years given the increased numbers of AMS radiocarbon dates for skeletal remains, during which process the levels of $\delta^{13}C$ are measured. The levels of $\delta^{13}C$ in human bone collagen can provide a crude indication of the types of foods consumed by past populations, in particular whether they relied largely on marine or terrestrial species. A recent paper on this work focusing on the Mesolithic–Neolithic transition made reference to the $\delta^{13}C$ levels in the human remains from Redcastle and other later prehistoric/early medieval burials in Scotland which had been published largely in *Discovery and Excavation in Scotland* (Schulting & Richards 2002, 166). Like many of the results, the values from Redcastle are quite low (ranging between –20.4 and –22.0), which might be taken to indicate that these individuals relied heavily on terrestrial resources. One individual, however, in Grave G250 had a higher value (–18.7) and, as this is the most recent individual buried in the cemetery (between AD 870–1160), this might suggest a rise in the use of marine resources. Given that Redcastle is located immediately beside Lunan Bay, the lack of obvious use of marine resources by the earlier population would be surprising but fits with the current picture in Scotland where there is a rise after AD 800 in northern Scotland (ibid, 167).

The use of these measurements, which were taken primarily for radiocarbon dating, for palaeodietary reconstruction is limited as no measurements are made of other stable isotopes such as nitrogen or sulphur. Given that so little work has been undertaken on Pictish skeletal remains, this is surely an area that will be expanded in future.

Finally, the discovery in the souterrain at Redcastle of a stone weight which has been interpreted as a line sinker for fishing (see Jackson above) might, however, suggest that fishing did form part of the economic practices of the Iron Age population, at least.

Table 16
Cranial measurements from SB1 (mm)

Maximum length	177.0
Maximum breadth	111.8
Minimum breadth	91.3
Basion bregma height	134.5
Bizygomatic breadth	111.1
Dacryon – dacryon	19.3
Nasal width	26.3
Maxillo-alveolar breadth	55.4
Foramen magnum length	37.6
Foramen magnum breadth	32.5
Cranial index	63.2
Length–height index	75.99
Breadth–height index	120.3
Fronto-parietal index	81.7
Cranial module	137.6
Orbital height, left	36.1
Orbital height, right	36.5
Orbital width, left	36.4
Orbital width, right	36.7

DISCUSSION OF THE CEMETERY

The Picts were formerly considered mysterious largely due to the lack of historical sources and the extensive

TABLE 17
Radiocarbon dates from the burials – earliest to latest

Lab no	*Sample*	*Species*	*Years BP*	*$\delta^{13}C$*	*Calibrated age (AD)*	
	Context		*uncal*		*1-sigma*	*2-sigma*
OxA-8412	RB1	Human tooth	1815 ± 40	–20.4	130–240	80–330
OxA-8413	G030	Human tooth	1675 ± 40	–20.7	260–420	250–530
OxA-10163	G030	Human bone (left femur)	1661 ± 36	–21.06	340–425	250–540
OxA-8140	SB1	Human bone	1580 ± 35	–20.6	430–540	400–560
OxA-8141	SB1	Human bone	1565 ± 40	–20.6	430–540	410–590
OxA-10167	G030	Human tooth	1544 ± 36	–20.66	430–570	420–600
GU-9676	G259	Human bone (rib)	1475 ± 50	–20.8	550–640	430–660
OxA-8144	RB2	Human tooth	1470 ± 40	–20.5	565–635	460–660
OxA-8142	SB2	Human bone	1455 ± 35	–20.5	580–645	550–660
OxA-10162	SB2	Human bone (left femur) Same sample as OxA-8142	1426 ± 36	–20.5	605–650	565–665
OxA-8383	SB3	Human bone	1385 ± 45	–20.6	610–670	560–770
OxA-8143	*G030*	*Human bone (left femur)*	*1305 ± 35*	*–21.1*	*660–770*	*650–780*
GU-9675	G252	Human bone (right femur)	1285 ± 50	–22.0	670–780	650–870
GU-9674	G250	Human bone (clavicle)	1055 ± 55	–18.7	890–1030	860–1160

All dates calibrated using OxCal v3.10 (Bronk Ramsey 1995; 2001). NB date shown in italics (*OxA-8143*) appears to be erroneous.

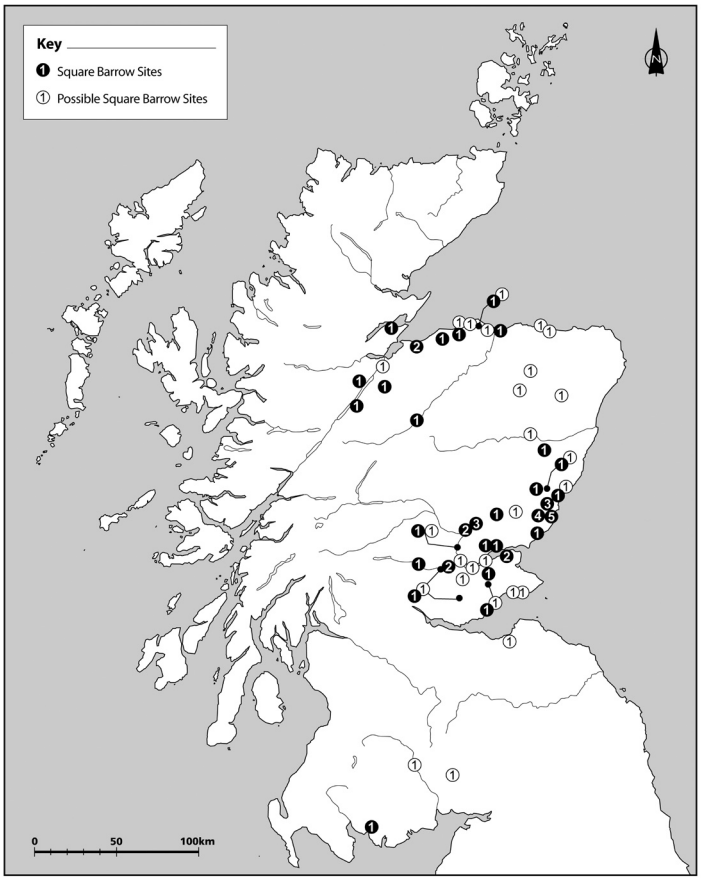
legacy of their carved symbol stones. Numerous other supposedly exotic elements heightened this sense of mystery, including a non-Indo-European Pictish language, suggestions of matrilineal descent and, finally, the disappearance of the Picts from the record. However, the vast majority of these old theories have been de-bunked and today the Picts are probably the best understood of Scotland's Early Historic peoples, certainly from an archaeological point of view (Foster 1996). Alcock (1993) has argued that, far from being mysterious, the Picts were 'a typical north-west European barbarian nation' and were accepted as such by the neighbouring Britons, Angles, Scots and subsequently the Scandinavians.

In contrast to their fortresses and dwellings, Pictish burials seem to have been less systematically investigated. Probably the best source of information is still the Pictish Studies volume (Friell & Watson 1984) on settlement, burial and art in Dark Age Northern Britain, in which Joanna Close-Brooks provided a review of 'Pictish and other burials' (Close-Brooks 1984). In this volume, Close-Brooks drew attention to the general lack of Iron Age burials and highlighted the change in the Early Historic period through the adoption of extended inhumation usually in a cist. Close-Brooks reviewed the evidence for three basic cemetery types: long cist cemeteries, platform cairns and ditched graves (or barrows). Pictish burial studies have not developed greatly and few new sites have been excavated. There has, however, been a marked increase in the number of cropmark barrow cemeteries identified through aerial photography. In 1984, Close-Brooks identified around 16 cropmark barrow cemeteries but this has steadily increased over the years and now stands at over 70 and there are undoubtedly more (illus 31).

In their recently published account of the platform cairn cemetery at Lundin Links, Greig and collaborators (Greig et al 2000) have produced a most useful review of the dating and relationships between these three site types. Thus, the discussion below will focus on the aspects of Pictish burial most appropriate to Redcastle, including questions such as the form and date of the graves and the identity of those buried therein.

Grave structure

All 16 of the graves at Redcastle were long graves within which the burials, where the evidence survives, were laid out extended on their backs. Almost all of the graves were lined with sandstone slabs, forming cists with base slabs, side slabs and capstones. Only G258 contained no sandstone slabs or other stones, which probably explains the very poor preservation of the skeletal remains in this grave. This was also the case for SB5 which clearly showed the remains of a wooden coffin as a dark line preserved in the grave fill (illus 29). In some cases, where there were no capstones present, it is possible that timber lids may have covered the graves, although there was no direct evidence for this. The excavation of the deep grave at Boysack Mills (Murray & Ralston 1998) also revealed evidence of a burial placed in a wooden coffin which was then covered with very large stone slabs. Unfortunately, there was no bone survival at Boysack Mills and radiocarbon dates had to be obtained from charcoal within the grave backfill. However, an iron ring-headed pin recovered from the grave suggests a date in the first–second centuries AD. Although rare, the use of wooden coffins rather than stone cists is at least attested in the archaeological record. Interestingly, one of the few references we have to Pictish burial practices is in an Irish elegy which stated that King Bridei, the victor of the battle of Nechtansmere in AD 685, only 17km west of Redcastle (Fraser 2002), was buried in a 'block of hollow withered oak' (Lowe 1999, 47). The curvilinear profile of the wooden coffin in the section through SB5 (illus 29) at Redcastle may support the idea of burial in a hollowed out tree rather than a plank-built coffin.



ILLUS 31 Distribution of barrow cemeteries in Scotland

Whatever the material used for constructing the graves it is clear that a certain amount of attention was spent on them, although some were noticeably better built or more substantial than others. As with the heavy covering boulder at Boysack Mills, the heavy capstones of SB1 at Redcastle needed to be lifted out carefully using ropes during the excavation, suggesting that these would also have required careful manoeuvring when they were originally set in place. In many of the other cases, the stones were a lot smaller and could easily have been placed by hand.

The beach pebbles used to pack behind the upright cist slabs in many of the graves were very similar to those found in the fill of the ditches around SB1 and on the north-west side of RB1, suggesting that beach pebbles were brought to the cemetery for most of the graves. This might support the idea that all the graves had once been covered by low cairns.

The graves were all generally orientated south-west to north-east with only slight variation either side of this alignment (illus 3). This consistent orientation of the graves suggests that they were marked on the surface in some way either by cairns,

posts or standing stones. No evidence for such grave markers was recovered during the excavation and no fragments of Pictish symbol stones were found, such as those from Garbeg and Dunrobin (Close-Brooks 1984, 101; Wedderburn & Grime 1984). Only SB1 had a pit (007), located to the north-east of the central grave, that may originally have held a timber marker post but, given that most of the other isolated pits in the excavation area contained Neolithic material, it is possible that this pit is not contemporary with the grave at all.

Enclosed graves

The excavated remains at Redcastle revealed that at least half the graves were surrounded by small ditched enclosures defined by lengths of straight or annular ditches (SB1–5 & RB 1–2). It remains possible, given the spacing between the graves, that many of the apparently unenclosed graves may originally have been surrounded by shallow ditches and banks which have been entirely removed by ploughing. In particular, G100 and G105 appear closely aligned with SB5 and may have formed a group of three contiguous barrows similar to some of the barrows at Garbeg or at Invergighty (illus 32).

The alignment of the graves, relative to the enclosing ditches of the square barrows, are generally parallel to the side ditches and at right angles to the end ditches (SB2–5), but in the case of SB1 it is noticeable that the central grave is positioned diagonally to the surrounding ditches. The reason for this remains unclear although it could be that the grave was excavated first and the ditches were added some time later, perhaps once the covering cairn was less well-defined.

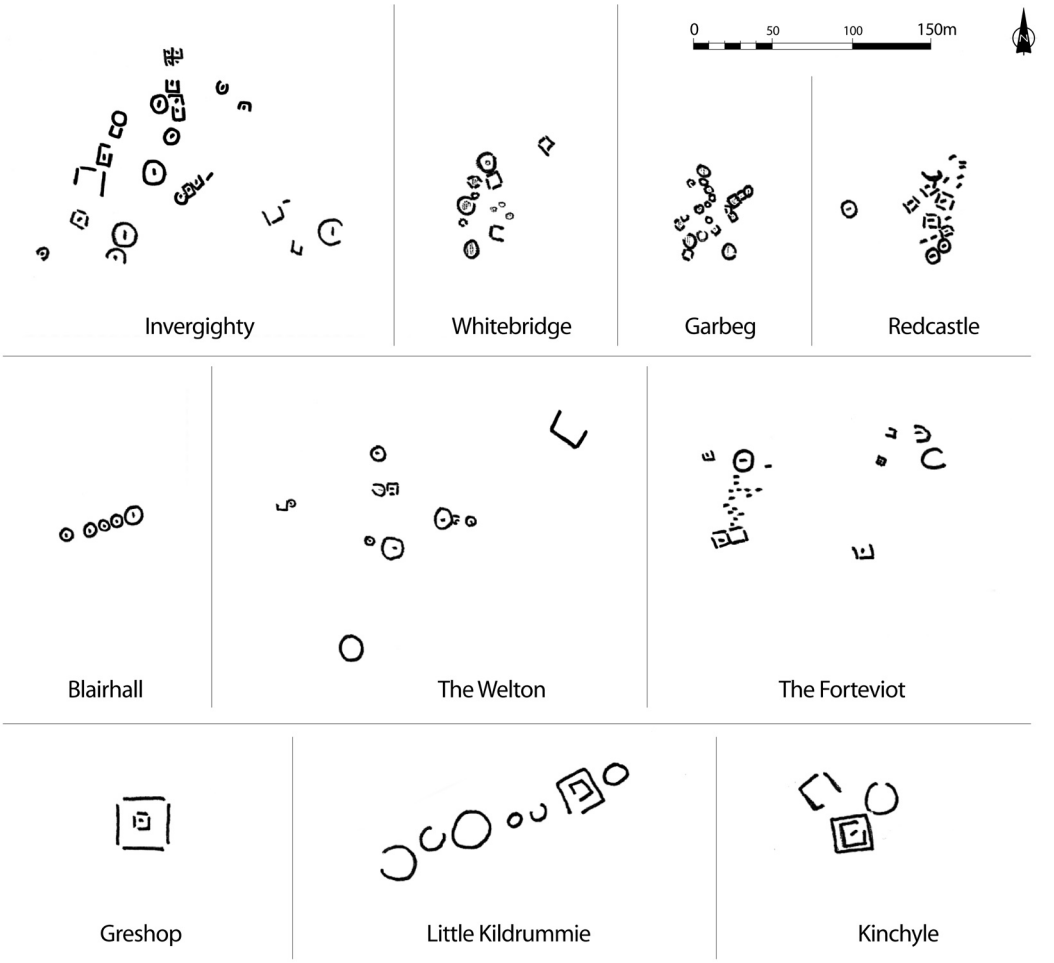
There was, however, no evidence for there having been barrow ditches around most of the graves at the northern end of the site. The long, shallow ditch (255) may represent all that remains of a square barrow around G262. It is possible that the eastern and western ditches could have been removed by ploughing, especially as the preservation of the other graves to the east (closer to the fence) was noticeably poorer, while to the west the ground slopes away and may have been more heavily plough-truncated. If this is indeed the case, then a northern ditch for such a barrow could be situated just outside the northern limit of the excavation area. This barrow would have been over 15m across; far larger than any of the surviving barrows. In addition, the curving Ditch 261 may have formed part of a round barrow around Grave 262, but this ditch appears too irregular and the grave would not have been located in the centre. In both cases, the argument for Ditches 255 and 261 having formed part of a square or round barrow is extremely weak and it is probably safer to regard them as unrelated.

The general distribution of the graves across the site is relatively even, with only G259 and G258 being in close proximity to each other. This even spacing suggests that, although no ditches survive, each of the graves was marked out on the surface, perhaps with a certain sized grave plot, which allowed subsequent burials to be placed at a discrete distance. Indeed, the proximity of G259 and G258 could suggest they were under conjoined cairns as seen at Lundin Links (Greig et al 2000), although perhaps the difference in grave alignment indicates they were not contemporary.

Cemetery organization and chronology

In general, the impression of the cemetery at Redcastle is that it developed linearly along the edge of the raised beach and was bounded on the landward side by the palaeochannel (illus 1). It was hoped that the dating of enough graves would allow an element of horizontal stratigraphy to indicate how the cemetery had grown over time and whether there was a pattern to this. The radiocarbon dates show that the earliest grave on the site was RB1, with G030 being the next earliest, but it is also clear that the cemetery did not develop linearly, starting at one end and extending therefrom, although it is noticeable that the two earliest graves are located very close to the edge of the raised beach in the southern half of the site. The evidence may suggest a more segmented development for the cemetery with clusters of graves: perhaps RB1, RB2, SB5, G100 and G105 forming one cluster and SB1–4 and G030 forming another.

The possibility that the different forms of enclosed graves represented either chronological, social or gender differences was one of the main research aims behind the excavation at Redcastle. From the radiocarbon dates, it remains unclear whether there is a clear chronological divide between the round and square barrows. Although RB1 is earlier than any of the square barrows, RB2 overlaps in date with a number of them, including SB1 and SB2. Unfortunately, neither of the round barrows contained well-preserved skeletal remains although the square barrows at least appear to contain a female inhumation (SB1). Interestingly, in the *Book of Armagh*, reference is made to the burial of three Christian daughters of King Loiguire within circular



ILLUS 32 Comparative plans of barrow cemeteries

ditches (McCullagh 1991, 49). In the cairn cemetery at Lundin Links (Greig et al 2000) there was evidence for men and women being buried under different cairns and possibly also in family plots. At least six of the skeletons in the Horned Cairn complex at Lundin Links were female (ibid, 601–3) and there were slight indications of a familial connection. It is possible that some of the clusters of graves at Redcastle may also have been family or kinship groups.

Looking at the plans of other barrow cemeteries (illus 32) it is difficult to see any obvious patterns other than that many of the cemeteries appear to develop linearly. This is largely as a result of following topographical features such as ridges, scarp edges, burns and rivers. The ground chosen for the cemetery at Redcastle is prime agricultural land and there may be an element of conspicuous consumption in the use of this resource by what would effectively have been an agricultural community. However, it could also be argued that the position is relatively exposed on the edge of the raised beach and restricted by the old stream channel to the west. It is possible that the location was selected for its liminal setting. Situated on the edge of agricultural land looking out to sea, it perhaps could be seen as a metaphor for the transition between life and death. More work requires to be undertaken on transcribing the cropmarks of other barrow cemeteries and checking the locations and topography in the field before any firmer conclusions can be drawn on this subject.

Given that the souterrain is located in the middle of the cemetery, it is worth considering whether the barrow builders knew that the earlier structure was there. The radiocarbon dates for the souterrain which fall between the first and fourth centuries AD overlap slightly with the earliest of the graves, RB1 and G030, which are also positioned away from the former. Perhaps then the souterrain was still in use or had only recently been abandoned when the cemetery was first used. Possibly the site was specifically chosen because it was known to contain the traces of earlier settlement and, as such, was felt to be linked with the ancestors. It has been suggested by some authors that some Pictish royal centres, such as Forteviot, were deliberately constructed in areas that displayed concentrations of prehistoric monuments (Driscoll 1998), although at Redcastle this could simply be a coincidence. Another site where long cists are associated with a souterrain is at West Grange of Conon (Jervise 1863) where a small cluster of six cists was found north-west of the main passage. More recently, two very truncated long cists were found associated with a promontory enclosure at Elliot outside Arbroath during upgrading of the A92 (Rees & Cameron 1998, 12; 2000, 11), although the date of these burials has yet to be established.

The Redcastle cemetery may have been positioned in a prominent location in order to make a statement about the people buried there and the community who interred them. Archaeologists have long suggested that prominent burial mounds may have been created to legitimize claims on land or resources and constantly to reinforce such claims. However, it is debatable how prominent the mounds at Redcastle would have been. Today it is easy to be struck by the bold patterns created by the cropmarks or the excavated plans but Early Historic visitors would not have had the benefit of aerial views. It is also likely that the land would not have been as uniform as it is today, having been flattened by years of mechanized ploughing. When approaching the upstanding site at Whitebridge, Inverness-shire, the differences between square- and round-ditched cairns is not particularly noticeable, which would suggest that either these differences were of little consequence or that they were only significant close up. The seeming lack of monumentality of the graves at Redcastle does not, however, take into account the possible presence of standing stones (with or without symbols) or wooden poles that may also have marked out the site. More monumental barrows of similar design, but larger in scale, can be seen at a number of sites but the best examples are at Kinchyle and Greshop (illus 32) where the surrounding ditches enclose areas of over 30m across.

Population of cemetery

The cemetery at Redcastle is obviously quite small and burial there, according to the radiocarbon dates, extended over a period of 500–700 years. Even taking the lower end of this range, and a figure of around 20 individuals in the cemetery, it adds up to barely one person per generation. Clearly not everyone was buried in the cemetery. While some prehistoric societies could have had childhood mortality rates as high as 50% (Parker Pearson 1999, 103), from the available evidence it appears that no children were buried in this cemetery. It is most likely that only mature adults belonging to a certain sector of the social order were interred. It seems safe to deduce that the deceased over whom most time and energy were expended following their death would have belonged to the higher echelons of society, as suggested in the Irish *Annals*. Just exactly what the status of those in the cemetery was remains unclear. Perhaps they were members of the leading family group in the local community, possibly part of a lordship or minor royal household.

Out of the 16 graves excavated, the age and sex could only be determined for fewer than half of the burials. In total, only one definite female, four possible females and one possible male could be identified. The presence of more females than males in the cemetery is intriguing but could simply be chance. Some scholars believe that, as Bede suggested, the succession of Pictish kings was through the female line rather than the male. Others, however, have pointed out that the lack of references to Pictish women, both in the documentary sources and on the symbol stones, would argue against such a matrilineal society (Foster 1996, 37). Although Woolf (1998) has convincingly argued against Pictish matriliny, it seems prudent to raise the issue again if only to emphasize that it has been roundly dismissed. However, when examining other Early Historic cemeteries, such as the long cist cemeteries, the ratio of men to women is almost equal and the apparent difference at Redcastle needs to be explained. Could this apparent dominance of females in the Redcastle cemetery be evidence that women at least had a special significance in Pictish society? The recently published cairn cemetery site at Lundin Links showed that 12 of the 22 skeletons were definitely female, two were probably female, while four were definitely male and another four

were possibly male (Greig et al 2000, 606). Although this ratio is not statistically significant, more work requires to be undertaken to see if there is any pattern to these sorts of results.

The argument that more males died away from home may seem overly simplistic but should be taken seriously. Not only was warfare endemic during the Early Historic period but many may also have been lost at sea – in the process of fishing, trading and raiding. We know that the Orkneys were destroyed by a Pictish king in AD 681 and that, in AD 729, a fleet of 150 Pictish ships was wrecked on the southern shores of the Moray Firth.

The middle of the first millennium AD was a time not only of social upheaval but also of religious upheaval, with the coming of Christianity. The exact manner in which the Picts were converted to Christianity probably varied in different areas at different times. Areas once converted may have lapsed for periods, and just how many of the trappings of Christianity local groups adopted must surely have varied. Ninianic missionaries spreading out from Whithorn may have converted parts of Pictland to Christianity in the fifth century. Others may have fallen under the spell of Columban missionaries from Iona and the west in the sixth century. Finally, the Northumbrian church appears to have got a foothold some time in the late seventh/early eighth centuries. King Nechtan asked for a Roman style church to be built in the early eighth century. Conversion was not a simple process and 'robbed of the old ways' there must have been a great deal of confusion. Leslie Alcock (1993) suggested that this confusion might partly be reflected in the mix of burial practices evident throughout the period. The arrival of Christianity may also have had an influence on who was buried where. Perhaps the lack of males at Redcastle is because they were being buried elsewhere, in Christian burial grounds for example. In Anglo-Saxon northern England, for example, churchyard burial in the seventh–ninth centuries was not extended to everyone (Hadley 2002, 211).

Like their artwork, fortifications, material culture, language and social structure, Pictish burial traditions seemed to draw upon a range of burial traits common across Britain at the time. These included placing the deceased in stone cists, or log coffins, set below low stone square or circular mounds. The edges of these mounds were sometimes defined by kerb stones or ditches reflecting the square or circular shape. Burials were usually grouped into cemeteries that varied in size and uniformity. The mix of long cists and barrow cemeteries, with square- and round-ditched burials, may reflect the unsettled times both socially and religiously.

As at Lundin Links, the orientation of the burials, the position of the heads at the south-west and the lack of grave goods might be taken to imply that those buried at Redcastle were Christian, although the early radiocarbon dates from RB1 would argue against this. Such consistent characteristics have also, however, been found in pagan cemeteries. The radiocarbon dates indicate that the cemetery – and therefore the burial rites – were in use prior to the accepted introduction of Christianity into Pictland. It remains possible that the burial rite had its origins in the Iron Age, as the date of Boysack Mill might suggest, with influence from Roman burial methods.

The people interred at Redcastle must have lived relatively close by. It is possible that during the Early Historic period the site of Red Castle itself could have been a high status fortified settlement. Unfortunately, no artefacts dating to this period were recovered when the site was trial trenched in the 1980s, although the ditch could certainly be earlier than the medieval castle (Pollock 1985). Perhaps the cropmarks of the roundhouse visible on the aerial photographs to the west of the cemetery represent a contemporary settlement (illus 1 & 2), although the other roundhouses excavated in the area at Ironshill (Pollock 1997) and Hawkhill (Rees, forthcoming) proved to be Iron Age in date (illus 1). Excavation work undertaken as part of the Field School in 1997 at Newbarns, to the south of Redcastle (illus 1), however, located the remains of a timber hall which has now been dated to broadly to the eighth–tenth centuries (McGill 2004). This hall was at least 12m long by 6m wide and had an apsidal north-eastern end. It is possible that some of the individuals who lived in this hall could have been buried at Redcastle, especially as no burial remains were found at Newbarns. Given the extremely plough-truncated nature of the remains at Newbarns, it is also possible that other timber halls were located in the immediate vicintiy of Redcastle but have not survived or simply do not appear on the aerial photographs.

Another remarkable find of the Field School was made at Hawkhill where, although the roundhouse and the souterrain were of Iron Age date, a pit containing three female inhumations was discovered and found to date to between the sixth and ninth centuries (Rees & Anderson, forthcoming). The difference in treatment of the dead between these burials and those at Redcastle is remarkable and surely must relate to differences in status.

Many questions remain unanswered: why do these cemeteries come into being and why do they stop? Were the cemeteries maintained? Were they abandoned suddenly or slowly forgotten? Is there indeed any link between the forms of barrows and gender and is the perceived dominance of females in the cemeteries significant? Answers to all these questions and more must await excavation of further cropmark cemeteries in order that larger datasets can be accumulated and interrogated. Modern scientific techniques could also be applied to some of the material: for example do the carbon 13 values obtained during the processing of samples for radiocarbon dating (Schulting & Richards 2002, 166) really indicate that the population at Redcastle did not rely on marine resources as part of their daily diet? Recent work in England and Wales has shown the wide range of burial practices in this period (Lucy & Reynolds 2002), and a similar review of all the evidence from Scotland would be extremely useful. However, given the poor bone preservation displayed at Redcastle, largely as a result of modern ploughing, such further excavation and analyses should be undertaken sooner rather than later as the bone assemblages, upon which we can base a better understanding of the Picts, are becoming more damaged annually.

CONCLUSIONS

The excavations at Redcastle have provided the first major investigation of a cropmark barrow cemetery. The information obtained, although limited by poor bone preservation, at least allowed the site to be positively identified as belonging to the Pictish period. Coupled with other recently published excavations such as Boysack Mill and Lundin Links, Redcastle has provided an insight into Pictish society that is normally better known through its art and settlement remains.

The excavation, detailed sampling and analyses of the timber-lined souterrain has provided evidence, supported by other recent excavations, that some souterrains were not completely backfilled as part of a ritual act of closure and abandonment. It remains possible, however, that some of the lowest deposits may have been the result of a process of dismantling and ritualized abandonment. Unfortunately, definitive evidence for the primary use of such structures still remains elusive.

Redcastle has made a significant contribution to our understanding of the first millennium AD in Angus, and indeed north-east Scotland, where both cropmark barrow cemeteries and souterrains are considered regional site types which have been under-investigated.

ARCHIVE

The full project archive will be deposited with the National Monuments Record of Scotland. Copies of the reproducible elements of the archive will be deposited with Angus Council Sites and Monuments Record. Finds disposal will be conducted through the Treasure Trove procedures.

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