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Medieval corn-drying kilns at Capo, Kincardineshire and Abercairny, Perthshire

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SUMMARY

Radiocarbon dating of grain from circular corn-drying kilns at Abercairny and Capo indicates that this type of kiln, traditionally regarded as being 16th- to 19th-century in date, was in use at least 500 years earlier.

INTRODUCTION

In 1984, three corn-drying kilns were excavated by the Scottish Central Excavation Unit, one at Abercairny, Perthshire (now Tayside Region) (NGR NN 904 224) and two at Capo, Kincardineshire (now Grampian Region) (NO 626 675) (illus 1). The three kilns were of the same basic design and varied only in detail. All three were isolated structures, had round kiln-bowls and short flues and were sunk into hillsides (illus 2, 3, 4). Although corn-drying kilns of this type are known from many parts of Scotland, very few have been the subject of archaeological investigation. Similar kilns have been traditionally regarded as 16th and 17th century AD in date and some are reported to have been still in use in the 19th-century (Martin Brown, pers comm; Close-Brooks 1980, 340). A letter written in the 17th century by James, Lord Drummond, mentions foundations being dug for round kilns (Fraser 1825, 130). Such documentation and the absence of earlier dating evidence have prompted the conclusion that these structures are post-medieval in date. However, the results of the excavations at Capo and Abercairny, coupled with the recent excavations of similar corn-driers at Chapelton, Tayside (Pollock 1985, 367), indicate that these round kilns were, in fact, in use in the 13th century and before.

Grain-drying is a necessary step in crop production in temperate climes where summers are cool and moist. There are three main reasons for grain-drying: as part of the malting process; the seed for the next year's harvest must be dried for storage; and, most importantly, as a prelude to grinding (Fenton 1978, 375). The grain-drying process attached to these kilns is well documented (Firth 1974, 24–25; Feachem 1957, 49–50). A fire was lit at the mouth of a covered flue and the heat produced was drawn along the passage to enter the kiln bowl below a raised floor, usually of wooden or iron struts. The grain was dried on this floor on a bedding of straw or such like.

In the Northern Isles up to the beginning of this century, and on mainland Scotland before the introduction of agricultural improvements over the course of the 18th century, almost every farm had its own kiln (*SAS*, V18, Kilsyth, 309). Much of the previous research on corn-drying kilns has been based on extant examples in Orkney and Shetland where two basic types survive: four-sided kilns and

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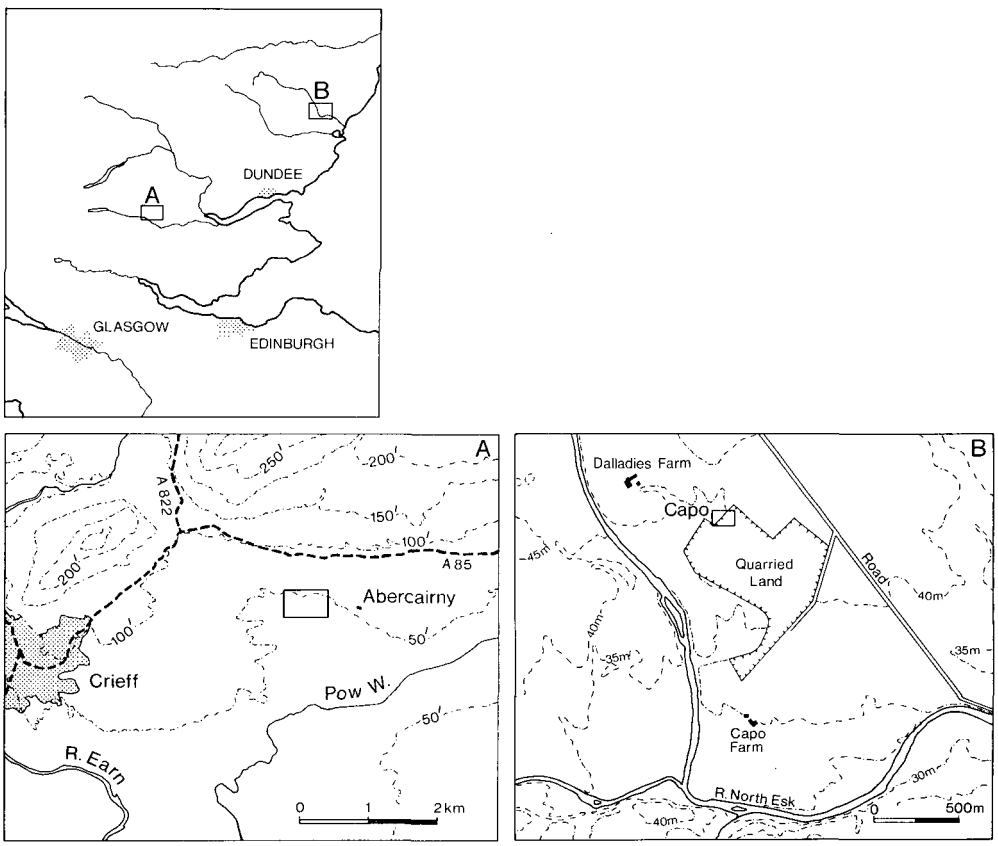
rounded kilns, both being integral parts of longhouses or barns. The Scottish mainland and Hebridean examples, however, are generally sited away from the homestead; the circular bowl and flue are sunk into the hillside and they often had no accompanying shelter. Fenton (1978, 379) does point out that the apparently distinct regional variations in corn-driers (at Freswick, Caithness) may partly be the result of the coincidence of survival, citing the existence of a four-sided kiln, found within a rectangular Viking structure.

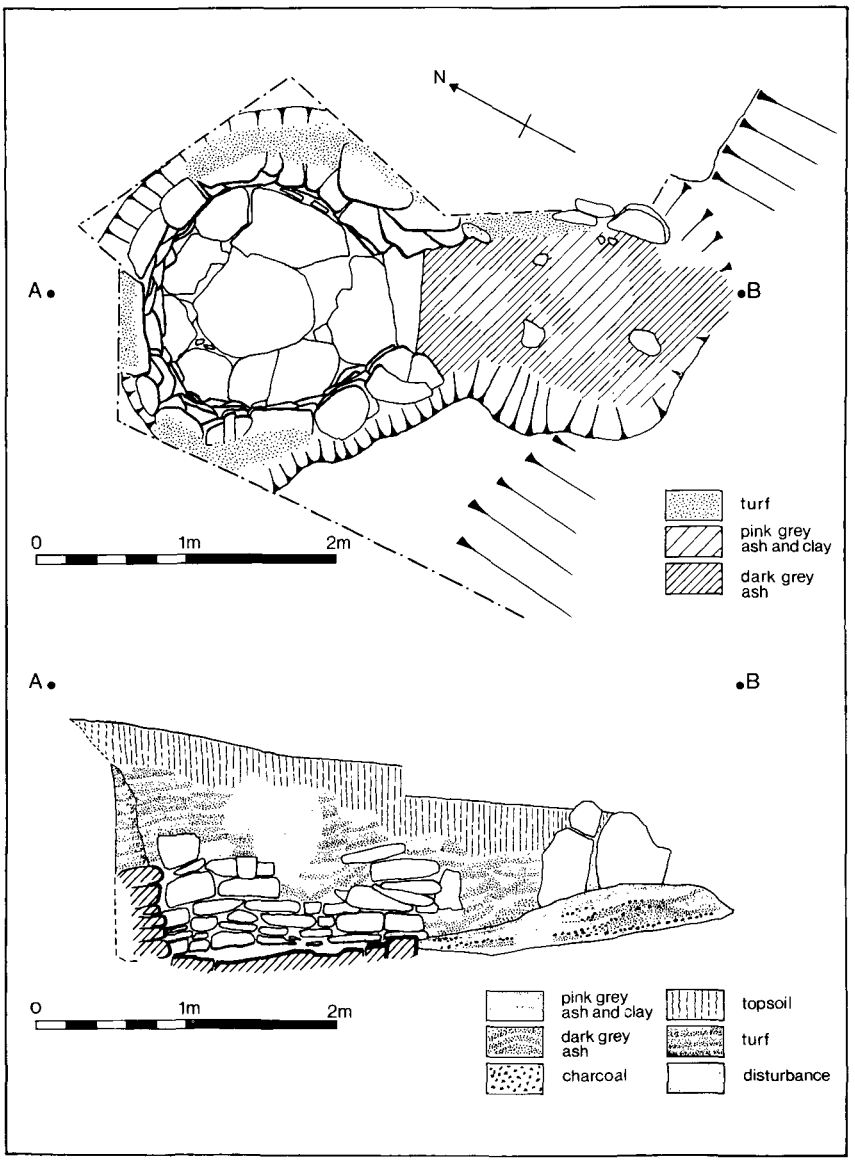
THE ABERCAIRNY KILN (NN 904 224) (illus 2)

During exploratory excavations in March 1984 in advance of the proposed levelling of a natural gravel mound at Abercairny, Perth (illus 1), a corn-drying kiln was discovered. Previous to this, in December 1983, a cist had been discovered on the top of the mound and excavated.

The kiln was situated on the south-south-east side of the knoll at a point where the slope rose sharply. The kiln pit and flue had been cut almost level into the hillside, with the flue entering from the south-east. The circular chamber (c 1·5 m in diameter) had a stone-flagged floor, the gaps in which were sealed by a pink clay. The lower portion of the chamber wall was of vertical, drystone construction, founded on the flagged floor, which rose to a height of c 0·7 m. The upper portion of the



ILLUS 1 Locations of Abercairny and Capo



ILLUS 2 The Abercairny kiln

wall, constructed of turves, added a further c 0·7 m to this height. These turves did not continue the vertical face of the lower stone wall but splayed outwards. Turves found within the kiln fill may have been part of a roof or may represent collapsed turf walling. The lower three courses of the stone element were more smoke-blackened than those above, the top of the blackening probably marking the position of the raised floor.

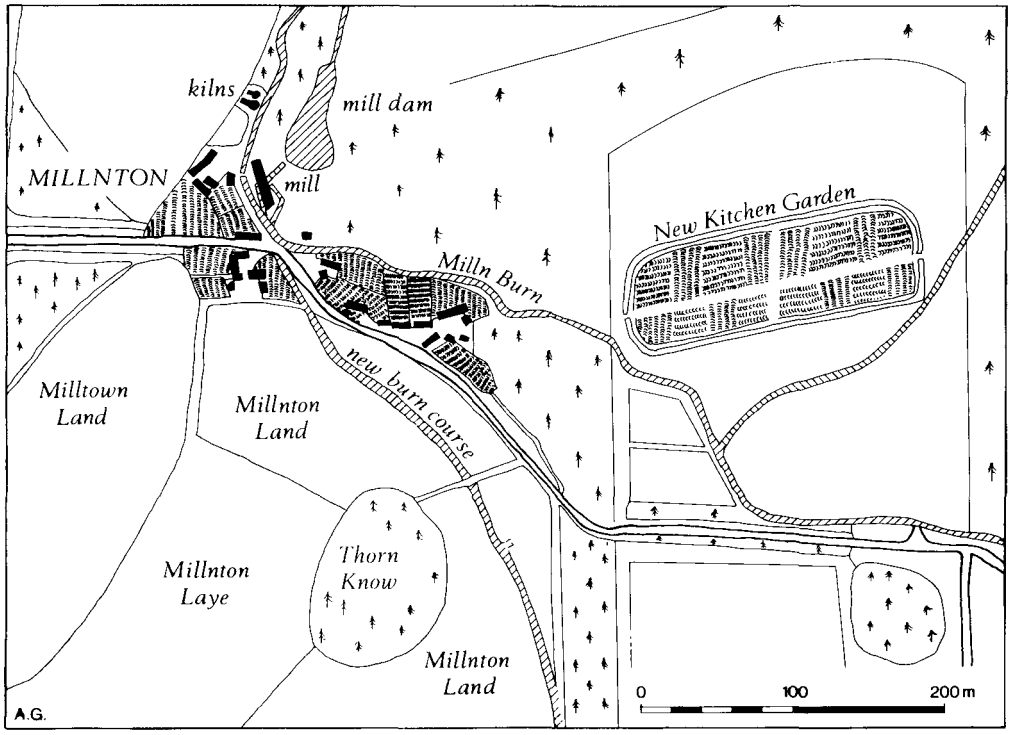
The flue was c 2 m long and had two construction phases. First, the flue had been cut into the hillside to a depth of c 0·9 m and a width of c 1·6 m; clay was found adhering to its south side. Its width was subsequently reduced to 1·2 m by the erection of a line of vertical stone slabbing which formed a

new wall. Turves found within the flue may have been part of the flue cover. The floor of the passage was covered with laminated, charcoal-rich deposits containing carbonized grain, some of which ran under the secondary stone walling described above. It is thought that these deposits represent debris from successive firings of the kiln. Slight scorching at the entrance to the flue probably marks the position of the fire. A step was cut into the subsoil to the south of the point where the flue entered the chamber. The bottom of the step was almost level with the supposed position of the raised floor and it could be that this step marks the point at which the contents of the kiln were loaded and unloaded. The turf walling at the back of the kiln bowl had been extensively burnt and some burnt turves had collapsed on to the floor. It is reported that this type of kiln 'not only required frequent reparations but was extremely liable to accidents by fire' (*SAS*, V 18, Kippen, 349). It appears that the Abercairny kiln was abandoned after one such fire. The flooring spars were removed and a massive boulder (1·5 m×1·5 m) was rolled into the kiln bowl.

No finds other than charcoal or carbonized grain were recovered from the kiln.

An Abercairny estate improvement map of 1775 (SRO, RHP 1006) shows the proximity of the excavated kiln to Millnton, a farm town of which there is now no surface trace (illus 3). The map also shows a mill with two keyhole-shaped barn kilns nearby (author's interpretation). It is likely that these large barn kilns represent a new type of kiln introduced during the period of agricultural improvements in the 18th century. In 1796, the *Statistical Account* for Kilsyth reported:

> '50 years ago . . . every farmer had his own kiln for drying his corns. A common kiln is now erected near each miln, where every farmer gets his grain dried at 6d per boil'. (*SAS*, V18, Kilsyth, 309).



ILLUS 3 An Abercairny estate improvement map of 1775

The smaller and earlier Abercairny kiln is of the type owned by an individual farmer which was situated away from the other farm buildings because of frequent accidents (Feachem 1957, 60). It is possible that the Abercairny kiln was associated with an earlier, medieval, settlement on the site of Millnton.

THE CAPO KILNS (NO 626 675)

Quarrying during June 1984 at the Tilcon Quarry, Kincardine and Deeside, revealed what appeared to be two stone-lined pits. The HBMD was notifed by Mr I Shepherd, the Grampian Regional Archaeologist and a small excavation was undertaken by the Central Excavation Unit. Both features proved to be corn-drying kilns which had been destroyed by fire. The kilns lay 7·0 m apart on the edge of a gravel outwash terrace above the River North Esk on a north/north-west facing slope.

KILN A (illus 4)

Kiln A had a round kiln-chamber (c 2·8 m in diameter) with a short flue (1·5 m long) leading into it from the north-west. The back of the kiln had been clipped during gravel extraction and a later machine cut (measuring 3·2×1·2 m) had been sunk to floor level on its west side. The chamber had a stone-flagged floor bedded in clean pink clay. A turf wall was built on this clay and stood to a height of 1·2 m, reaching the top of the chamber pit.

The flue was shallow (0·15 m), with clay- and turf-lined sides. Two small postholes, which were found straddling the outer part of the flue, probably indicate the position of a wooden structure. Vertical stone slabs propped against the turf wall at the entrance to the chamber may have served to strengthen the flue at the point at which the kiln was loaded.

A collapsed network of carbonized branches was found on the floor and sides of the chamber and flue. The majority were round-sectioned (c 0·10 m in diameter) but some had been squared off. There was no obvious pattern to the position of squared as opposed to round-sectioned pieces. This network of branches may represent elements of the collapsed remains of the raised floor of the kiln. The dense soot deposit adhering to the wall of the chamber suggests that the raised floor was higher than the present day ground surface. However, it seems more likely that this network of rounded branches is collapsed roofing material.

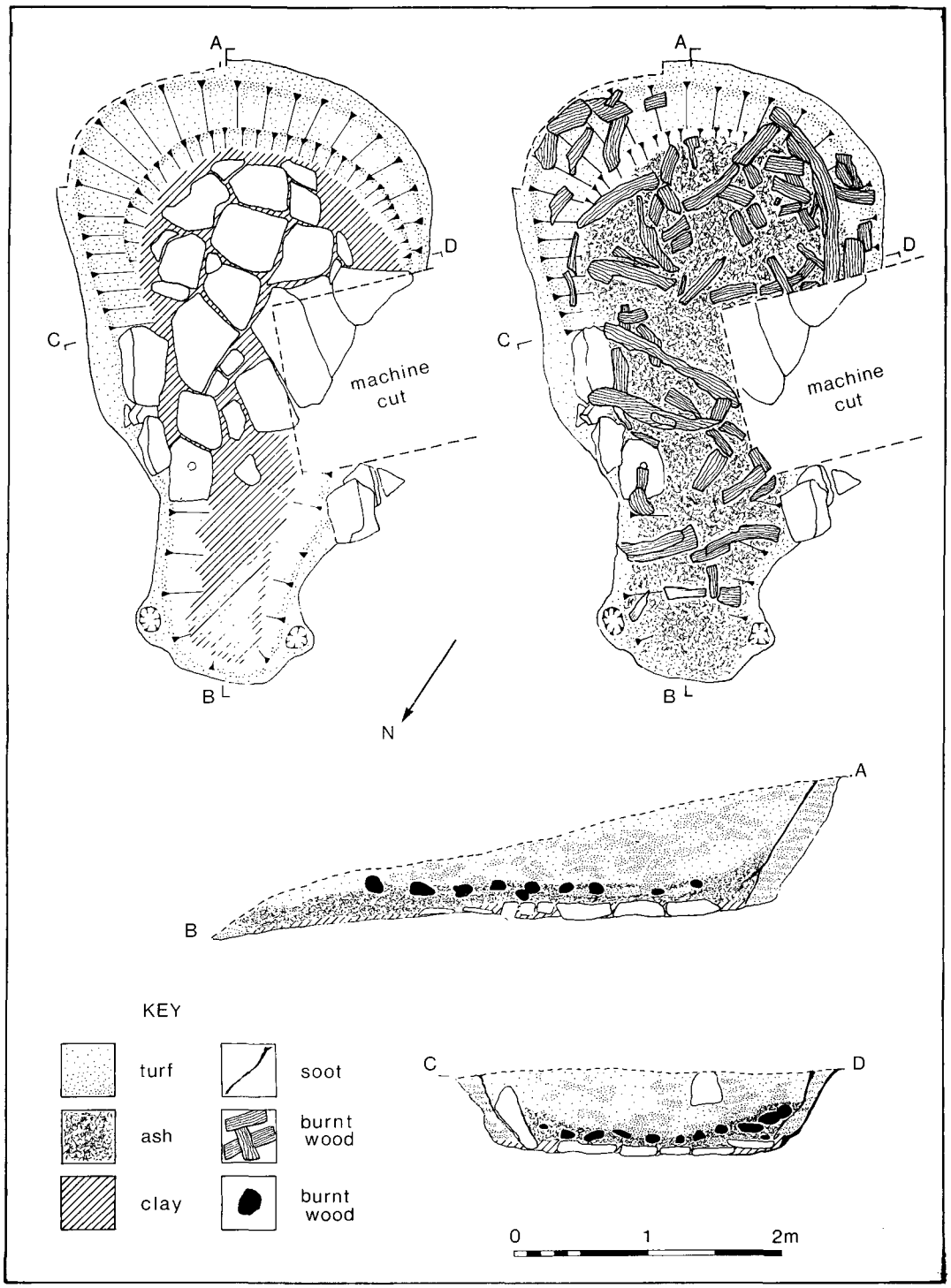
A spread of bright orange peat- or turf-ash covering the carbonized wood was overlain by a thick layer of regular, smoke-blackened turves. The upper fill also contained turves and clean sand. Until now there has been little or no evidence as to how such kilns were covered from the elements. The Capo excavation has provided the first clear indications of a roofing structure. (I am indebted to Dr A Fenton for his interpretation of the Capo evidence.)

Finds

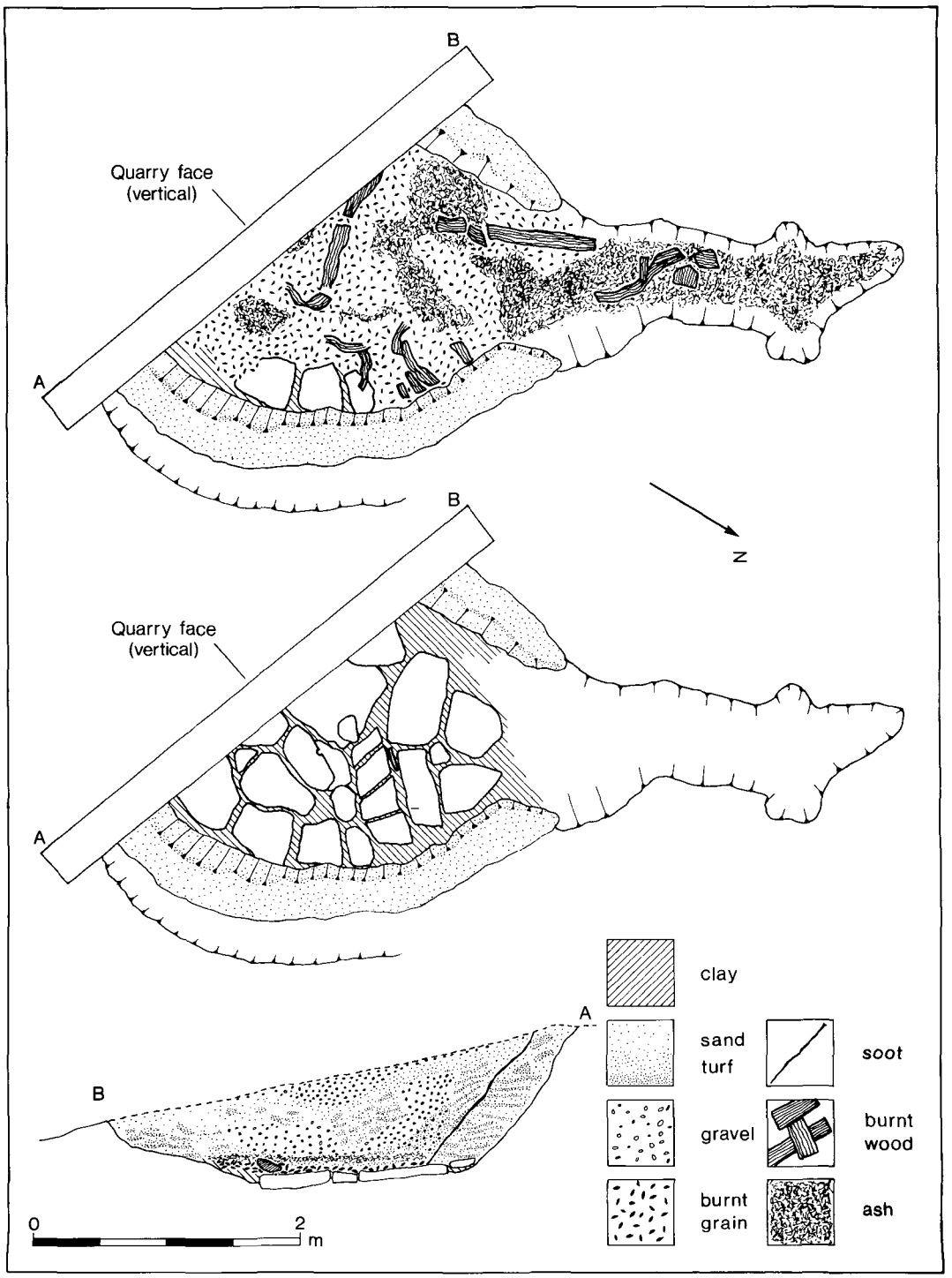
One rectangular block of stone (0·45×0·30×0·25 m) with a circular, central, indentation (0·5 m in diameter), formed part of the chamber floor. No other artefacts were recovered.

KILN B (illus 5)

Kiln B had a round kiln-chamber (c 3·5 m in diameter) with a short flue (2·0 m long) leading into it from the north-west. The back of the kiln had been clipped during gravel extraction. The surviving part of the chamber had a stone-flagged floor with any gaps sealed by clean pink clay. The turf walling of the chamber was built on this floor and reached a uniform height within the chamber.



ILLUS 4 Capo, kiln A



ILLUS 5 Capo, kiln B

Dense soot-blackening on the turf walling indicated that the raised floor was positioned above this level.

The flue, which was not lined, was shallow (0·15 m). Two small circular (0·10 m in diameter) depressions were found on either side of the flue and may indicate the position of an original wooden structure.

The chamber floor was covered in deposits of carbonized grain, sometimes several centimetres thick. Mixed with this were burnt straw and lengths of burnt wood, often flat in section. The flue contained similar pieces of carbonized wood but no grain. These remains most likely result from accidental firing when the kiln was in use, the burnt wood being collapsed struts of the raised floor on which the straw and then the grain had been placed. A spread of bright orange peat- or turf-ash covered the carbonized remains. Wedges of gravel found in the upper fill of the chamber suggest deliberate backfilling and the cut turf material in this context may be collapsed upper walling.

Finds

The upper fill produced several sherds of 13th-century pottery. Half of the upper stone of a rotary quern was found incorporated into the stone floor of the chamber.

DATING

The recent excavations at Abercairny and Capo have produced the first group of radiocarbon dates for such sunken corn-drying kilns. Sealed deposits of grain from the floor of the Abercairny flue produced two dates, both of AD 1075±50 (GU 1927, GU 1928), and a single deposit of carbonized grain from the chamber floor of Kiln B at Capo produced dates of AD 1330±50 (GU 1929) and AD 1275±50 (GU 1930). A 13th-century date for the Capo kiln is supported by the recovery of a small assemblage of 13th-century pottery from its upper fill (George Haggarty, pers com). Similarities in both the construction and the siting of Kiln A and Kiln B suggest that they were broadly contemporary.

The 11th-century date for the Abercairny kiln is the earliest date so far recorded for this type of kiln. The earliest date postulated for the north Scottish rectangular kilns is before the 14th century, on the evidence of an excavated example at Freswick, Caithness. The earliest known example of a north Scottish round kiln was excavated at Jarlshof, Shetland and is thought to date from the 14th or 15th century (Fenton 1978, 384, 379). As yet there is not a sufficient number of well researched and securely dated sites to devise any convincing chronological typology.

The 11th- and 13th-century dates from the Abercairny and Capo round kilns and the medieval date suggested for the Chapelton examples indicate that this type of kiln enjoys a far longer history than previously suspected. Both radiocarbon dates are substantially earlier than the 16th- to 19th-century dating bracket traditionally attached to these kilns, and it is quite possible that the 11th-century date of the Abercairny kiln does not reflect the earliest chronological limit for the use of such kilns.

Corn-drying kilns of one form or another have been in use since prehistoric times. Agrarian communities devised a variety of methods for grain-drying and many of these will have left no trace in the archaeological record (Fenton 1978, 375). Rudimentary corn-drying kilns have been recorded at Unival, North Uist and Tigh Talamhanta, Barra and possibly Skara Brae, Orkney (Feachem 1957, 45). Given the existence of these early kilns, the 11th- and 13th-century dates for the Abercairny and Capo kilns, and the paucity of reliable dating evidence for corn-driers generally, automatic allocation of other corn-driers to the post-medieval period must now be questioned.

APPENDIX: CARBONIZED GRAIN

Alan D Fairweather

ABERCAIRNY

The sample was taken from a charcoal-rich layer on the floor of the flue-passage. The layer was homogeneous and overlain by laminated charcoal-rich deposits. Nearly half the sample consists of cereal grains (table 1), most of the remainder being unidentifiable carbon fragments mainly derived from cereal parts and wood twig charcoal. A substantial proportion of the fraction smaller than 1 mm consists of mineral grains, sand, soil peds, etc. A little less than half of the material larger than 2 mm was wood charcoal, the remainder cereal remains.

Cereals comprise 52% of the sample and about 60% of the cereals consist of hulled barley of the lax six-row type *Hordeum vulgare* (syn *H polystichum*). Most of the grains show signs of having begun to germinate, the embryo being prominent and protruding. Separated embryos were also found. Many grains are rather flattened giving the appearance of having been squashed when in a soft condition. This is consistent with the observed signs of germination.

Oats make up about 40% of the cereal fraction and were of a small grain type consistent with *Avena strigosa* and/or *A fatua* (bristle or grey small oat and wild oats respectively). This is confirmed by the frequent finds of flower bases with fracture marks diagnostic of both species (ie *both* types found). There is no evidence for the presence of *A sativa* and all broken and entire are interpreted as *A strigosa* and/or *A fatua*.

A fatua was present in significant quantities as estimated by the frequency of basal fracture scars, but the exact proportion of grains attributable to *A fatua* is hard to determine because the naked grains are not certainly distinguishable from *A strigosa*.

There are a very few culm nodes or parts of cereals other than grains and light chaff (glumes, lemmas, paleas). The preservation of these parts and their quantity suggest that the sample consists of grain which had been threshed from the straw, entire. The chaff would have become brittle and broken off *in situ* during or after carbonization. This tends to be confirmed by the presence of several entire flowers with caryopses (grains) still within lemmas and paleas.

TABLE 1
Carbonized seeds from Abercairny

		Nos of Seeds found
Carex flacca	sedge	1
Chenopodaceae (*Chenopodium* or *Atriplex* sp)	orache, or fat hen	1
Galeopsis tetrahit agg	hemp nettle	24
Lapsana communis	nipplewort	2
Polygonum aviculare	knotgrass	1
Polygonum cf *persicaria*	redshank	32
Raphanus raphanistrum (portion of siliqua)	wild radish	1
Rumex acetosella	sheep sorrel	12
Rumex obtosifolius/crispus	dock	1
Spergula arvensis	corn spurrey	14
Stellaria media	chickweed	1
% of *cereal* portion of sample:		
BARLEY *Hordeum vulgare* (syn *H polystichom*)		60%
OATS *Avena strigosa* / *Avena fatua*		40%
CEREAL		
% of volume *excluding* large charcoal lumps but *including* broken grains		52%
REMAINDER		
Other parts: broken lemmas, paleas, charcoal, soilpeds etc		28%
(About 20% of the volume consists of large charcoal lumps, 2 mm)		20%
		48%

Eleven species other than *Avena* and *Hordeum* were identified. The fruits, seeds, achenes, etc (henceforth referred to as seeds) were mainly those which may be described as weeds of cultivation. Four weed species were frequently represented throughout the sample: *Polygonum* cf *persicaria* (redshank), *Galeopsis tetrahit* agg (hemp nettle), both species with comparatively large seeds, and *Rumex acetosella* (sheep sorrel) and *Spergula arvensis* (Corn spurrey) with smaller seeds. *Polygonum* and *Galeopsis* are tallish plants whereas *R acetosella* and *Spergula* are rather shorter and can be indicators of acid, rather impoverished, land. All the other species identified are to be expected. However, although only one nutlet was found, *Carex flacca* is interesting as this sedge tends to favour enriched damp ground or flushes with a higher pH and mineral content.

CAPO

About 6% of the total sample volume consisted of charcoal lumps larger than 2 mm. The largest fraction, 31% of the total volume, was of material less than 0·6 mm, most of which consisted of broken light chaff components with about one third of this fraction made up of mineral grits, soil peds, etc. The 0·6–1 mm fraction constituted 10% of the total and was mainly light chaff (lemmas, paleas, awns, and their fragments), with about 6% mineral material.

Cereal grains made up 53% of the sample. Oats (*Avena spp*) made up 88% by volume of the cereal fraction. Of the oat fraction 80% was small grains in the size range between 1 and 2 mm. The remaining 20% of oat grains, above 2 mm, were still within the upper size range of *A strigosa* and *A fatua* (bristle and wild oat). There was no evidence from floret parts for the presence of *A sativa* (the 'cultivated' oat) which could have accounted for the grains above 2 mm. Floret parts identified were all of *A strigosa* or *A fatua* and the size range tends to confirm this. From the floret parts in the sample one may deduce that the crop was *A strigosa* with *A fatua* as a weedy component in the sample.

Eleven per cent of the cereal fraction was of barley (*Hordeum vulgare* syn. *H polystichum*) of the lax six-row type, hulled. The barley grains were all entire and many showed signs of squashing, but did not appear to be violently impacted. This would indicate pressure when quite soft, probably with a moisture content of 24% (dry store grain needs to be kept at MC 14% to prevent deterioration).

The remaining 47% of the sample was mainly composed of fragments of light chaff (lemmas, paleas, awns, and other fragments) which would most probably have been carbonized on the grain as a parching process to facilitate 'shellin' ('shellin' was the removal of the lemma and palea to expose the naked grain for milling). Many grains were found 'unshelled' or entire within the floret. Storage of oats was normally in floret if grain was to be threshed and sheaves were often stored whole. Parching of the florets was undertaken before grinding. No large straw nodes or fragments were found. This would indicate that the sample had been processed by raking or sieving and perhaps winnowing after harvest and before carbonization. Had the sample been winnowed, however, one would have expected few light weed seeds (ie *Rumex acetosella* and *Spergula arvensis*). This material may of course have become mixed-in at a later stage, recontaminating a clean sample.

'Weed' species were represented by 16 different species (including three ignota) identified to species level in 11 cases and to family in two cases. Ignota were damaged and not easily determinable. The four most frequent species were hemp nettle *Galeopsis tetrahit* agg and *polygonum* most closely comparable to *P periscaria* (redshank). Both have large 'seeds' greater than 1 mm in comparison with the more abundant *Rumex acetosella* (sheep sorrel) and comparatively frequent *Spergula arvensis* (corn spurrey). This comparative frequency of the latter two in the sample would tend to indicate acid-impoverished soil (with the caveat of course that the sample typifies the growing crop). The growing conditions indicated would be expected in Angus at this time from historical references and accounts. Oats of course are quite tolerant of a low pH and the bristle oat (*A strigosa*) performs tolerably well in comparison with other cereals under these conditions.

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