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The excavation of Cairnwell ring-cairn, Portlethen, Aberdeenshire

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ABSTRACT

A ring-cairn at Cairnwell was completely excavated prior to its reconstruction nearby. The site originally comprised an arc of pits, in use by the Middle Neolithic period — 4320±80 BP (GU-4402) — surrounding a stone circle which may have been of similar date. After a long hiatus, a pyre was burnt within the stone circle — 3070±60 BP (GU-4399). A timber enclosure, with an entrance to the south, was then erected within the stone circle and five urned cremations interred in pits in the centre of the enclosure. Later the timber enclosure was replaced by a stone ring-cairn which respected the interior area delimited by the timber enclosure. This ring-cairn was subsequently expanded to incorporate the stone circle. The excavation and reconstruction of Cairnwell ring-cairn were commissioned and funded by G & J Investments Ltd and undertaken by AOC (Scotland) Ltd.

INTRODUCTION

The ring-cairn was located on a gentle rise 580 m north-east of Cairnwell farmhouse at NGR: NO 9071 9733 (NMRS NO99NW 4) (illus 1 & 2). Total excavation of the site was commissioned by G & J Investments Ltd in advance of future development within Badentoy Park, an industrial estate. The excavation concentrated on recovering the sequence of activity at the site and in the immediate surrounding area. All contexts were sampled to maximize the recovery of archaeological material, in particular cremated bone, and contextually secure samples were taken to allow a comprehensive dating programme. After excavation the monument was relocated and accurately reconstructed within a landscaped site, accessible to the public, 175 m to the north-west (illus 3). Fieldwork and reconstruction supervision was undertaken by AOC (Scotland) Ltd in January and February 1995. The site was a Scheduled Monument protected under the Ancient Monuments & Archaeological Areas Act 1979. The project was conducted under the terms of a scheduled monument consent.

ANTIQUARIAN INVESTIGATION AND RECENT SURVEYS

The land surrounding the ring-cairn was enclosed, for arable agriculture, during the middle of the 19th century. The site itself lay within a tongue of unimproved stony land, running north/south,

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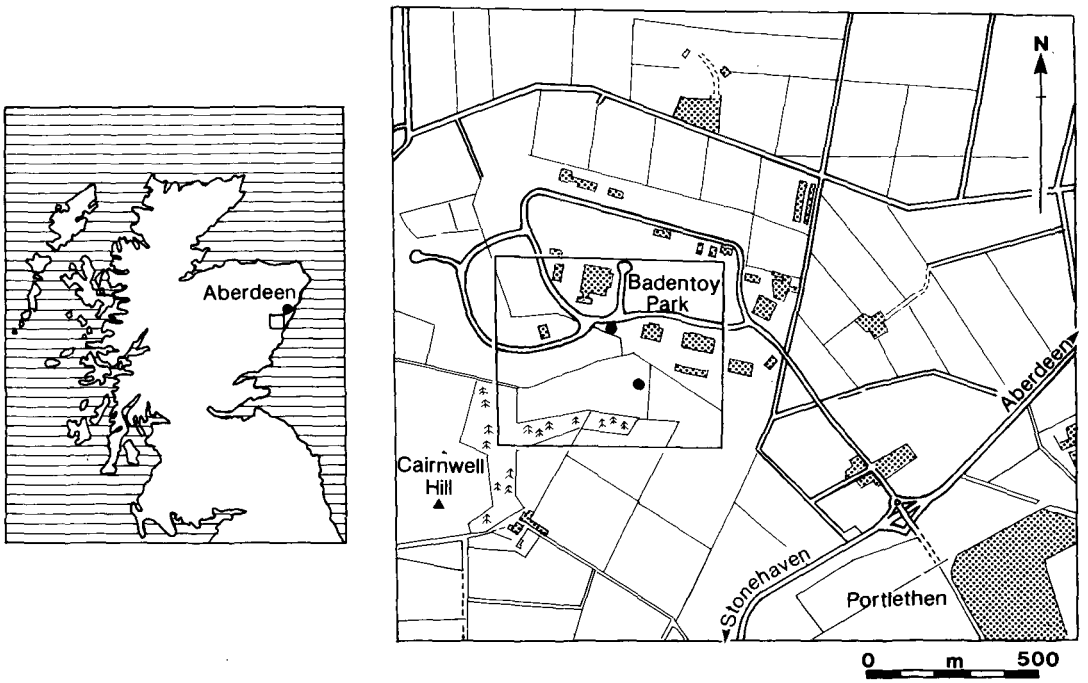


ILLUS 1 Site location map. (*Based upon the Ordnance Survey map © Crown copyright*)

which supported gorse bushes, heather, bracken and other heathland plants. The form and size of this tongue of land has remained constant since 1865 (OS 1865).

The ring-cairn was first surveyed in 1858 by Thompson (1864, 132) when it was known as Kingcausie. His plan appears to show a much more complete monument with 13 standing stones and two intact kerbs (illus 4). The measurements are clearly erroneous and even contradictory to the text suggesting that the illustration may not have been an accurate representation of the site. This is, however, the only record for the site prior to the removal of large portions of the stone circle. Thompson also undertook an excavation within the then stone-free central area of the ring-cairn:

> We found it full of black mould, ie, churchyard earth, with fragments of bone and wood charcoal, and, what was especially interesting, we found at five spots, arranged in a quincunx, fragments of coarse earthenware urns; thus proving unquestionably that it had been used as a place of burial (Thompson 1864, 132).

In 1899 the site was again surveyed (Coles 1900, 150); the plan shows three standing stones and two kerbs. The monument also appears to be relatively free of field clearance rubble, the kerb stones appearing as ridges on the plan. This may be a cartographic simplification of the situation as photographs from the Ritchie collection (KC/296, KC/300 and KC/334 taken between 1902 and 1904), held in the National Monuments Record of Scotland, show the site accumulating large quantities of field clearance rubble around its exterior, although there appears to be little stone in the interior and no visible disruption to the kerbs.

The plan from Henshall's visit of 1957 (Henshall 1963, 401) has strong similarities with the monument prior to excavation (illus 4), although fewer kerb stones are visible. This suggests that the addition of field clearance rubble to the monument continued up to the recent past progressively covering kerb stones. The most recent survey prior to excavation was conducted by AOC (Scotland) Ltd in 1994 (Carter 1994) (illus 4).

EXCAVATION RESULTS

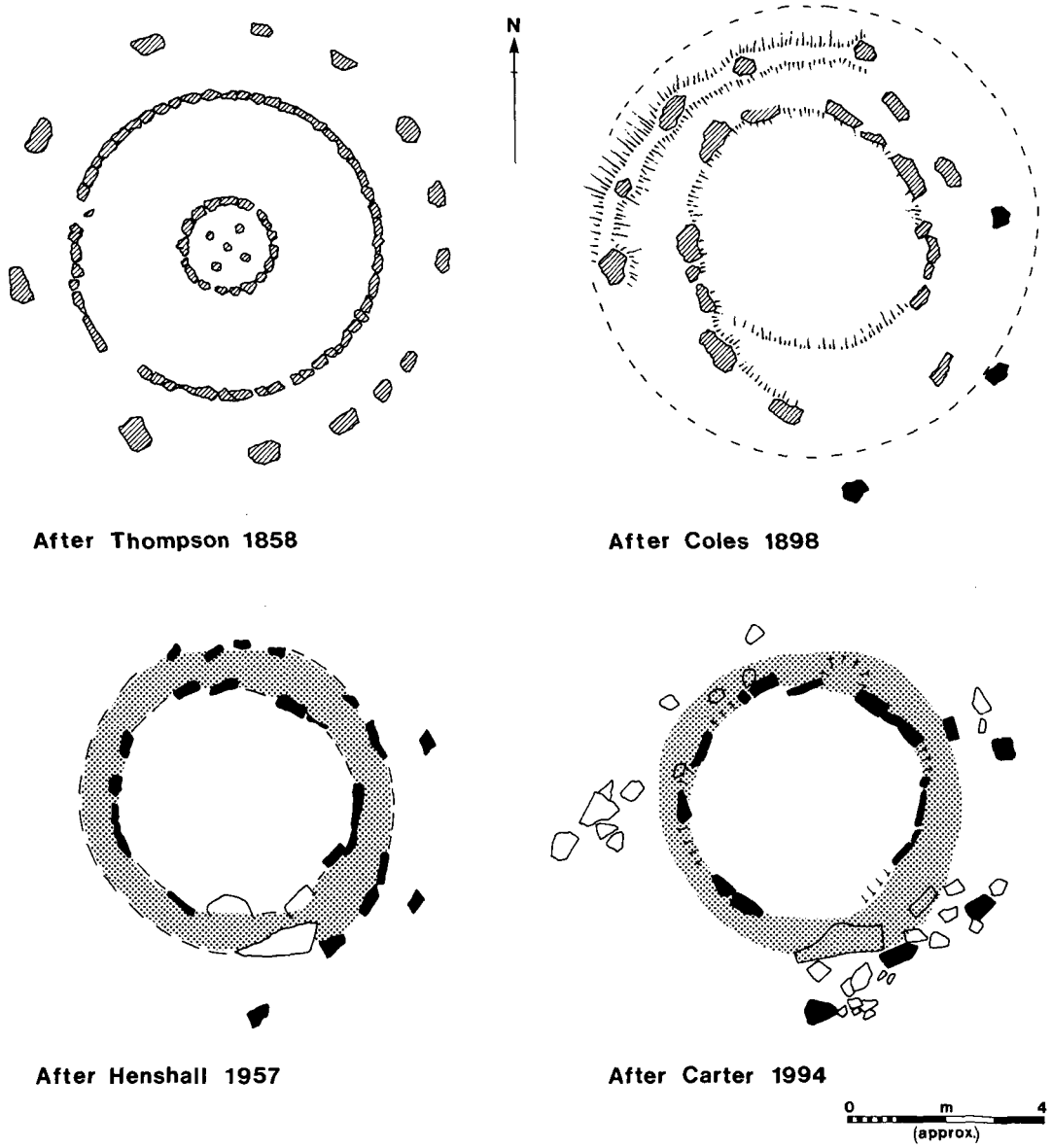
PHASE 1: NATURAL SEDIMENTS

The site is underlain by stony granite/granite gneiss till and soils derived from this are assigned to the Countesswells Association (Glentworth & Muir 1963). The area has been mapped as poorly draining (*Soil Survey of Scotland*, Soil Map sheet 67) but the ring-cairn is situated at the crest of a gentle rise and therefore the soil here is only imperfectly drained and it may be classified as belonging to the Dess Series of the Countesswells Association (imperfectly drained iron podzols).

PHASE 2: MIDDLE NEOLITHIC PITS AND THE STONE CIRCLE

The earliest human activity identified at the site comprised an arc of six Middle Neolithic pits, which were concentric with the stone circle.

Exterior pits Six pits (F200, F202, F204, F207, F211 & F216) formed a curvilinear arrangement with a projected diameter of c 16 m (illus 5). These lay to the north, west and south of the ring-cairn. The pits lay between 2.8 m and 7.3 m apart and varied in form from circular, rounded pits (F211, 0.78 m wide and 0.25 m deep) to elongated, shallow scoops (F204, 1.1 m long, 0.6 m wide and 0.11 m deep) (illus 6). All the pits were truncated to subsoil level by later disturbance (Phase 6) and all, except F211, appeared to have



ILLUS 4 The four surveys of Cairnwell ring-cairn

single-context pit fills. Pit F211 had two fills, though this was probably an effect of root penetration and other post-depositional factors.

The fills of two of these pits contained pottery (F211 & F204). Pit F204 also contained burnt bone and a further two (F211 & F207) contained wood charcoal. Wood charcoal from the lower fill of F211 was radiocarbon dated to 4680 ± 80 BP (GU-4402). In addition cereal grain (barley and emmer wheat) was recovered in quantity from F211 and in smaller numbers from two other contexts, F202 and F207 (Holden, below).

Another exterior pit (F209) is excluded from this group as it was considered modern in origin by the excavator, an interpretation supported by the botanical remains (*ibid*).

The stone circle The stone circle had an overall diameter of c 9 m and was composed of eight stones. At the time of excavation three stones from the stone circle were still erect in their sockets (F060, F089 & F053). A fallen stone, with its socket (F041), was located during excavation as well as another four stone sockets (F062, F076, F214 & F218). These were interpreted as having held stones, probably removed during the 19th century (Phase 6). The three erect stones stood around 1.2 m high and had sockets which penetrated the subsoil. None of the sockets holding surviving stones contained botanical remains suitable for dating or characterization and during excavation the fills of the stoneless sockets were interpreted as having been contaminated by 19th-century material.

The pits described above were arranged in an arc which was concentric with the ring-cairn (Phase 5). As Phase 2 and Phase 5 are separated by at least 1600 radiocarbon years their common orientation could not have been assured by any method other than a durable structural element being present over the considerable hiatus. The stone circle could not be dated, although it was ultimately incorporated into the ring-cairn (Phase 6), but is the most probable element of the site to date from the Middle Neolithic.

PHASE 3: BURNING AND OTHER PRE-ENCLOSURE FEATURES

Subsequent human activity on site was represented by a large area of burning (F064) within the stone circle, overlain by burnt deposits (F065 & F068). At least one post-hole (F066) is associated with this phase.

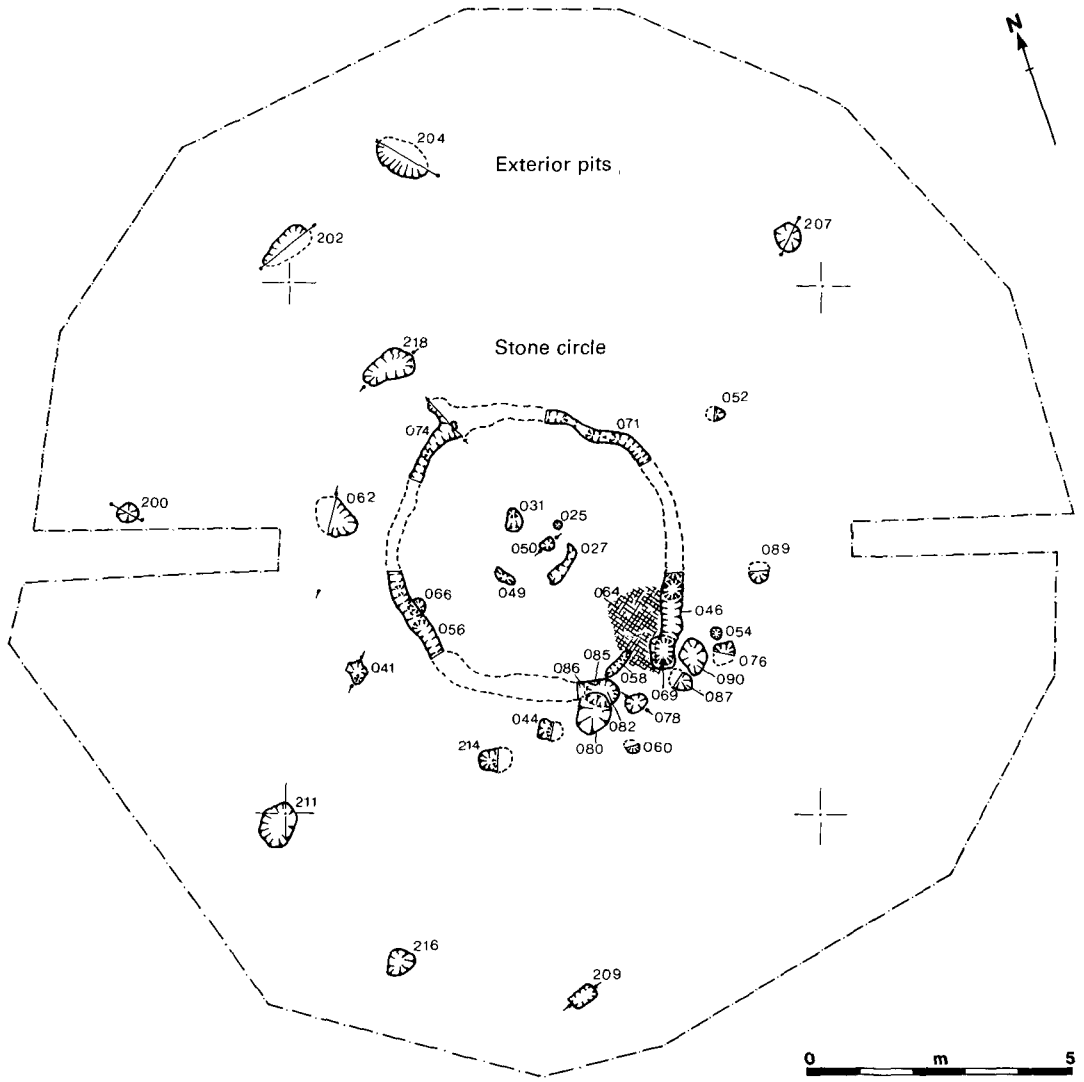
Burning In the south-east of the site, within the stone circle (Phase 2), an area of bright red heat-affected subsoil (F064) was identified, 1.54 m by 0.92 m in extent and up to 50 mm deep (illus 5). This was overlain by burnt deposits (F065 & F068). These burnt deposits contained wood charcoal and unidentifiable burnt bone. A sample of wood charcoal from F065 was radiocarbon dated to 3070 ± 60 BP (GU-4399). A small quantity of cereal grain was also recovered. The extent and depth of the heat-affected till together with the presence of burnt deposits suggest that the topsoil was stripped from the area prior to the burning episode. Disturbance caused by the construction of the ring-cairn (Phase 5) has, however, prevented the survival of any clear evidence of topsoil stripping during this phase.

Post-holes One post-hole (F066), with a very light-coloured fill, was identified in the south-west of the site and was cut by the ring-slot (Phase 4). There is another possible vestigial post-hole along the north-western circuit of the ring-slot (F074, illus 5), but the relationship between the ring-slot and this ephemeral feature could not be defined in the field. The post-hole (F066) is, therefore, the only negative feature which stratigraphically pre-dates the ring-slot.

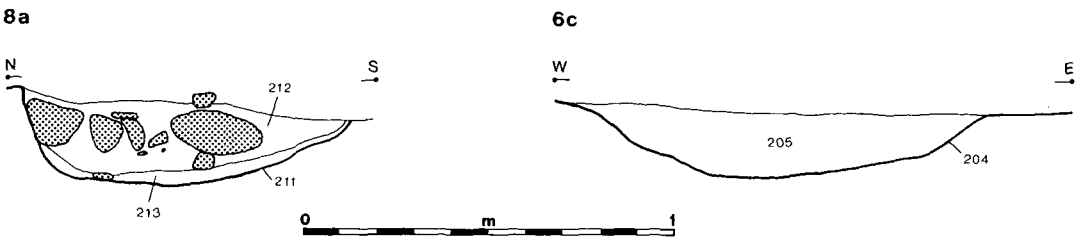
PHASE 4: TIMBER ENCLOSURE AND CREMATIONS

After the burning event of Phase 3 a timber enclosure was constructed within a ring-slot, which, on the basis of radiocarbon dates, is contemporary with a series of five internal cremation pits and four pits around the entrance to the enclosure.

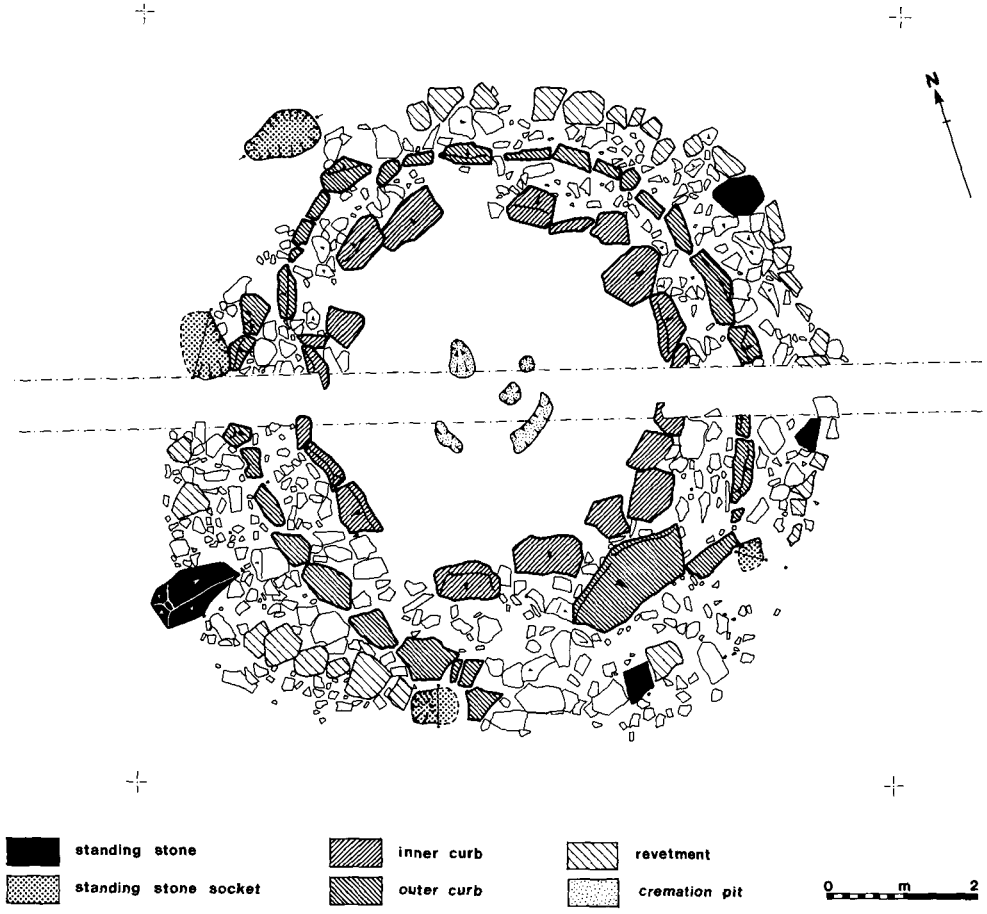
The ring-slot A ring-slot (F046, F056, F071, F074 & F086), 5.7 m in diameter and 0.25 m deep at most, lay in the centre of the area excavated. This ring-slot had a distinct opening in the south, marked by two large post-holes (F082 & F069), one at each terminal (illus 5). The evidence observed was not sufficient to determine the cross-sectional form of timbers nor whether the ring-slot had contained a continuous palisade.



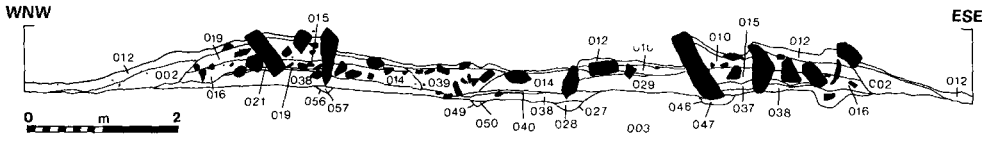
ILLUS 5 Plan of negative features



ILLUS 6 Cross-sections of two of the Neolithic pits



ILLUS 7 Plan of the ring-cairn



ILLUS 8 Cross-section of Cairnwell ring-cairn

However, the packing stones visible within the ring-slot and depressions in its base suggest that it contained upright posts in close juxtaposition to each other.

Wood charcoal, burnt bone, cereal grain and pottery were recovered from this feature and a sample of wood charcoal from the basal fill of F069 was radiocarbon dated to 3020 ± 70 BP (GU-4400). The basal fill was interpreted as having been deposited prior to the setting of the post, hence this date provides a *terminus post quem* for the construction of the enclosure. Charred cereal grain was also recovered from the north-west section of the ring-slot (Holden, below).

The ring-slot cut a number of Phase 3 features including the area of burning and the post-hole (F066), but was sealed in turn by the construction of the ring-cairn (Phase 5).

The cremation pits Five pits (F025, F027, F031, F049 & F050) were identified within the interior of the monument (illus 5). They could not be linked stratigraphically with the timber enclosure but are included in this phase on the basis of their radiocarbon dates and inferred position within the phasing. These pits were only clearly defined where they penetrated the subsoil, their upper levels having been truncated by later disturbance (below, Phase 6).

Each pit contained a homogenous fill and within four of the features (F025, F027, F049 & F050) burnt material, including cremated bone and wood charcoal was recovered. Only one of the pits (F027) contained fragments of pottery, all from the same vessel (MacSween below). Previous excavations at the ring-cairn (Thompson 1864, 132) recorded pottery fragments from all five cremation pits. These excavations truncated the cremation pits and removed most of the material from these urned cremation deposits.

Two radiocarbon dates were obtained for these pits from wood charcoal: 3020 ± 50 BP (GU-4396) from F027 and 2970 ± 50 BP (GU-4398) from F049.

Entrance area pits A series of four negative features (F044, F054, F078 & F087) was sealed by the ring-cairn (Phase 5). These features could not be related stratigraphically to each other but they clearly pre-date the construction of the ring-cairn. Their forms varied but were in general sub-circular and were suggestive of small pits. Their distribution implies a relationship with the ring-slot enclosure as they were clustered around the entrance in the south (illus 5). In addition the fills of all four features contain cremated bone (McSweeney, below). The bone in F054 was identifiable as human although only a small quantity was present. The fill of F078 was of interest in that it contained fragments of burnt bone which probably belonged to a large mammal. Wood charcoal from the same context has been radiocarbon dated to 2970 ± 50 BP (GU-4401).

Old ground surface The overlying ring-cairn (Phase 5) was not of sufficient mass to prevent pedogenesis in the underlying surface. The only exception to this was F038 (illus 8), a natural soil horizon to the east of the ring-slot which was sealed by a layer of till (F037) redeposited during the construction of the overlying ring-cairn. The soil layer contained pottery and a considerable quantity of charcoal, interpreted as one charred timber in the field, although subsequent analysis showed that both alder (*Alnus glutinosa*) and hazel (*Corylus avellana*) were present. Wood charcoal from this context was radiocarbon dated to 3100 ± 50 BP (GU-4396). This provides a *terminus post quem* for the construction of the ring-cairn.

PHASE 5: RING-CAIRN CONSTRUCTION AND MODIFICATION

The ring-cairn was comprised of an outer and inner kerb, which lay approximately 1 m apart (illus 7 & 8), with rubble between them. This structure was sited within the stone circle with the inner kerb sitting above the course of the ring-slot (Phase 4). Overall there was an asymmetry to the layout with the gap between the stone circle and the ring-cairn varying between 0.7 m and 0.1 m, the closest point was in the south of the circuit.

Ring-cairn kerbs The outer kerb (F005 & F008) was composed of 36 kerb-stones and had one break in the south of its circuit. The stones differed in lithology and form. The major part of the circuit was constructed of thin (0.15 m) flagstones, 0.7 m high. In the south-west part of the circuit, however, the kerb-stones were predominantly boulders, being significantly broader (0.4 m) and sub-rounded in form although continuing the fairly constant height of the outer kerb. In the south portion of the circuit, beyond the break (illus 7 and above), there was an unusually large kerb-stone which was tilted inwards. This kerb-stone was 1.8 m long, over twice the length of any other outer kerb-stone. The outer kerb was interpreted as having rested upon an old ground surface or having been slightly embedded into it. Only one *in situ* kerb-stone had a socket (F090) which penetrated the subsoil. Another socket (F080) for an outer kerb-stone was located on the west side of the large outer kerb-stone (illus 5), at the break in the circuit of the outer kerb.

The inner kerb (F004 & F007) was composed of 21 kerb-stones. The circuit of this kerb was much more fragmentary than the outer kerb with at least three breaks. None of these was aligned with the one break in the outer kerb and these gaps may relate to the robbing of kerb-stones prior to the accumulation of loose rubble upon the monument (Phase 6). The kerb-stones were of varying lithology but were, in form, flagstones roughly 0.25 m thick and standing about 1 m high. The inner kerb-stones were all bedded to a greater depth than the outer kerb. However, this bedding was not normally deeper than the depth of the old topsoil (F038) and penetrated the subsoil in only two places (F085 & F058). Indeed the inner kerb had suffered as a result of the shallowness of this bedding and had generally tilted inwards. In the south-east part of the circuit some inner kerb-stones had collapsed totally. This, however, may have been a product of active dismantling of the monument (Phase 6).

Ring-cairn rubble The area between the two kerbs was infilled with rubble (F015 & F018) which varied in lithology and size. The lower levels of this material were earthfast and had suffered only limited root penetration while the upper levels had suffered extensive root penetration. Within the eastern portion of the monument the cairn rubble includes a layer of redeposited subsoil (F037) at its base. It was only here that the mass of the cairn rubble, combined with the till, was able to prevent pedogenesis in the underlying deposit (Phase 4, old ground surface).

Outer revetment The outer revetment (F006, F009, F016 & F017) was an apron of rubble which expanded the ring-cairn to incorporate the stone circle. Its outer limit extended between the stones in the stone circle (Phase 2). The fragmentary nature of this revetment suggests that it has subsequently been damaged, possibly as a consequence of 19th-century land improvements (Phase 6). Although fragmentary in form it is a coherent element of the monument. It respects all standing stones, including those removed during the 19th century.

PHASE 6: MODERN DISTURBANCES

Soil accumulation An accumulation of soil (F206) was identified abutting the north side of the ring-cairn (Phase 5). It was not modern topsoil and contained both pottery and burnt bone.

Thompson's investigation of 1858 A series of disturbed contexts (F024, F029, F039 & F040) was identified in the interior of the ring-cairn (illus 5). These have been attributed to the excavations of Thompson in 1858 which clearly penetrated to the depth of the cremation pits (Thompson 1864, 132), although the lower portions of these pits remained undisturbed. F040 contained pottery and human burnt bone and may be the residue from the disturbance of the upper portion of the cremation pits. The soil accumulation to the north of the ring-cairn (F206, above) may also have its origin in these excavations.

Thompson (1858) to Henshall (1957) Thompson's survey of the monument (1864, 132) shows only limited damage to the kerbs of the ring-cairn (illus 4). Between Thompson's survey in 1858 and that of Coles in 1899 a number of stones from the stone circle were removed or collapsed, 10 if we accept Thompson's numbers or five based on excavation evidence. Coles' survey (1900, 150) and photographs from the Ritchie collection (held at the NMRS) show arable fields to the west and east of the monument and large quantities of field clearance rubble to the north and south. There appears at this time to be little visible disruption to the kerbs but by the time of Henshall's visit in 1957 (1963, 401) there had been substantial disruption to the south and south-east of the circuit of the ring-cairn, with the unusually large slab in the outer kerb (Phase 5) having been pushed over.

SPECIALISTS' REPORTS

CREMATED BONE

Kath McSweeney

In general the condition of the cremated bone from Cairnwell ring-cairn was poor. Most deposits of bone were very small, as was individual fragment size. There were very few fragments larger than about 15 mm (Table 1). As a result identification of anatomical provenance was difficult and in some instances it was impossible even to detect species. Despite the absence of positive identifications, texture and breakage patterns suggest that some bone fragments were probably animal.

The cremation pits

The fills of three of the five interior pits (F025, F049 & F050) contained only small deposits of cremated bone which had a high probability of being human in origin, identifying these as cremation pits. It is not possible to say whether any of these were from one or several individuals although it is clear that none of these surviving deposits of bone represented full cremations (Table 1).

TABLE 1
Summary of cremated bone findings

Context	Fill of	Phase	Weight (g)	Size (mm)	Species	Anatomical Area	Estimated no. Frags
205	204	2	0.05	2–4.5	Human??	?	6
65	Layer	3	3.9	1–16	Anim/Hum	Rib	100
68	Layer	3	1.11	1–9	Anim/Hum	?	60
26	25	4	0.98	1–9	Human	Cran	50
28	27	4	229.22	1–33	Human	All (Age 18+, Sex M?)	1000
38	Layer	4	0.09	3–5	Human??	?	8
45	44	4	0.34	3–5	Human??	?	5
47	46	4	0.61	1.7–11.5	Human??	?	21
48	49	4	4.09	1.5–25	Human	LB	70
51	50	4	1.85	1–13	Human??	?	70
55	54	4	1.54	1–13	Human	Teeth (Age 13+)	50
57	56	4	0.11	1–4	Human??	?	11
59	58	4	0.4	1–11	Human??	?	20
70	69	4	0.73	1–8	Anim/Hum	?	25
73	69	4	0.17	1–4	Anim/Hum	?	20
79	78	4	16.73	1–19	Animal?	LB	>100
83	82	4	1.24	1–10	Human??	?	50
84	82	4	1.54	1–12	Human??	?	50
88	87	4	0.16	2–9.5	Human??		6
37	Layer	5	0.25	2–13	Human??	?	20
81	80	5	0.06	9	Anim/Hum	?	1
12	Layer	6	0.83	2–12	Human?	Metatarsal	30
14	Layer	6	?	3.5–21	Human?	LB	7
29	Layer	6	1.08	2–13	Human??	?	25
40	Layer	6	5.24	1–13	Human	Cr, LB, H/F (pos Adult)	150
206	Layer	6	0.05	22	Human??	LB	1

Key to Anatomical Area:
LB Longbone
Cr Cranial
H/F Humerus/Femur

The fill of the interior pit F027, with over 229 g of cremated bone, is clearly more substantial than the other deposits and identifies this as a cremation pit although it contained much less bone than has been found in modern cremations (McKinley 1993). In the absence of any duplicated bones, or of any variation in robustness, it is concluded that only one individual was buried here. A fully developed third molar gives a minimum age at death of around 18 years but partly fused cranial sutures suggests that age was older than this, although probably not much more than 30–40 years. There was only very tenuous evidence for sex; muscle attachments on two pieces of cranium appeared quite marked, indicating that the individual may have been male. The absence of many hand and foot remains, which previous personal experience has shown to survive well, does suggest that the gathering of the remains in antiquity was not very meticulous.

The very small deposits of bone in most of the features are surprising. On balance the most probable explanation is that the severe truncation of the cremation pits by the 19th-century excavations (Phase 6) removed the bulk of the cremated bone. In contrast, the deeper burial of the urned cremation in F027 ensured its survival.

Other contexts

Burnt bone was also recovered from nine contexts clustered in the south-east of the site (Table 1). In general the quantities of bone were so small or degraded that they did not allow definite identification of species. The distribution of the fills containing burnt bone may, however, indicate a spread of burnt material on the ancient ground surface which was subsequently incorporated into contemporary pits and post-holes.

Only one of the entrance area pits contained definite cremated human bone (F054); two adjoining fragments of a fully formed upper premolar indicate that age at death was at least 13 years. F078 (Phase 4 pit) included some animal-like fragments of longbone shafts, apparently from a larger (ie sheep or deer size) animal. It is possible that some of the unidentified fragments from other features were also from animals. F064 (Phase 3 burning) also produced quantities of burnt bone, possibly animal in some cases.

BOTANICAL REMAINS

Tim Holden

The preservation of the charred plant remains from Cairnwell was generally poor and the diversity low with high concentrations of grain restricted to a small number of contexts. Nevertheless, some patterns in the data (Table 2) have been observed and contribute to the understanding of the site.

Carbonized plant remains from the topsoil contexts overlying the site were restricted to a small number of charred heather (*Calluna vulgaris*) florets. The origin of these is uncertain but they probably represent evidence of heather management by burning at some time prior to the use of liming for soil improvement on the adjacent fields. The general absence of charred remains, other than heather florets, from the more recent strata discounts the possibility that recent charred remains had become incorporated into older sediments by worm and other biological activity. The presence of charred heather florets in specific contexts has allowed the identification of otherwise unstratified recent features or disturbance within older features. The presence of charred heather florets in the fill of F209, for instance, suggests that this rectangular pit is more recent than many of the surrounding negative features.

In most cases, poor preservation of the remains precluded identification to the level of species but even in the absence of cereal chaff much of the cereal grain could be categorised as barley. A small number were identified as naked barley (*Hordeum sativum* — naked) and it is likely that much of the poorly preserved grain is also of this variety. In general the grain recovered from Cairnwell had been cleaned of contaminants with almost insignificant numbers of seeds of segetal (of cultivated fields) and ruderal (of waste places) weeds present and no identifiable remains of chaff.

Phase 2

The character of the charred remains from the external arc of Neolithic pits is very variable. Contexts F212 and F213 (the fills of F211) both contained significant numbers of barley grains (probably *Hordeum sativum* — naked) with over 250 grains per 10 litre sample of soil as well as three grains of emmer wheat (*Triticum dicoccum*), the only other cereals on site. The fills of F202 and F207 also contained barley but only in small numbers. Those from F207 were tentatively identified as the naked variety. The remainder of the samples contained only traces of charred material with no evidence for cereals.

Due to the truncation of these pits (Phase 6), it was not certain whether the charred grain represented spreads of material across the site or deposits that were only present in the pits. The composition of the cereal-containing assemblages across the site is similar and on these grounds they could easily have derived from a single source, possibly as the result of a conflagration somewhere in the vicinity of the site. Pit F211 contained the highest concentration of charred grain and could represent the location closest to the suggested conflagration. However, in the absence of well-stratified deposits it is difficult to be more precise regarding the sources of the grain.

The presence of naked barley and emmer wheat from Neolithic contexts fits into an already recognized pattern from eastern Scotland with both being present at the nearby site of Balbridie (Fairweather & Ralston 1993) and also from Lairg, Sutherland (Holden in press).

Phase 3

The single sample from F065, one of the pre-enclosure burnt deposits overlying F064, has a slightly elevated level of cereal grain which is likely to have become charred *in situ* as part of the burning event. This could provide the source for much of the low-level cereal concentrations observed in the negative features in the south-eastern part of the site.

Phase 4

The features making up the timber enclosure contained a small scatter of essentially segetal weed seeds. Cereal grain was heavily concentrated in F074, the ring-slot in the north-west of its circuit, but occasional grains also occurred in a terminal post-hole (F082). It is possible that the source of grain in this feature is the same as that in the nearby stone socket (F062). The cremation pits contained sparse charred remains, consistent with small quantities of reworked material in the backfill. The cereal grain is comparable with that recovered from Phase 2 contexts. If they do derive from a common source (above) they must represent redeposited concentrations of grain, possibly domestic in origin, occurring in patchy spreads over the surface during a period of the site. The presence of naked barley does, however, continue well into the Bronze Age as evidenced

TABLE 2
Botanical remains

Latin name	Plant part	Common name	Phase	2	2	2	2	2	2
			Context no	63	29	203	208	212	213
			Fill of/Layer	62	L	202	207	211	211
			Orig. volume	12	14	13	9	32	18
Corylus avellana L.	nut shell	hazel		1				1	
Polygonum persicaria/lapathifolium	nutlet	persicaria/pale persicaria							
Polygonum sp.	nutlet	knotgrass							
Rumex sp.	nutlet	dock							
Polygonaceae indet.	nutlet	knotweed family			1				
cf. *Polygonaceae*	nutlet	knotweed family							
Spergula arvensis L.	seed	corn spurrey							
Ranunculus sp.	achene	buttercup/crowfoot							
cf. *Ranunculus* sp.	achene	buttercup/crowfoot							
Rubus idaeus L.	stone	raspberry							1
Rubus cf. *idaeus*	stone	raspberry							
Calluna vulgaris (L.) Hull	floret	ling, heather							
Empetrum nigrum L.	seed	crowberry							
Galium aparine L.	fruit	cleavers							
Ajuga reptans L.	nutlet	bugle							
Plantago lanceolata L.	seed	ribwort							
Triticum dicoccum Schubl	caryopsis	emmer wheat						1	1
Hordeum sativum indet.	caryopsis	barley indet.		11		7		249	62
Hordeum sativum (naked)	caryopsis	naked barley						4	
Hordeum sativum (cf. naked)	caryopsis	naked barley					2	23	
Hordeum sativum (naked–straight)	caryopsis	naked barley							1
Hordeum sativum (naked–twisted)	caryopsis	naked barley							2
cf. *Arrhenatherum elatius*	rhizome/tuber	false oat-grass							
Gramineae indet.	caryopsis	grass indet.						1	
Gramineae (large grained)	caryopsis	large-grained grass							
Cereal indet.	caryopsis	cereal indet.		5					4
Carex sp.	nutlet	sedge							

by sites such as Suisgill, Sutherland (van der Veen 1985), and also at Lairg, Sutherland (Holden in press).

POTTERY

Ann MacSween

The coarse pottery assemblage from Cairnwell comprised 157 sherds (plus many smaller fragments), weighing 553 g and representing 16 vessels. The majority of sherds are undecorated body sherds (Table 3). In most cases, the fabric is a sandy or micaceous sandy clay with a percentage of added rock fragments (10–30%). From examination of the hardness of the sherds, most seem to have been well fired. Most of the vessels are sooted on either their exterior or interior, indicating their use as cooking vessels. No complete profiles could be reconstructed, and in most cases the sherds are too small to allow the morphology of the vessel to be determined and hence to facilitate comparisons with other assemblages. Where method of manufacture can be determined, coil construction was most common, although V.3 (Phase 2) may have been slab-built. Thin section analysis of four sherds (V.1, V.9, V.11 & V.12) indicated that both the clays and temper could have been obtained locally.

2	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	5	5	5	6	6	6	6
53	67	65	59	26	28	47	72	73	75	83	84	45	55	79	19	16	17	81	12	24	39	210
52	66	L	58	25	27	46	71	69	74	82	82	44	54	78	L	L	L	80	L	L	92	209
12	8	14	8	10	59	20	14	12	14	14	14	15	14	14	6	14	12	13	34	12	12	14
																						1
				1																2	1	
							1						2									
						1		1														
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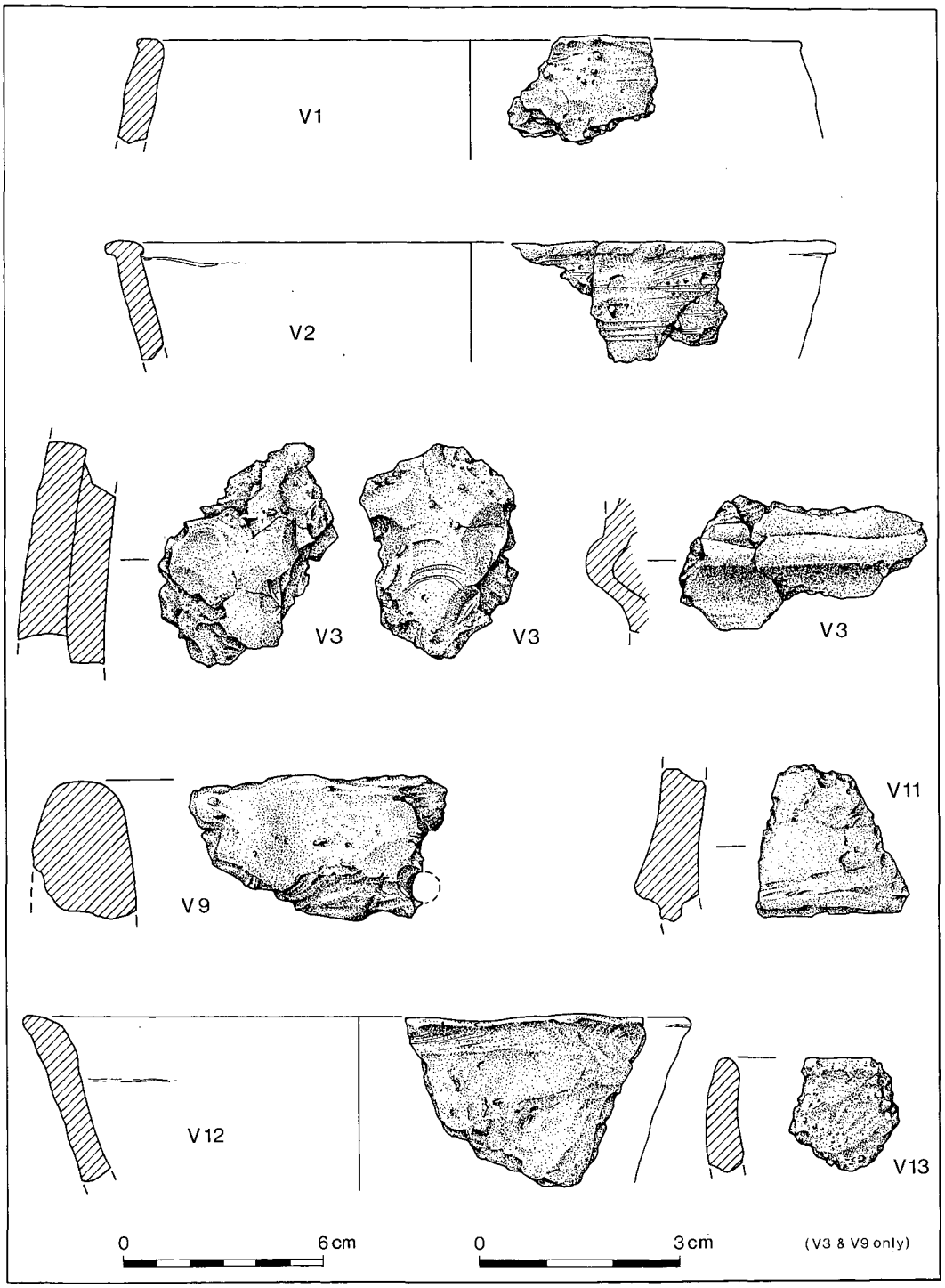
											1											
			4				2									1	3		5			3
		1																				
			2			3									2							
																					1	
																		1				
		5	2		1				75	1	2				2							
		1																				
					1				3				1	1								
1	2				1		1	1														
												1										1
		3							1				2							1		
																	1					

Phase 2

Some 95 sherds from 10 vessels were recovered from Phase 2 contexts and these vessels were mainly open bowls (Table 3). Each vessel was from only one context except V.3 which was in both the upper and lower fill of F211, one of the exterior pits. This vessel was the only one with decoration: some of the sherds have finger-tip impressions and two fragments have a thin applied cordon (illus 9). These are possibly from a Grooved Ware vessel, although the size of the sherd makes a positive identification impossible.

The vessels associated with pits F211 and F204 probably belong to the 'round-based pottery tradition' of the Early to Middle Neolithic, Smith's Grimston/Lyles Hill Series (1974, 106–8). This type of pottery has a wide geographical distribution, and as yet there are too few assemblages from Scotland to allow the definition of local sub-styles. Through consideration of the assemblages from the Boghead burial mound, Moray (Burl 1984, 35–73), the chambered cairn at Easterton of Roseisle (Henshall 1983), a further two assemblages from pits at Tulloch of Assery B and from beneath the chambered cairn at Camster Long, Henshall (1984, 61) has suggested attributes which could distinguish a north-east style of the Grimston/Lyles Hill Series. These attributes are the frequent use of fluting and the rarity of other forms of decoration; the simplicity of the rims and carinations; the occasional use of lugs on carinations; the presence of simple



ILLUS 9 The pottery

uncarinated bowls; and the preference for relatively shallow forms with everted or vertical necks. The assemblage recovered was too small to determine whether it conformed to these general principles.

Phase 4

Some 56 small sherds from four vessels were identified within Phase 4 contexts. The method of manufacture could be determined for V.9; this was by coil construction. It was not possible to reconstruct profiles for any of these vessels, although V.11 was probably a shouldered vessel. V.9, from one of the cremation pits, was perforated (illus 9).

Phase 6

Six sherds from two vessels were identified, none of which was diagnostic.

TABLE 3
Summary of pottery report

Context	Fill of	Phase	Vessels	No. of Sherds	Distinctive features & comments
205	204	2	V.12	4 (2 rim)	–
205	204	2	V.13	1 (1 rim)	Plain rim
212	211	2	V.1	16 (1 rim)	Open bowl, exterior & interior sooted
212	211	2	V.2	3 (2 rim)	Open bowl
212 & 213	211	2	V.3	57	Thin applied cordon, exterior sooted
212	211	2	V.4	5	–
212	211	2	V.5	1	–
212	211	2	V.6	1	–
212	211	2	V.7	3	Interior sooted
212	211	2	V.8	4	–
28	27	4	V.9	53 (1 rim)	Flat-rimmed vessel, exterior & interior sooted
38	Layer	4	V.11	1	Shouldered sherd, well smoothed on rim interior
45	44	4	V.18	1	–
56	57	4	V.10	1	Smoothing of the exterior surface
40	Layer	6	V.14	4	Interior sooted
206	Layer	6	V.16	2	–

LITHICS

Thomas Rees

The excavation recovered a combined assemblage of 55 lithics, of which 31 were flint and 24 were quartz.

The flint was distributed throughout the stratigraphy of the site. Its presence in features beneath the ring-cairn (F038, F044, F069 of Phase 4) supports a long-term deposition of flint upon the site, albeit in small quantities. The absence of flint cores, retouched pieces and the small size of the flint assemblage suggests that the flint pieces at least were brought onto the site by accident or as waste and that no manufacture took place at the site.

The quartz assemblage contained three cores: two single platform cores and a bipolar core, although again there were no retouched pieces. The presence of quartz at the site was restricted to the structural elements of the ring-cairn (F015 of Phase 5) and disturbed contexts (F024 & F029

of Phase 6). This suggests a later introduction of quartz to the site, although no inference can be taken from this concerning the use of flint and quartz in the wider cultural environment.

Overall the lithic assemblage has failed to provide enough evidence for the reconstruction of the reduction method practised, and the absence of this and modified pieces prevents any determination of age being placed upon the assemblage.

RADIOCARBON DATES

CHARCOAL SAMPLES

Alan Duffy

All the charcoal samples submitted for radiocarbon dating were examined. They all consisted of small fragments of roundwood identified as hazel (*Corylus avellana*), alder (*Alnus glutinosa*) and birch (*Betula* sp). The limited degree of fractionation observed in the wood charcoal suggests that it became incorporated into the sediments shortly after combustion. The wood charcoal from pit fill F073 contained what appear to be iron salt crystals.

CALIBRATION

Magnar Dalland

The seven dates were calibrated using data from Pearson *et al* (1986), producing a calibrated Probability Distribution (PD) for each date. The calibrated PD curves were used to calculate the Short Continuous Range (SCR) and the Long Continuous Range (LCR) for each date (Table 4). These are the shortest continuous ranges within which the sum of the probabilities add up to at least 68.26% and 95.45% respectively. These values are equivalent to the probabilities of the one and two sigma ranges of a normal distribution.

TABLE 4
SCR and LCR of the calibrated dates from Cairnwell

Sample	F no	Feature	yrs BP	SCR (1 sigma)	LCR (2 sigma)	*d*C13‰
GU-4401	79	Pit under ring-cairn	2970 ± 50	1295–1125 BC	1395–1050 BC	−26.5
GU-4398	48	Cremation	2970 ± 50	1295–1125 BC	1395–1050 BC	−27.6
GU-4400	73	TPQ enclosure	3020 ± 70	1420–1220 BC	1435–1035 BC	−26.9
GU-4396	28	Cremation	3020 ± 50	1390–1220 BC	1420–1135 BC	−27.1
GU-4399	65	Pre-enclosure burn	3070 ± 60	1425–1285 BC	1515–1180 BC	−26.7
GU-4397	38	OGS under ring-cairn	3100 ± 50	1430–1315 BC	1515–1270 BC	−27.5
GU-4402	213	Exterior pit	4680 ± 80	3535–3340 BC	3650–3190 BC	−25.3

ANALYSIS OF THE RADIOCARBON DATES

John Barber

For the purpose of the following analysis, the raw radiocarbon determinations are used. The dates are listed in Table 4 in order of their radiocarbon age and it was decided to test the legitimacy of averaging together successive pairs of dates using the method outlined by Long & Rippeteau (1974). This resulted in the observation that it would be legitimate to average all the pairs of dates, with the exception of the oldest pair, GU-4397 and GU-4402. This shows that there is an interval between these two dates which is significant with respect to the precision of the radiocarbon method.

The legitimacy of averaging all but the oldest date was then examined and the weighted mean and standard deviation was calculated at 4970±22 BP. With a Chauvenet's rejection criterion of 1.65 (*ibid*, 208) this yielded lower and upper bounds of 5006 and 4934, respectively. The two earliest, GU-4397 and GU-4399, and the two latest dates, GU-4401 and GU-4398, in this group fall outwith these bounds. It is, therefore, not legitimate, on statistical grounds, to average the dates in this group.

After eliminating the oldest date, GU-4397, the remaining five dates were tested in the same fashion, leading to the elimination of GU-4399. However, averaging the four remaining dates yielded a weighted mean and standard deviation of 4968±27 BP which provided lower and upper bounds of 3062 and 2774, respectively. All four dates fell within these bounds, indicating that the spread of dates represents a duration which is not significant with respect to the precision of the analyses. This does not, however, 'prove' that the dated events are strictly contemporaneous because they could have occurred sequentially within an interval too short to be resolved by radiocarbon dating.

Testing of the two remaining dates, GU-4399 and GU-4397, confirmed that these could also be legitimately averaged together and represented by the weighted mean and standard deviation, 5038±38 BP.

These several dates are derived from discrete contexts representative of individual human acts and there is a sense in which it would be implausible to average a pit and an enclosure, for example. If, however, they are viewed as sample dates from a population of dated human activities it is clearly appropriate to explore the 'central' chronological tendency of those dated acts. In this context, we could, for example, calibrate the weighted means of the groups of four and two dates, 4968±27 BP and 5038±38 BP. These calibrated ranges would then represent the best available dates for the groups of human acts on the site at these two distinct periods.

DISCUSSION

The primary aim of the excavation at Cairnwell ring-cairn was to elucidate the sequence, nature and extent of activity on the site. The excavation produced a far more complex sequence than that suggested by an initial assessment. The discussion is presented in terms of the chronological sequence of the monument.

PHASE 2

The stone circle

The distribution of the exterior pits, in an arc concentric with the later stone complex in the centre of the site, suggests that some visible element of the complex must have been present in both phases. The stone circle is the only structural element of the later complex which cannot be reliably located within the chronology of the site, except that it is in place prior to the expansion of the ring-cairn, ie the construction of the outer revetment.

If we accept the argument presented above then the radiocarbon date from the exterior pit provides a *terminus ante quem* for the construction of the stone circle in the late to mid fourth millennium BC. The form of the stone circle, being a plain circle of quite small diameter, would usually be ascribed a later date. However, the stone circle is within a landscape of many similar monuments. Within 1.5 km of Cairnwell there are another four known stone circles: Craighead (NO99NW 3), Aquhorthies (NO99NW 1), Auchlee 1 (NO89NE 4) and Old Bourtreebush

(NO99NW 2). Craighead is the best parallel as it originally consisted of at least seven free-standing stones (Thompson 1864, 130–1), of which only four stones now remain. The other three stone circles enclose ring-cairns or cairns. Clearly it is not proposed that these stone circles were all contemporary, rather that the number of these monuments within the immediate landscape would support a long period of currency for their use.

The exterior pits

It has not been possible to determine the process by which material was incorporated within the fills of the exterior pits. The multiple fragments of sooted pottery vessels, especially in F211, suggest the fills derive from domestic waste disposal, as does the presence of burnt bone and wood charcoal. However, four out of six of the fills are substantially empty of anthropic material which argues for a purpose for these pits other than domestic waste disposal. In addition the distribution of the pits, concentric and almost paired with the stone circle, implies that these pits were placed within a formal framework imposed by the form of the stone circle. Holden (above) has presented the possibility that the charred cereal grain could have become incorporated into the negative features through bioturbation, with the original source being a surface spread of material deriving, perhaps, from a conflagration. Such a source, perhaps a burnt domestic structure, could be used to explain the clean, chaff-free, processed nature of the grain recovered, a condition difficult to explain if these are refuse pits. If the charred grain is not an original element of the fill of these pits then the argument for their use as waste disposal pits is hard to sustain. However, the process of infilling could not be clarified so the potential remains for the material recovered to have derived either from a single depositional phase or from accretion from multiple sources over a long period.

The deposition of assemblages of cereal grain, pottery and burnt bone in pits is a feature commonly associated with Early to Middle Neolithic ritual monuments. Conventionally such deposits are characterized as refuse deposition (Smith 1964) or 'structured' ritual deposits (Barclay & Russell-White 1993). More recent studies have also begun to highlight the lack of understanding in the process of deposition and the arbitrary nature of the dichotomy between sacred and profane activity (Richards 1990; Barclay & Russell-White 1993).

THE HIATUS

There is no evidence of any identifiable activity on and around the monument between Phases 2 and 3, a hiatus which lasted for 1600 radiocarbon years. Such a long hiatus in identifiable activity suggests that the site had been abandoned. The reuse of the stone circle, nearly two millennia after its original construction, indicates that the monument had regained a significance within Bronze Age society to the extent that it was deemed suitable as a focus of funerary activity.

PHASE 3

The burning of a large fire within the stone circle is the first identifiable activity after the abandonment of the site. This conflagration must have been intense and long lasting in order to penetrate the subsoil over such a large area. The presence of burnt deposits immediately above the subsoil suggests that the topsoil was deliberately stripped prior to the conflagration. This deliberate process suggests that the activity being undertaken was more than just scrub or tree removal. It seems most likely, given the subsequent events in Phase 4, that the burnt deposits and

burnt subsoil are the result of a funeral pyre and that the topsoil was deliberately removed as part of the associated ritual.

The funeral pyre is probably the source for much of the burnt bone found throughout later phases in the south-eastern portion of the site. Burnt bone in the ring-slot and the entrance area pits suggests the presence of a spread of burnt material on the surface, material from this spread becoming incidentally incorporated into their fills.

PHASE 4

The fact that the radiocarbon date from the Phase 3 conflagration, GU-4399, could not be averaged together with the four Phase 4 dates suggests that the duration over which these phases of activity occurred is significant with respect to the precision of the radiocarbon analysis (Barber above). However, the interval between the Phase 3 date and the earliest Phase 4 date, GU-4396, is not significant on this basis. This indicates that these phases probably represent sub-divisions of a period of continuing activity. In addition, the wood charcoal found in the Phase 4 features was still distinguishable as small roundwood and was not highly fragmented. If the Phase 3 conflagration was the source of this charcoal, as seems likely, then a significant duration of time did not elapse between the conflagration and the incorporation of the wood charcoal into the Phase 4 features.

The timber enclosure

It is argued here that the construction of a timber enclosure with an opening to the south, within the stone circle, came immediately after the conflagration in Phase 3. The enclosure was not concentric with the stone circle with the result that the terminal post-holes forming the entrance to the enclosure were immediately adjacent to two of the standing stones. The juxtaposition of these two forms of uprights would have created a slightly elongated entrance, and highlighted the event of passing through the stone circle to reach the interior of the enclosure.

Earlier enclosures under cairns are rare. However, the site at Beech Hill House, Coupar Angus (Stevenson 1995), also has evidence for an earlier enclosure. Here a kerbed cairn was underlain by a palisade which enclosed an area 8.5–9 m in diameter. Only part of its circuit survived and the location of an entrance, if present, is unknown. The presumption at Cairnwell, as at Beech Hill House, is that a continuous fence or palisade was bedded in the ring-slot, although at Beech Hill House it was much deeper, being up to 0.6 m deep (*ibid*). The shallowness of the ring-slot at Cairnwell does not preclude the presence of a continuous fence.

Enclosures such as those at Cairnwell and Beech Hill House should be carefully distinguished from the ring-ditch enclosures which are often found in association with early Bronze Age funerary monuments, such as that at Loanleven (Russell-White *et al* 1992, 301) and Balfarg (Barclay & Russell-White 1993, 115). The ring-ditch phenomenon appears to involve true shallow ditches, encircling funerary sites, which have often been gradually infilled with stone. The presence of post-pipes and packing stones in the ring-slots at Cairnwell and Beech Hill House indicate that they originally supported palisades or fences.

The cremation pits

The radiocarbon dates obtained from two of the cremation pits and from the base of a terminal post-hole of the timber enclosure cannot be differentiated from each other on statistical grounds

(Barber above). This suggests that the timber enclosure was probably associated with the phase of funerary activity on the site. Furthermore, the case for linking the timber enclosure with the cremation pits is supported by its layout. The five cremation pits lie centrally within the circuit of both the enclosure and the ring-cairn but, in the case of the former, there is a formal entrance providing access into the interior. The continuous circuit of the ring-cairn would have had to be 'violated' to gain access and it is argued here that ease of access would have been necessary for ritual activities.

Of the five internal cremation pits only F027 provides strong evidence for the burial of a complete cremation. The evidence suggests that the remains of a mature male were interred in a thick walled pottery vessel. Three of the other pits contain small deposits of human bone (F025, F049 & F050) and no pottery. These may have been token deposits which were interred either in organic containers or without containers. However, given that Thompson (1864, 132) recorded coarse earthenware fragments in each of the five pits, it seems most likely that the pottery containers and the bulk of the cremated bone were removed by him. The urned cremation in F027 may have survived Thompson's attention because it was more deeply interred.

The entrance area pits

The purpose of the four pits which lay adjacent to the entrance of the timber enclosure is hard to explain. The radiocarbon date obtained from one of the four pits could not be differentiated from the radiocarbon dates from the enclosure and the cremation pits on statistical grounds (Barber above), and so it is argued here the entrance area pits were associated with the funerary activity on the site.

Their function is not clear but their position immediately outside the entrance to the enclosure and the presence of burnt human bone (in F054) and burnt animal bone and wood charcoal (in F078) strongly suggests that they were, in some way, related to ritual activities associated with the deposition of the cremations. The possibility that this material is residual from an earlier phase of activity cannot be excluded but the balance of evidence suggests otherwise.

PHASE 5

The construction of the stone ring-cairn marks a shift in the use of the site in that the activity which took place no longer involved the deposition of material. If the interpretation of the ring-cairn as a commemorative phase of the monument is to be accepted then the ring-cairn would have been constructed soon after the abandonment of the timber enclosure. The sample of wood charcoal from the OGS underlying the ring-cairn, GU-4397, was radiocarbon dated because it was thought that it would provide a close *terminus post quem* for its construction. However the radiocarbon date from F078 (GU-4401), the fill of one of the pits sealed by the ring-cairn, provides a more recent *terminus post quem*. This implies that the wood charcoal in the OGS was residual when the ring-cairn was constructed. The radiocarbon dates from the OGS and from the Phase 3 conflagration could not be differentiated from each other on statistical grounds (Barber above) and it is argued here that the latter was the source of the charcoal which became incorporated in the OGS.

In addition to the radiocarbon evidence two features of the construction of the ring-cairn suggest that it may have been built while elements of the timber enclosure were still visible.

Firstly, the inner kerb sat in the old ring-slot for the major part of its circuit except in the south-east where it was embedded into the subsoil. There is no evidence to determine whether the wooden posts of the enclosure had rotted *in situ* or whether the ring-cairn builders deliberately removed them in order to construct the ring-cairn. The reuse of the ring-slot also indicates that the area defined by the earlier timber enclosure was still of great significance at the time of the construction of the ring-cairn. This reinforces the strong link between these two phases and implies a shared treatment of the inner area although the later structure clearly inhibited access through the absence of an entrance.

The second element which connects the ring-cairn with the earlier timber enclosure is the form of the outer kerb in the south-east portion of its circuit. At this point there are two kerb-stones which, uniquely, were bedded into the subsoil between which lay the largest kerb-stone, some 1.8 m in length. This substantial kerb-stone straddled the old entrance to the timber enclosure. Such features are traditionally known as false portals and are found on other Scottish sites such as Culcharron Cairn, Benderloch (Peltenburg 1972, 50) but they have never previously been linked with entranceways to earlier structures. As such the three kerb-stones of this false portal recollect a true portal which preceded them.

The presence of rounded boulders, rather than flagstones, along the south-west circuit of the outer kerb links Cairnwell to the broader tradition of megalithic monuments in north-east Scotland which are commonly distinguished by features such as recumbent stones, large flankers or simply by the presence of the largest stone on the circuit (Burl 1972, 45). In general the ring-cairn tradition within the north-east of Scotland has been studied in relation to Clava cairns (Henshall 1963; Ritchie & MacLaren 1972; Burl 1972) leading to the suggestion that the ring-cairns of the north-east represent the degeneration of the Clava tradition. For instance, more massive ring-cairns such as those at Raedykes are seen as being early and closer in form to the Clava cairns while others such as Sands of Forvie and Cairnwell are slighter and hence later, extreme degenerate forms (Henshall 1963, 27, 33 & 35). This relationship was strengthened by the frequent presence of stone circles and recumbent stone circles around both the ring-cairns of the north-east and the Clava cairns.

However, Kenworthy (1972, 20) strongly argued that, regardless of the recumbent stone circle distribution, there is a ring-cairn tradition within the north-east distinct from that of the Clava group. Cairnwell, with its slight structure and small overall diameter, was still viewed as a late, albeit 'developed', type (*ibid*). The assumption that slighter structures are chronologically later than more massive constructions is supported by the evidence from Cairnwell where the ring-cairn is radiocarbon dated to after 2970 ± 50 BP (GU-4401). Thus, within the north-east the two extremes of the ring-cairn form, with sites like Raedykes with broad bands of cairn material at one extreme and sites such as Cairnwell and Sands of Forvie with very narrow bands of cairn material but comparable internal spaces at the other extreme, may be chronologically distinct.

However, as argued above, the construction of the ring-cairn at Cairnwell marks a fundamental change in the use of the site. By sealing all the earlier features the ring-cairn may be viewed more as a commemoration of the events which were undertaken there. This interpretation of the use of the ring-cairn is at odds with the current understanding where a ring-cairn acts as the enclosure for the active phase of interring cremations (Barclay & Russell-White 1993). Thus a simplistic chronological division based on the form of ring-cairns within the north-east may mask diversity in the function of these physically similar monuments.

The outer revetment marks a clear change in the form of the ring-cairn. It was clearly added after the construction of the main ring-cairn because the rubble it revets abuts the outer kerb. However the duration of time between the construction of the ring-cairn and the outer revetment

could not be identified. This expansion may reflect a change in the function of the monument, in that there was no longer a need to have the stone circle separate from the ring-cairn. Rather there was a need for the ring-cairn and stone circle to be merged into one single complex. The significance of such a change is hard to imagine; other ring-cairns have incorporated stone circles such as Park of Tongland, Kirkcudbright (Russell-White *et al* 1992), although in that case the stone circle was within the cairn material at the initial construction.

CONCLUSIONS

The ring-cairn at Cairnwell was originally thought to be a relatively simple monument which had been extensively damaged by 19th-century investigations and later activities. This excavation has shown that both assumptions were largely unfounded and that despite agricultural and industrial activities around the monument it had remained sufficiently intact for excavation to recover evidence of a complex sequence of events focused on the stone circle.

The evidence recorded at Cairnwell presents a fascinating sequence of events at the very end of the supposed chronological range of ring-cairns. The site can only be poorly understood within its contemporary cultural environment, in north-east Scotland, because of the absence of modern excavations within the area. The experience of Cairnwell does suggest, however, that excavations at similar sites should be able to recover equally complex, and dateable, sequences of activity. Further work may also clarify whether the broad ring-cairn category masks a diversity of function and age within a common structural form.

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