

The excavation of a hut circle at Cùl a’Bhaile, Jura

J B Stevenson*

with contributions by Camilla A Dickson, M J Stenhouse,
G Whittington and Caroline R Wickham-Jones

SUMMARY

Recent fieldwork in Argyll carried out by the Royal Commission on the Ancient and Historical Monuments of Scotland and others has located numerous open settlements, a type of monument hitherto largely unknown in the area. Excavation of one example at Cùl a’Bhaile, Jura revealed a farmstead comprising a hut circle within an enclosure, which was occupied between the late second and early first millennium BC. The hut circle was of multi-period construction and had been reroofed on at least three occasions.

INTRODUCTION

The excavation of a hut circle and its surrounding enclosure at Cùl a’Bhaile, Jura was undertaken by officers of the Royal Commission on the Ancient and Historical Monuments of Scotland between 1976 and 1980 as part of the preparation of the *Inventory of Argyll* (Vol 5, *Islay, Jura, Colonsay and Oronsay*). The site was discovered in 1966 (*Discovery Excav Scot* 1966, 9) during the course of peat-cutting by Mr A Buie, Knockrome; he drew it to the attention of Miss Marion Campbell of Kilberry and Miss Mary Sandeman who were compiling a list of the antiquities of Jura, and they generously made a copy of this unpublished work available to the Commission.

Until the mid-1970s no hut circles had been positively identified in Argyll and few open settlements or field systems were known, but subsequent fieldwork on the islands of Islay, Jura, Colonsay and Oronsay by officers of the Royal Commission and the Ordnance Survey showed that considerable numbers of these types of monument exist. Fieldwork alone, however, could not provide a proper archaeological context or date for these monuments, and the excavation at Cùl a’Bhaile was planned as one of a series designed to examine these newly discovered open settlements and field systems (Ritchie *et al* 1980; Barber & Brown, this volume; Ritchie 1981; Ritchie & Welfare 1983; RCAMS 1984).

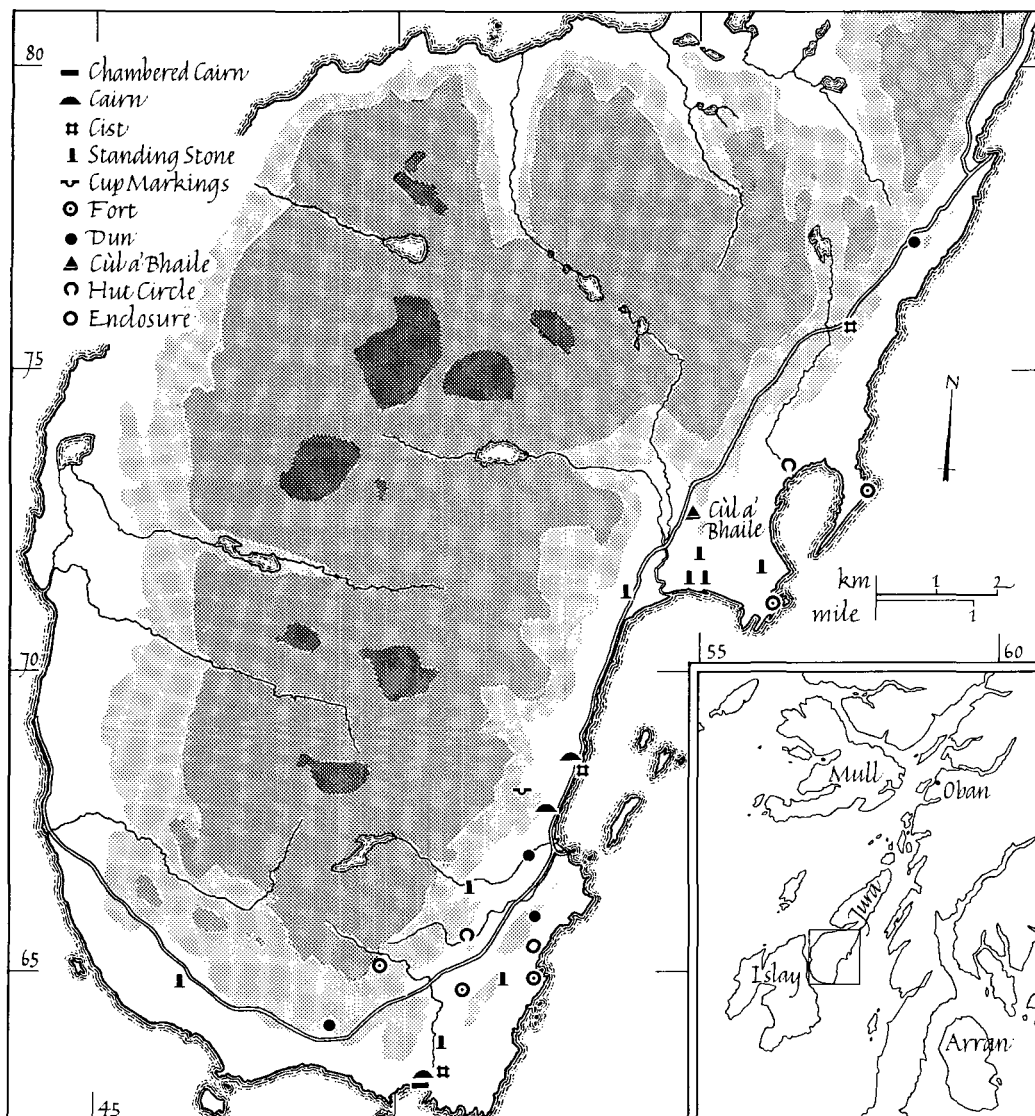
LOCATION

Cùl a’Bhaile (NGR NR 549 726) lies within Knockrome township, 1 km NW of Knockrome itself and 5.5 km NNE of Craighouse (illus 1). It is situated on the crest (80 m OD) of the broad ridge that separates Lowlandman’s Bay from Loch na Mile, and has extensive views to the NE up

* Royal Commission on the Ancient and Historical Monuments of Scotland, 54 Melville Street, Edinburgh

the Sound of Jura, to the S along the coast of Kintyre, and eastward as far as the peaks of northern Arran. Similarly, its position on the crest would have meant that, in the absence of extensive tree cover, the house would have been a prominent local landmark, particularly when viewed from the NE and SW.

Today, the site is surrounded by open moorland with extensive areas of blanket bog interrupted by isolated rock outcrops, and it is in the lee of one such outcrop that the enclosure was built. Cùl a'Bhaile (Back of the Farm), as the name suggests, lies towards the outer limits of the pasture used by the township, but its position is enhanced by its south-easterly aspect and the shelter from westerly winds provided by the knoll; beyond lies less hospitable land suitable only



ILLUS 1 Cùl a'Bhaile, South Jura, Argyll: location map 1:125 000 (insert map 1:1 000 000)

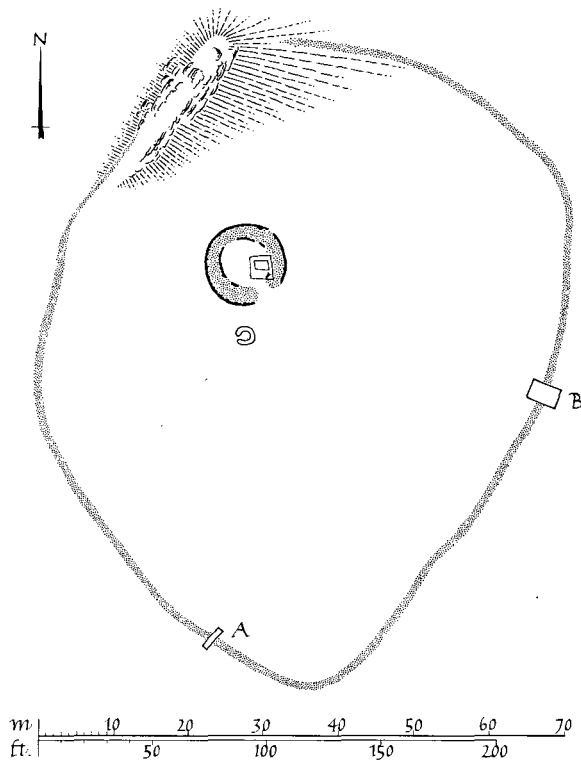
for grazing in high summer. At the time of its construction the house probably also lay on the upper limits of settlement, close to the junction of two ecological zones, and may therefore have represented a fringe settlement.

THE SITE

The enclosure is set on gently sloping ground in the lee of a low rocky knoll; sub-rectangular on plan (illus 2), it measures 77 m by 64 m within a rough, drystone wall, and encloses an area of about 0.41 ha. There is no sign of an entrance, and extensive probing and some peat clearance failed to locate any gaps through the wall. The southern half of the interior is blanketed by peat, which reaches a maximum thickness of 0.9 m, and the S part of the enclosure wall is well preserved as a result; elsewhere stone-robbing has reduced it to its basal course, except along the crest of the knoll where it has collapsed completely and is represented only by tumble at the foot of the slope.

At the base of the knoll and on the best-drained area in the interior there was a hut circle which, before excavation, appeared as a subcircular enclosure about 6.5 m in diameter within a bank up to 2 m thick and 0.3 m high, a single larger boulder was visible on the line of the outer face but no other facing-stones could be seen, and the position of the entrance was not clear. The only other structures within the enclosure were two lambing-pens; one lay in the interior of the hut circle and the other immediately to the S.

Outside the enclosure, and extending southwards towards Knockrome Hill, piles of stones



ILLUS 2 Cùl a'Bhaile, Jura: site plan (1:1000)

occasionally protrude through the peat. These do not appear to be of natural origin, but because of the peat cover it is not possible to be certain whether they are parts of enclosure walls, clearance heaps, or burial cairns; in any event, it is likely that the house and enclosure were the focal point of an extensive land-management system.

THE EXCAVATION

In 1976 a trial excavation was undertaken to determine whether the features discovered by Mr Buie were of prehistoric or more recent date. Accordingly, a portion of the house wall was cleared of turf and peat, and a length of the enclosure wall was exposed and sectioned. The results suggested an early date and from 1977 to 1980 work continued for a fortnight a year. Attention was focused on the excavation of the house, with small-scale work being carried out on the enclosure wall; no attempt was made to strip the interior of the enclosure as this was beyond the resources of the Commission.

THE ENCLOSURE WALL

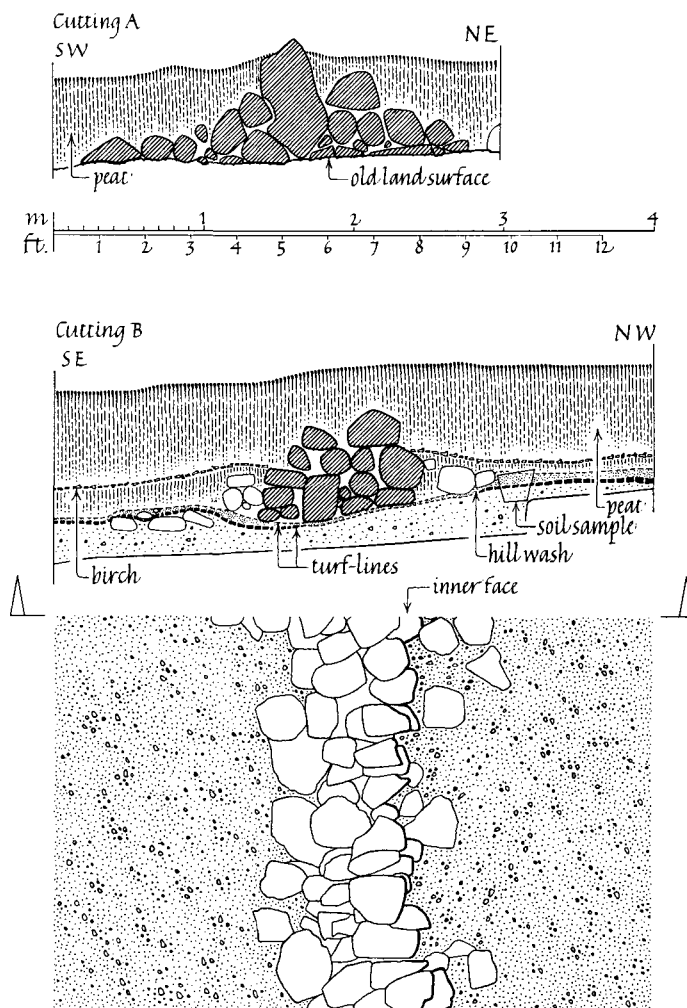
The enclosure wall was sectioned in two places (illus 2, A & B), and partially cleared of peat in three others in an unsuccessful attempt to locate the entrance. In all instances the wall was of drystone construction, but there was some variation in the building technique. The stones may well have been gathered from the interior of the enclosure, as similarly sized stones litter the pre-peat land-surface exposed to the W of the enclosure. The wall was generally of simple dump construction, and in some sections seemed to be little more than a linear clearance-heap. For the most part, no attempt had been made to provide either a vertical face or any form of inner or outer kerb; however, its loose-stone construction and height (up to 0.7 m) would have made it an awkward barrier for stock, particularly cattle, to cross.

In Cutting A (illus 2, A; 3) a larger boulder had been incorporated into the wall; it had been set upright, resting on the old land surface, and was held in position by smaller chocking stones. The wall stones had then been piled on either side of the boulder, but they did not rise to the same height, leaving the top of the boulder exposed. Probing along the line of the wall indicated that it had a series of high points or peaks, perhaps suggesting that it was built as a series of linked clearance heaps, or that it had had piles of stones added to it after it had been built. Waterlogging prevented excavation below the old land surface.

Only at Cutting B (illus 3) had there been any attempt to build the wall carefully. Here, there was a roughly coursed, near vertical inner face rising to a height of 0.5 m. The outer face was less regular, and behind it lay a spread of stones which had either tumbled from the wall or been deposited as field-gathered stones. The wall had not been built on the original old land surface but on a secondary turf-line which had developed on a layer of grey hill-wash which sealed an earlier turf-line. The hill-wash continued beyond the line of the wall but it was noticeably thicker on the inner side of the enclosure. Above the upper turf-line there was a capping of blanket peat which was divided into two sections by a layer of silver birch roots and branches; these presumably indicate a brief period of woodland regeneration which may have extended over much of the hillside, as birch fragments are visible in many of the nearby peat-cuttings. For the results of soil and pollen analysis from this section, see *infra*.

THE HOUSE

The excavation revealed that the house was of multi-period construction (illus 4) involving major remodelling of the wall on two occasions, and the complete replacement of the posts



ILLUS 3 Cùl a'Bhaile, Jura: enclosure wall: plan and sections

supporting the ring-beam at least three times. These events have been divided into three main constructional phases, although it is clear from the number of times that certain posts were replaced that piecemeal reconstruction and refurbishment of the fabric, possibly during rethatching, also took place. The development of multiple iron-pan layers and intensive leaching in the interior of the house unfortunately masked much of the stratigraphy in the floor area, and it was not possible to distinguish floor levels as readily as might have been expected. Consequently it proved difficult to relate periods of wall construction to phases of post replacement and, in order to avoid confusion between the two sequences of events, the descriptions of the wall and the postholes have been separated.

Period 1: The earliest house

The earliest house was roughly circular on plan (illus 5a) measuring about 7.5 m in diameter (44.17 sq m) within a wall which was well preserved on all sides except the NW, where it had been

removed during reconstruction in Periods 2 and 3. The wall was of composite construction consisting of a plinth of carefully laid stones, 1 m in thickness and up to 0.25 m high in two to three courses, and capped by a low bank of earth and possibly turves, which gave the wall a height of at least 0.4 m. The doorway lay on the S; the NE side of the wall-terminal had been removed between Periods 2 and 3, but on the S enough survived to show that the passage was straight-sided, either passing through the house-wall at a slightly oblique angle or, as is more likely, splaying towards the interior. Forming the floor to the entrance-passage there was a well-laid gravel surface which extended outwards from the interior of the house for about 2 m.

Concentric with the inner face of the wall, and at an average of 100 mm from it, there was a ring of stakeholes set at intervals of about 350 mm, which had been driven up to 200 mm into the subsoil. With the exception of a break for the entrance, and one or two single gaps, the stakeholes formed a complete penannular setting. They probably held the vertical elements of a wattle screen which formed an inner wall to the house. There was no indication of the height to which the wattle stood, but it is unlikely to have been much higher than the wall-head.

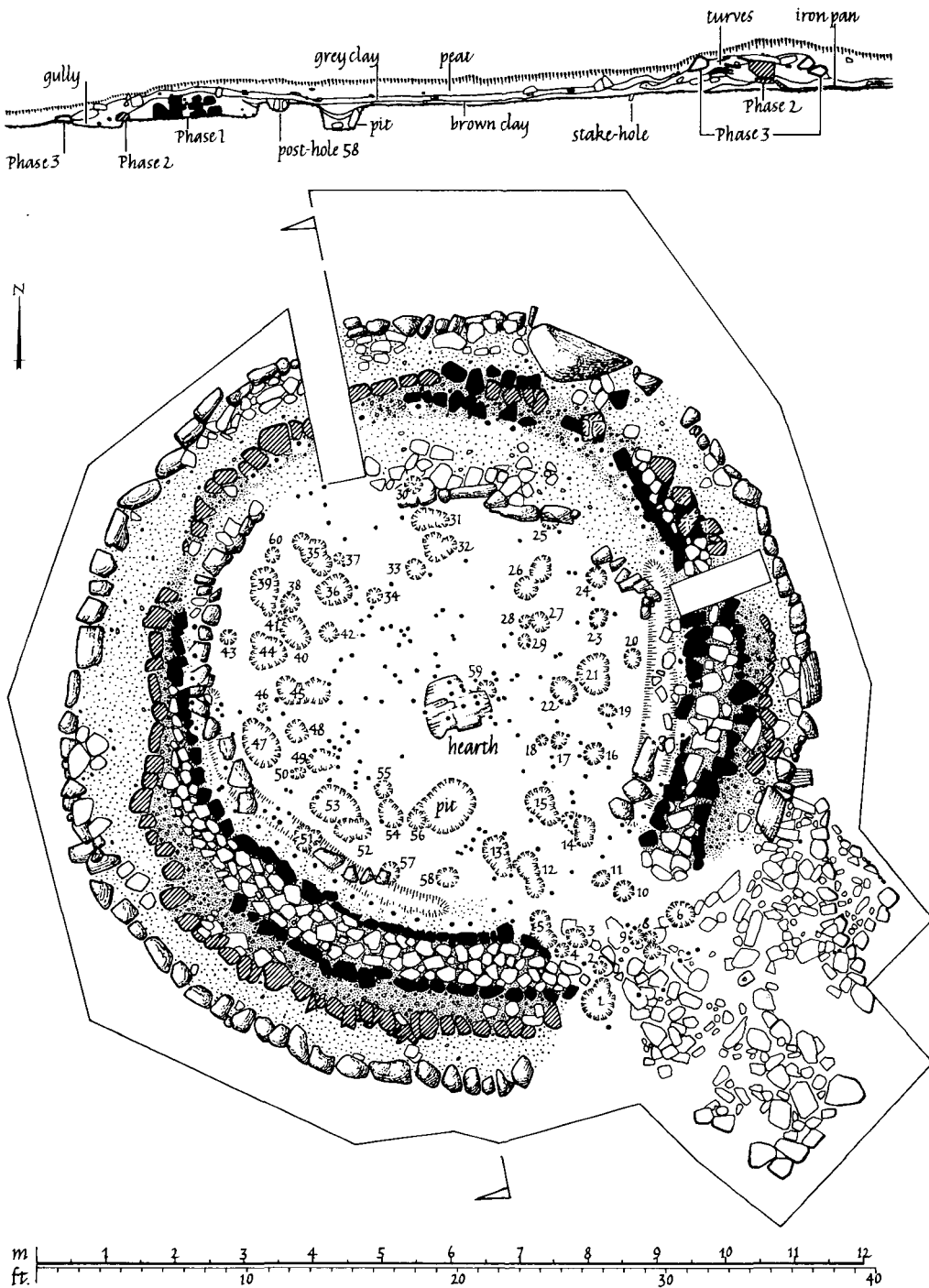
Outside the wall, on either side of the entrance, the slight slope on which the house had been placed was cut back to form a narrow terrace which acted as a drainage gully and kept water away from the entrance; no trace of this gully was found around the N half of the house. To the W of the entrance the gully was up to 0.5 m from the wall-face, but on the E it dropped directly from the facing-stones, and in places was beginning to undermine them. Because of the nature of the slope there was likely to be greater run off the E side of the house, and this was probably responsible for the greater degree of erosion on this side. The only finds from the gully were abraded sherds from a single pot (catalogue nos 160–210) (illus 12) and fragments of carbonized alder and hazel, which gave radiocarbon dates of 970 ± 65 bc and 904 ± 55 bc (GU-1383 and GU-1385 respectively).

Period 2: The intermediate house

In Period 2 (illus 5b) the earlier house was extensively remodelled, involving modifications to the wall and roof, the replacement of the wattle screen, and the addition of a stone-flagged forecourt outside the entrance; there was, however, no evidence to suggest a break in the occupation of the site at this time.

The Period 2 wall was built over the earlier house-wall and consisted of an earthen bank revetted on the outside by a stone kerb. Because the centre of the house was shifted to the SSE, the remodelling work differed on either side of the transverse (E–W) axis. On the S, the kerb, (up to 0.45 m high in three courses) was added outside the earlier wall-face; this necessitated the filling and levelling of the drainage gully. The gap between the kerb and the earlier wall-face was filled with occupation material, which was continued as a capping over the crest of the Period 1 wall, giving a combined height of about 0.45 m. This capping material contained much organic matter and charcoal, and may have been derived from a midden or scraped up from the floor of the house; a sample of alder charcoal from this material has yielded a radiocarbon determination of 795 ± 70 bc (GU-1386). In the N half of the house the outer kerb was brought over the line of the Period 1 wall, which was demolished on the NNW but incorporated into the Period 2 wall on the NNE. As on the S, the kerb retained an earthen bank, but in this half it was noticeably cleaner and contained few charcoal fragments.

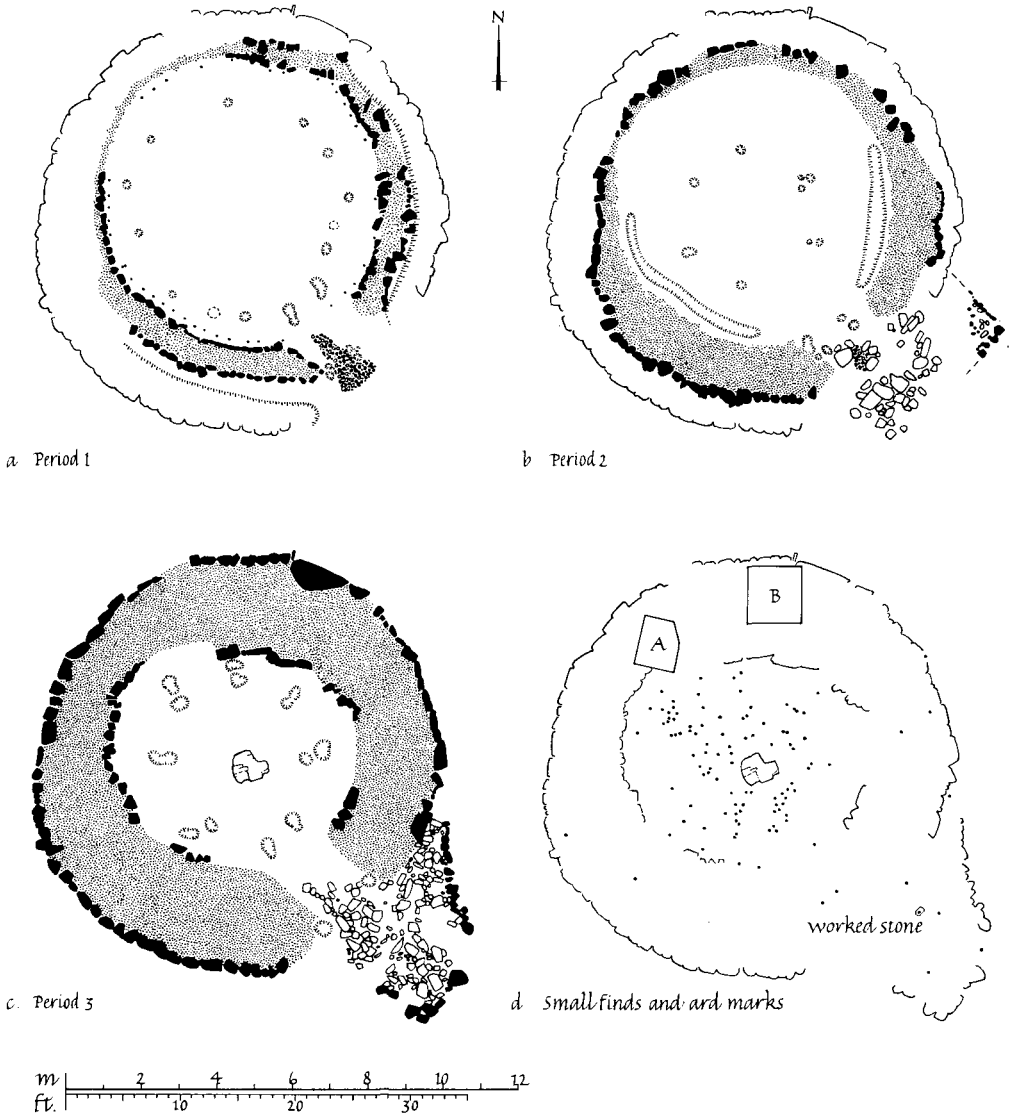
There was no trace of a stone revetment to the inner face of the earth capping, nor was the wattle screen renewed. In the S half of the house, however, a slot was cut on either side of the entrance; it extended for 5 m on the W and 4 m on the E and was concentric with the line of the inner face of the Period 1 wall; U-shaped in section, the slots measured 0.35 m in average width and 0.13 m in depth, and were filled with dirty clay. They appeared to have been deliberately



ILLUS 4 Cùl a'Bhaile, Jura: house: plan and section (1:100)

back-filled, and originally may have supported upright timbers forming an inner wall, comparable in function to the wattle screen. The relationship of the slots to the stakeholes of the screen was difficult to ascertain, but the fill of the slots masked those stakeholes closest to its outer lip. Although it is possible that the slots were constructed late in Period 1, it is more likely that they belong to Period 2 as their N ends correspond to the points at which the Period 2 wall crosses the Period 1 wall, and they therefore seem to be more closely connected to the later Period.

Outside the entrance, the gravel surface of Period 1 was covered by stone paving. Only a fragment of this stonework survived, as it had been disturbed both in Period 3 and more recently,



ILLUS 5 Cùl a' Bhaile, Jura: house. A-C, principal construction periods with selected postholes; D, distribution of small finds and location of ard-marks (1:200)

but enough remained to suggest that originally it formed a roughly rectilinear area in front of the doorway. One of the slabs bears an oval depression (measuring 50 mm by 40 mm and 10 mm in depth) in its upper surface, which resembles a cupmark, but it may be an anvil-stone (catalogue no 158; *illus* 11).

Period 3: The final house

In Period 3 the house was again extensively remodelled (*illus* 5c); the wall was expanded, the roof replaced, and the forecourt repaved and extended. As in Periods 1–2 there was no evidence for a break in the continuity of occupation of the site between Periods 2 and 3.

The wall was expanded by the addition of a further clay capping raising the height to a maximum of 0.5 m. On the exterior, the capping was revetted by an almost circular kerb of large stones which, on the N, reached a height of 0.4 m in four courses. On the S, later stone-robbing had removed the kerb to the E of the entrance, and to the W only the basal course remained. The clay capping buried the two inner wall-slots and, on the N, extended more than 1 m beyond the line of the Period 1 wattle-screen, reducing the floor diameter from 7.5 m (44.17 sq m) to about 5.5 m (23.75 sq m), while the external diameter rose from 9.5 m (Period 1) to 11.2 m (Period 3). In contrast to Period 2, the inner face of the Period 3 wall was revetted by a rough kerb of stones; later disturbance had removed some stretches, and for much of the circuit only one course remained, but on the N up to three irregular courses survived. On the NW two stretches of the kerb overlapped, and it is possible that it was not all built at the same time but added to, or patched.

The forecourt was repaved and extended to cover a roughly trapezoidal area measuring 5 m by 4 m, but, as in Period 2, stone-robbing (probably to provide material for the lambing-pens) had removed parts of the forecourt on the W and SE. Larger, more closely-set, slabs were used than in Period 2, and a distinct kerb of rounded stones was added. Situated on the SW angle of the paving, there was a pile (1.2 m in diameter and 0.2 m in height) of fire-cracked pebbles (possibly pot-boilers), which included the two halves of a rubbing stone (cat nos 156–7, *illus* 10).

Only in the final period was there evidence for any form of hearth structure; even then it consisted solely of an irregular stone slab laid directly on the floor at the centre of the house. No ash or charcoal was found on the hearth-slab, and it appears to have been neatly cleared after it was last used. Beneath it, and extending for a short distance all around, the ground was burnt, indicating perhaps that the hearths for the earlier houses had been in a similar position.

Another feature possibly associated with the hearth was a roughly rectangular, vertical-sided, pit (0.8 m by 0.7 m and 0.4 m deep) situated to the S of the hearthstone (*illus* 4, no 56). Filled with dark material combined with charcoal, burnt stones and a small quantity of finely comminuted burnt bone, it may have been an oven or cooking-pit (half the contents were wet-sieved but no cereal or charred grains were recovered). The pit had been deliberately back-filled before the house was abandoned, and cannot be assigned with certainty to any of the three periods of construction.

The postholes

The multi-period construction evident in the wall of the house was mirrored in the interior by a complex sequence of post-pits, many of which had been recut on more than one occasion (the numbers used in the text and in *illus* 4 refer to post-pits rather than individual postholes or post-pipes). Analysis of the posthole pattern was further complicated because the original floor-levels and other archaeological features had been masked by differential leaching and by the development of multiple and localized iron-pan deposits. Thus, it was frequently not possible to

tell from what level a particular posthole had been cut or to what period it should be ascribed. It is likely, however, that the majority of the postholes were structural, and supported the main roof and a porch-like structure at the entrance.

The post-rings

With the exception of posthole no 59 all the posts in the interior of the house lay within a band about 1.7 m broad, leaving the central half of the interior unencumbered. Some 47 post-pits were excavated representing a minimum of 70 posts, most of which were large enough to have supported uprights for a ring-beam, although they need not necessarily all have done so. The postholes were not evenly distributed within the band, there being rather more on the SW than elsewhere, suggesting that in this area there were either additional structures or that for reasons of greater dampness (noted during excavation) these posts had to be replaced more frequently. In addition, on the NE half of the interior the posts appeared to be set in a radial pattern, which was not so apparent on the SW. Although it is not possible to disentangle the complete sequence of postholes, enough evidence survived to allow a partial, but somewhat tentative, analysis of the number of times the roof timbers were replaced and, secondly, the form of the post-ring.

Three of the radial settings of post-pits were sufficiently isolated and well-defined to allow a count to be made of the minimum number of posts erected on a particular radius. Thus in the radius comprising pits 12-13 and 14-15 there were a minimum of five posts respectively, while in pits 30-3 there were at least seven. The discrepancies between the numbers can readily be explained in terms of the failure to determine correctly the number of times a particular post-pit had been reused and in the probability that some posts may have been replaced individually. Taking the overall number of postholes into consideration, it is likely that the post-ring was totally replaced on at least four occasions, with individual posts substituted on a piecemeal basis (perhaps during rethatching).

Despite the large number of postholes and the relatively broad band that they occupy, there was no evidence to suggest that there was ever more than a single post-ring at any one time. Two series of postholes were identified which, with some degree of confidence, could be linked to form post-rings; one belonged to the earliest phase of the post sequence and the other to the latest. The earliest ring (illus 4 & 5a) consisted of 12 or possibly 14 posts (nos 12, 14, 16, ?19, 20, 24, 25, 30, 38, 43, 47, 51, ?57, 58) which lie somewhat eccentrically to the Period 1 stake-ring. On stratigraphical grounds at least one post (no 51) pre-dated the S internal slot and, as there was nothing to suggest a free-standing timber building, this group is probably contemporary with the stake-ring and belongs to Period 1.

In a later design the diameter of the post-ring was decreased from 6 m to about 4.5 m and the number of posts reduced to eight (illus 4 & 5c). The line of this ring remained in use for a considerable period of time with the posts being replaced on at least two occasions. Where it was possible to determine the sequence (at nos 26 & 45) the innermost post was the latest, giving possible rings comprising nos 13, 15, 21, 26, 31, 45, 52 and nos 13, 15, 22, 26, 32, 36, 45, 54. These uprights were the latest in the post-sequence and the latter group, at least, was probably contemporary with the Period 3 wall.

No other complete post-rings could be identified with certainty, but by a process of elimination a further possible ring of posts emerged. It is situated just within the line of the latest post-ring (illus 4 & 5b), comprising nos 17, 18; 27, 28, 29; 33; ?34; 42; 49; ?55; 56, and stratigraphically lies between the earliest and latest post-rings. Although they may represent an intermediate post-ring of six uprights (with an unidentified pair to be added at the entrance), it is not possible to be certain that they were either all contemporary or even part of a single structure.

The entrance

The entrance features lay outside the line of the Period 1 stake-ring and comprise 11 post-pits (nos 1–11; *illus 4*) representing at least 14 individual posts. As with the postholes in the interior, it was difficult to disentangle the complete sequence of events, but enough evidence survived to suggest an outline of the development of the entrance structures.

Throughout the numerous reconstructions of the house the form of the entrance remained essentially the same, consisting of one, or possibly more, opposed pairs of posts set within the entrance-passage and roughly aligned on the adjacent pair of uprights in the post-ring. Only the latest pair (nos 1 & 6) can definitely be associated, as their post-pipes were not covered by the final phase paving in the forecourt. They are 1.3 m apart and, like the majority of the earlier pairs, are set a short distance within the entrance-passage. Elsewhere nos 7, 8, 9 were sealed beneath the forecourt paving and they may either have been cut through or be contemporary with the earlier gravel surface. Posts 2 and 3 were also covered by the forecourt paving, and although part of pit no 5 was apparently overlain by the Period 1 wall-footing, the section through the double posthole it contained showed that the later of the two posts lay under the wall, and they may in fact both be later than the Period 1 wall.

Two groups of posts, however, can be identified, but their chronological relationships could not be demonstrated stratigraphically. Nos 2, 7, 8, 9 and part of no 1 make up one group, giving a narrow entrance only 0.7 m wide, the posts of which were replaced at least once and probably twice. The second group (nos 3, 4, 5; 10, 11) form roughly opposed pairs which are up to 1 m apart. While on stratigraphical grounds it would be possible for elements of both groups to be either contemporary, or earlier or later than each other, the most likely sequence is that the first group formed the entrance to the earliest house and that the second group belong to later periods.

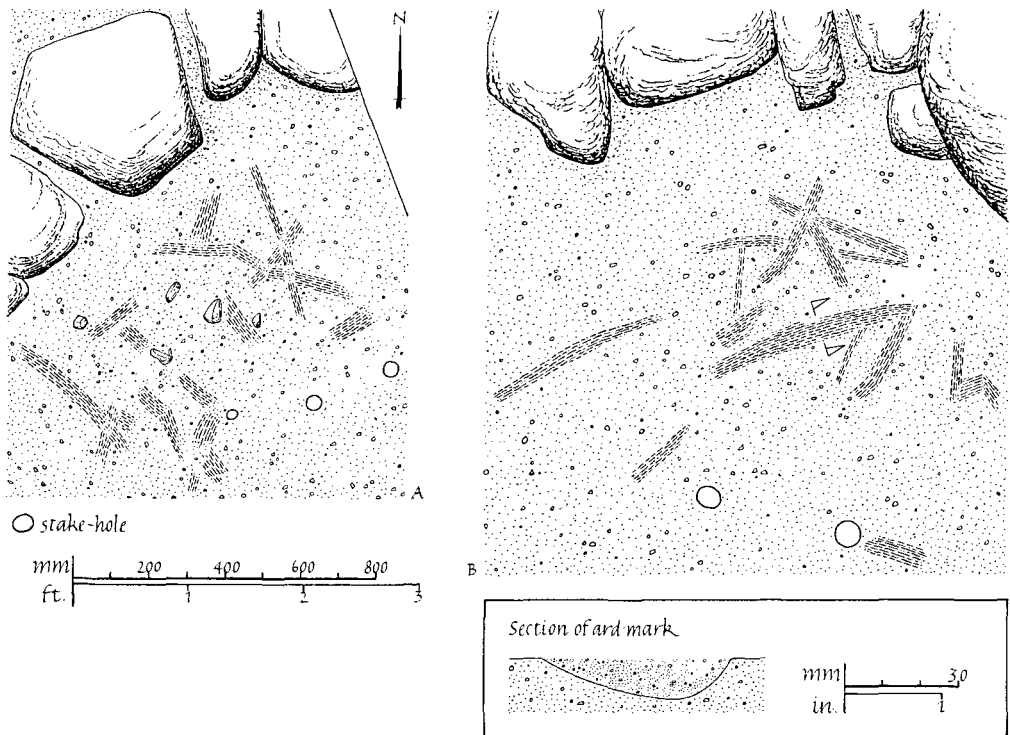
The stakeholes

At least 164 stakeholes (excluding those from the Period 1 stake-ring) were found in, or about, the house (*illus 4*). Most were circular on plan, although a small number were triangular; they ranged from 30 mm to 90 mm in diameter and had been driven up to 200 mm into the subsoil. It is unlikely that anything approaching the original number of stakes were located, as shallow-driven stakes, particularly those belonging to the final period of occupation, may not have been detected, and others will have been removed by later features.

In spite of the comparatively large number of stakeholes, little can be said of the structures that they represent. Although many probably held the uprights for internal wicker divisions, it is difficult to detect any patterns as regular as that seen in the Period 1 stake-ring. The distribution of stakeholes, however, is not even; there are marked gaps to the W of the hearth and around post-pits 38–44, which may in themselves define activity areas, the former being associated with the hearth and possible oven, and the latter with the concentration of non roof-supporting postholes. The functions of the numerous stakeholes under and close to the hearthstone are uncertain, but they may be associated with posthole 59 and connected with the construction or refurbishing of the roof, alternatively they could indicate that at one period the house was without a hearth and possibly used for some non-domestic function.

Ard-marks

When sections of the Period 1 wall were removed, two groups of ard-marks were identified in the surface of the underlying boulder-clay (*illus 5d*). The marks measured between 10 mm and 65 mm in breadth by up to 10 mm in depth (*illus 6*), and the broader and deeper marks were



ILLUS 6 Cùl a' Bhaile, Jura: ard-marks: plans and section (1:20 plan, 1:2 section)

asymmetrical in cross-section (illus 6c). At least five different directions of ploughing were observed in both the samples, but there was insufficient evidence to suggest whether cross-ploughing had been attempted or to indicate how many phases of ploughing had been involved. The soil lying between the boulder-clay and the old turf-line buried beneath the Period 1 wall was flecked with charcoal which may represent the remains of midden material that had been added to the tilth as manure (cf Shepherd & Tuckwell 1977).

There is no indication of the length of time separating the phase of ploughing from the construction of the house, and it is unlikely that the ploughing was a preliminary stage in the preparation of the site prior to the erection of the house. Evidence from the enclosure wall and the external soil/pollen sample shows that there were at least two phases of agricultural activity before the construction of the house; one probably preceded it by a considerable period, while the other may have occurred only a short time before it was built, but there was nothing to suggest to which, if either, of these phases the ard-marks should be ascribed.

THE STONE ASSEMBLAGES

Caroline R Wickham-Jones*

PART 1: THE FLAKED STONE

Raw material

The assemblage is composed predominantly of flint; of the 153 pieces only four are made of other stone, one being pitchstone and three quartz. The flint used was obtained from pebble sources

* Artefact Research Unit, National Museum of Antiquities of Scotland.

and is probably local. In many cases the material contains flaws and, where it remains, the cortex is generally smoothed and rounded, often exhibiting ring cracks and small flake scars. There are no complete, unused nodules in the collection, but an idea of the size of the material that was being worked may be gained from pieces such as no 5, a core made upon a rounded pebble. In this case an inherent flaw has caused the pebble to split, probably after its abandonment as a core. (For the possible sources of flint were Woodman 1978, 144–7 and Wickham-Jones & Collins, 1978, 9–11.)

The discussion that follows will deal only with the flint assemblage. The four items of other stone are all very small and detailed analysis is impossible. They are not represented among the retouched pieces of the collection and do not indicate a great reliance upon such stones. The pitchstone probably derives ultimately from Arran. Quartz is an ubiquitous stone and cannot be so finely placed. The actual mechanisms of their arrival cannot be traced and they must simply be regarded as an indication that the prehistoric inhabitants of Cùl a'Bhaile were prepared to obtain and use stones other than flint when necessary. Many of the pieces are burnt; these lie in a general scatter inside the house indicating the burning and subsequent dispersal of pieces discarded or moved too near a fire. There is no evidence in the distribution for the deliberate burning of flint, nor of its use in any function involving fire.

Technology

A. Primary knapping processes: the initial break-up of nodules

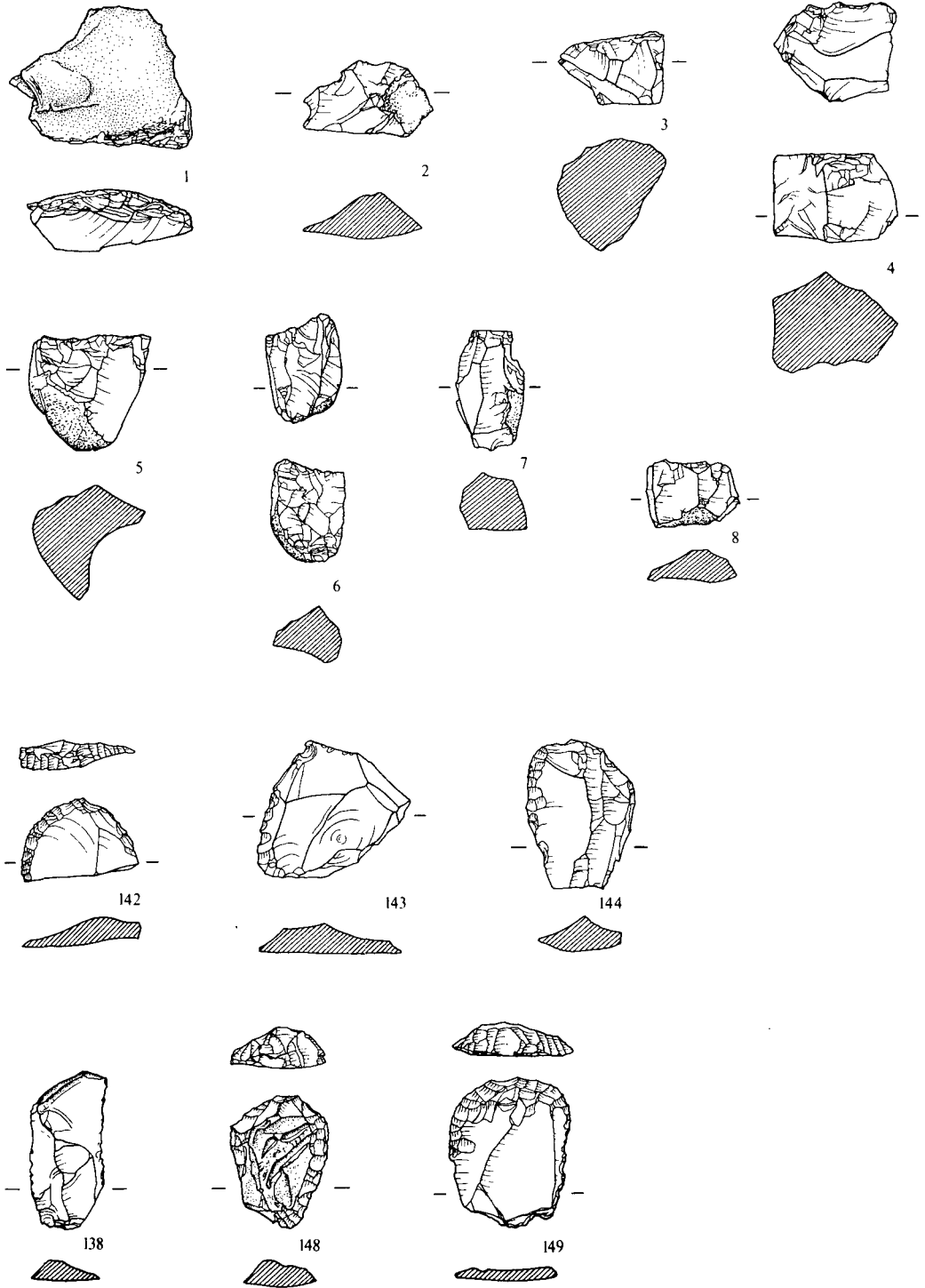
The collection contains much technological detail as both cores and other debris from the knapping process are present. The attributes of the flakes themselves (for example, platform type and the shape of the bulb of force) also provide evidence of the methods used. The raw material, small nodules with many internal flaws, is not of good quality and this may be reflected in the technology as specialized techniques are necessary in order to maximize the number of useful flakes produced from any nodule.

The seven cores are all made on pebble nodules. In some cases a flake has been removed to make an artificial platform and flakes struck from this around the core; in others they were detached in several directions all over the surface. The cores are small and, although some preserve cortical areas, each seems to have been exhausted. In one case, no 6, the platform has been worked away completely to produce a scalar core. On others, eg no 7, the angle at the platform edge is no longer efficient for the successful detachment of flakes. Ring cracks occurring on some platforms, eg on no 5, demonstrate the failure of the hammer in such an instance. The existence of four core-trimming flakes, nos 8–11, formed by the removal of projections on the core surface below the platform edge to rejuvenate that edge and facilitate the further removal of flakes, indicates one way in which the material, though poor, was worked to the greatest advantage.

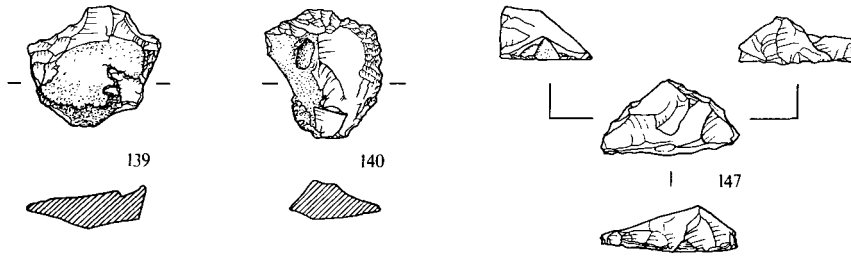
Another example of this economical use is in the existence of the bipolar technique and the often related method of indirect percussion with a punch. These give more control over the flaking process and are particularly suited to the working of small nodules leading, for example, to greater accuracy in the positioning, force and angle of the blow. Two cores, nos 6 and 7, exhibit the use of the bipolar technique whereby the piece is rested on an anvil whilst force is applied to the platform at the top. The resultant flake scars sometimes show signs of flake removal at both ends. Indirect percussion is often used to provide the force for bipolar flaking and may be inferred in this assemblage from the detachment features on some of the flakes, eg nos 74, 86, 95 and 105.

A high proportion of this assemblage (41½%) is made up of chips and chunks with no ventral surface or platform. This is largely because, as the raw flint contains flaws, it tends to split apparently at random when struck. It may also be, however, the result of post-depositional treatment, as flawed pieces were broken, either by burning, or as a result of incorporation into the house floor.

The flakes produced vary greatly in size and shape, with a tendency to be chunky and irregularly shaped. Where it has survived, the platform is always artificial and, in five cases (nos 74, 112, 126, 127 & 148) it has been prepared by the removal of small facets over the surface. As this gives greater purchase to the hammer and stabilizes the edge it helps to produce a more regularly shaped flake. It is possible from an examination and comparison of the detachment features on a group of flakes to suggest the type of hammer used to remove them. Only 27 of the flakes here, however, provide such evidence. Diffuse bulbs in combination with wide and lipped platforms indicate the probable use of a soft (maybe wooden) hammer, and occur on 13. The other 14 have pronounced bulbs which, together with attributes such as ripple marks, erraillure, and fissures, suggest the use of a hard (antler or stone) hammer. Three of the latter, nos 86, 74 and 95, and one other flake, no 105, have particularly narrow



ILLUS 7 Cùl a'Bhaile, Jura: flint (scale 1:2)



ILLUS 8 Cùl a'Bhaile, Jura: flint (scale 1:2)

platforms and signs of percussion damage at both dorsal and proximal ends; these indicate the use of a punch, probably of antler, and indirect, not direct, percussion.

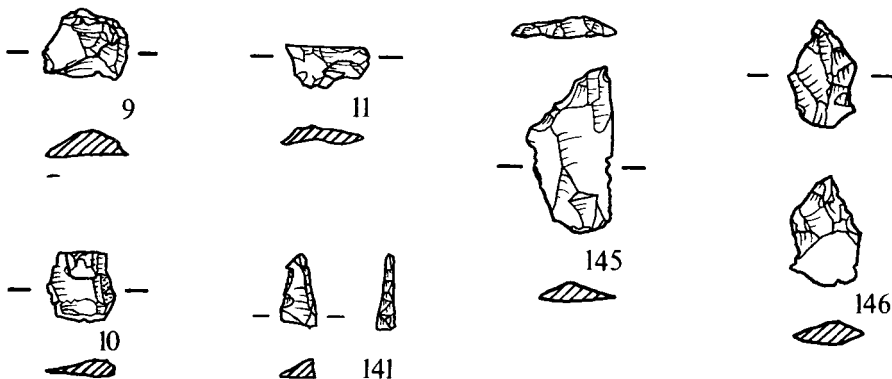
The large percentage of inner flakes compared to the secondary and primary flakes (68.8%, 26.6% and 4.6% respectively) reflects the success of these techniques of flake removal. Such a percentage is unusual for an assemblage based upon small nodules as from smaller nodules fewer inner flakes are easily available so that more secondary flakes would normally be expected. This may be accounted for here, to some extent, by the tiny size of many of the pieces recovered, a large number of which are *débitage* elements from the knapping process. However, taken with the evidence of the cores, etc, it indicates a high level of technical skill on the part of the knappers.

B. Secondary knapping processes: the modification of certain pieces

The poor quality of the raw material placed restrictions upon the selection of flakes for modification. Those chosen for retouching are, in some cases, as irregularly shaped as others discarded without further working. Regardless of colour, the quality of an individual piece was the deciding factor when a blank was selected.

The flakes were modified only by retouch; several different types were used, varying presumably with the demands of the task, as well as with the quality of the flint and skill of the knapper. In most cases the flake scars are shallow and irregular, although the existence of parallel retouch as on no 144 or no 149, and invasive surface retouch on no 146, indicates that, when necessary, more regular work could be produced.

One piece (no 138) has been assigned to the category of morphological tool, (see catalogue notes, fiche 3:A4) as it is a very regular, if somewhat chunky, flake, although there is no retouch. The other tools all bear retouch and a full description of each may be found in the catalogue. Three of them are broken, but from the complete ones it would seem that the retouch was not designed to make the tools represent common morphological types present upon other sites. The two scrapers (nos 148 & 149) and possibly the point (no 146) form exceptions to this, but otherwise the type of tool produced at



ILLUS 9 Cùl a'Bhaile, Jura: flint (scale: 1:1)

Cùl a'Bhaile would seem to have been dictated by the task in hand and the form and quality of the selected blank, rather than by any cultural or other preconceptions.

No functional information is intended by the definition of these morphological tools. In addition to retouched pieces, unretouched flakes make efficient functional tools and a comprehensive microscopic analysis is necessary in order to isolate this type of detail.

The morphology of the assemblage

The collection forms a working domestic assemblage defined by morphological attributes, and it cannot be used to provide culturally diagnostic comparisons with other sites. Here the final assemblage owes more to the local raw material and techniques of knapping than to any cultural preconceptions in the minds of its makers.

The distribution of the pieces

No discrete areas of knapping debris were found despite the fact that such debris is well represented in the collection. The cores are widely spread within the house and, if knapping took place inside, the piles of debris must have been scattered within a short time of their formation. The distribution of burnt pieces, which are widely dispersed rather than clustering around the hearth, lends support to this. However, it is also possible that knapping took place outside. In this case, the amorphous distribution of flint within the house could be an artificial distribution resulting from the bringing in of material to patch and stabilize the floor. Evidence for such patching was noted during excavation, and the almost complete absence of finds on the paved forecourt area is relevant, suggesting that it was, for instance, swept clean.

The sharp contrast between the distribution of the tools, both morphological and functional, and that of the other pieces is interesting. Unlike the rest of the assemblage, which was concentrated inside the house, the tools are more dispersed, being found both inside and outside the house, as well as within the core of its walls. While it seems likely that the main body of the assemblage may be deposited in secondary positions, many of the tools would seem to have been recovered from the primary contexts in which they were abandoned or lost.

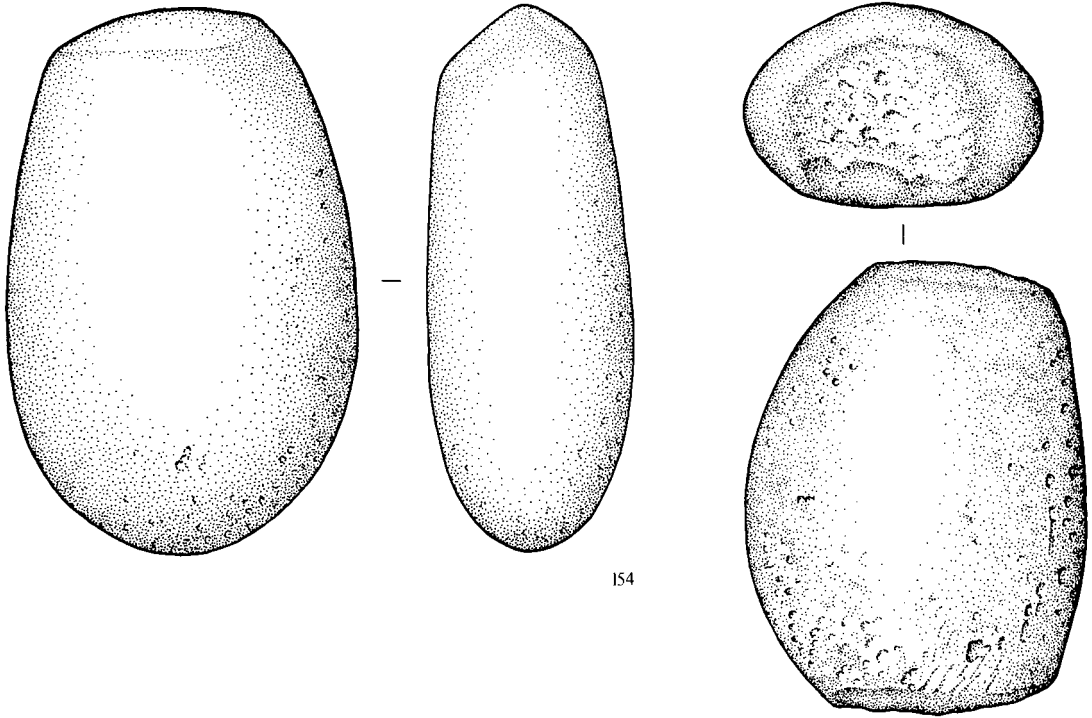
PART 2: NON-FLAKED STONE

There are four stone tools which have not been made by flaking; none of them is of flint. Two form the broken halves of one original piece. They are all formed on naturally rounded pebbles of coarse stone which could have been picked up in local gravels such as the beach or river deposits. They are of finer composition than the majority of local pebbles from which they were probably selected.

No 154 has a coarse edge formed by two pecked facets at one end. This would not have formed an efficient functional edge for tasks such as cutting. Indeed the absence of greater damage at this edge and on the end makes it likely that, unless the tool is in pristine condition, the facets and edge are the result of use and not intended for use. The weight and shape of the stone would, for example, make it an efficient hammer when held at such an angle as to produce the facets, although other functions could be suggested.

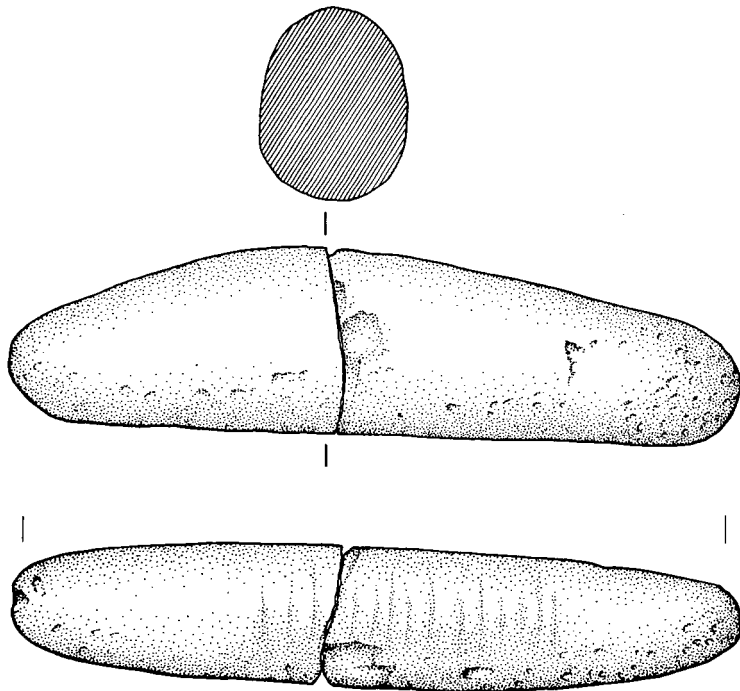
Both ends of no 155 have been flattened by coarse pecking, and there are no signs of use elsewhere on the tool except for a few rough flakes which have been removed around the edges of these flattened ends. This too would be consistent with a hammering function which flattened the ends and, when the stress became too great, caused the flakes to shear off.

The two broken pieces (nos 156 & 157) join together to form a long, slightly curved stone, rounded in cross section and with blunt ends. The concave face shows evidence of having been flattened and smoothed by cross rubbing, while both ends have been slightly damaged by pecking. Several functions may be advanced to explain this wear, but the stone is too coarse for a conclusive micro-analysis. It is possible that the piece has been used as a rubbing stone on a quern, although its shape would not produce a very efficient surface for this. Alternatively, the damage could have been made by the drawing of a metal blade across the surface in a sharpening process. Although no metal was found on the site, this does not preclude the presence of a crude whetstone. Another possible explanation would be the use of the stone to shape and polish bone artefacts. These two pieces were found at some distance from one another: the larger was in the forecourt, while the smaller was in the house wall material. The damage to the ends indicates that, probably after breakage, they were both used as hammerstones for lightweight tasks, and this may explain their separation.



154

155



157

156

ILLUS 10 Cùl a'Bhaile, Jura: worked stone (scale 1:2)

All of these pieces appear to have undergone some use as hammerstones, although for precisely what purposes cannot be determined. The smoother damage of no 154 would indicate a gentler use, despite its weight, than no 155 which, in addition to deeper, coarser damage, bears the scars of flakes removed during greater stress.

SUMMARY

The collection contains the evidence of both the making and using of stone tools on the site. It represents the general domestic assemblage of people with a sophisticated stone-working technology well suited to the local material which, although mainly flint, was not of good quality. There is no evidence of any access to a supply of better nodules to be used, for example, for selected tools. It would be quite possible to make all of the pieces from the local material. The consequence of this is that the retouched pieces are designed for local tasks rather than shaped by culturally diagnostic models. This limits the value of inter-site comparison on a cultural level.

The four non-flaked hammers may have been involved with the production of the flint tools but this cannot be demonstrated definitely and other functions are possible. The knowledge provided by the two stone assemblages demonstrates the variety of tasks performed by, and the importance of, stone to the community.

THE FINDS CATALOGUE

FLAKED STONE

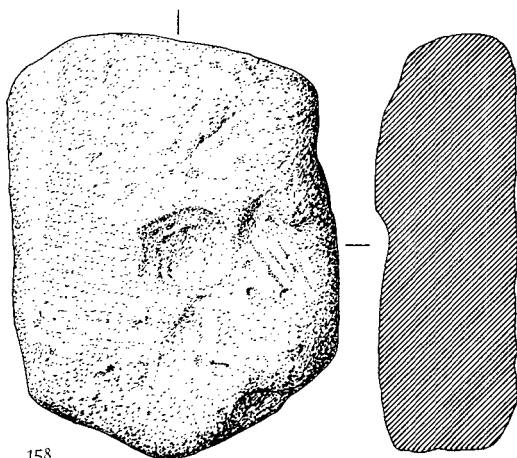
COARSE STONE TOOLS

Note

Catalogue entries nos 1–157 for flint, other stone and coarse stone tools are on fiche 3:A5–14. A report by R Bradley on the functional analysis of the majority of the stone objects is available in the National Monuments Record of Scotland.

WORKED STONE OBJECT

A quartzite slab, 0.23 m by 0.16 m and 0.06 m thick, bearing on its upper surface a cupmark-like artificial depression which measures 50 mm by 40 mm and 10 mm in depth (illus 11). Found cupmark side uppermost in the Period 2 forecourt paving. Function unknown, but may have been used as an anvil. A number of similar stones were found at the broadly contemporary unenclosed platform settlement at Green Knowe, Peebles (Jobey 1980, 89).



ILLUS 11 Cùl a'Bhaile, Jura: stone object (scale 1:4)

THE POTTERY

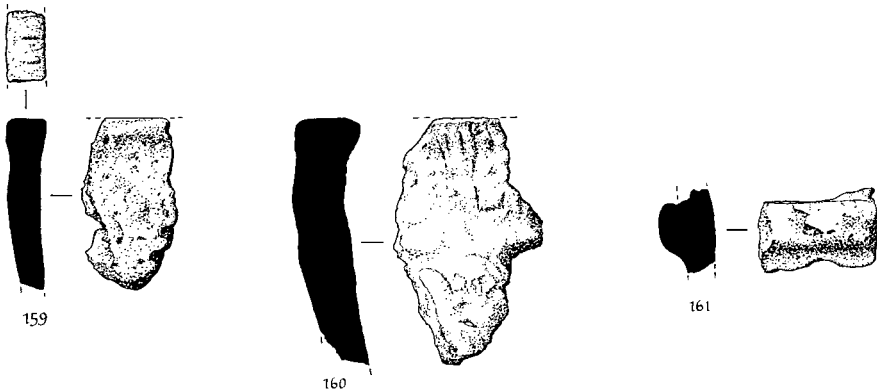
A small amount of fragmentary pottery was found during the excavation of the house, but only two vessels are probably represented. This apparent lack of pottery may either be a reflection of the generally clean nature of the interior of the house and the acidic soil conditions, or it may indicate that pottery played only a minor role in the economy of the settlement.

Of the two pots present, one (represented by a single fragment, no 159) is of relatively fine ware and was a comparatively small vessel. The other is considerably coarser and larger, and was probably a storage jar. The surviving portions of both pots are too small to allow reconstruction or close comparison with other vessels, but their general form and fabric types are not out of keeping with derived beaker/food vessels (no 159) and late urns (nos 160–211).

Catalogue

- 159 Rim fragment of a straight-sided ?jar. Fabric: buff-grey, 8 mm in average thickness, with small grits. Flat rim, with transverse impressed (?fingernail) decoration; slight pinching below rim (illus 12). *From upper fill of posthole no 58.*
- 160 Rim fragment of a coarse ?storage jar. Fabric orange-buff, 15 mm in average thickness, with large grits. Flat rim with simple inturned lip (illus 12). *From fill of external drainage gully, SW of entrance.*
- 161 Body fragment with applied cordon (illus 12). Fabric similar to no 160. *Found with no 160.*
- 162–210 Forty-eight undecorated body sherds found together with no 160. Some sherds have carbonized material on inner surface.
- 211 Body sherd from a coarse vessel similar to nos 160–210. From material immediately above Period 1 gravel surface at entrance, but may well be from same vessel as no 160–210.

All the small finds have been deposited in the National Museum of Antiquities of Scotland, Queen Street, Edinburgh.



ILLUS 12 Cùl a'Bhaile, Jura: pottery (scale 1:2)

CHARCOAL AND RADIOCARBON SAMPLES

Charcoal samples were taken from the house wherever suitable deposits were found; these were located in internal features, the external drainage gully, and from the cores of the Period 2 and 3 walls. Thus much, if not all, of the charcoal came from redeposited material, most of which was probably derived either from an external midden or from scraped-up floor deposits (see illus 13).

The charcoal samples were examined by Mrs C A Dickson, Department of Botany, University of Glasgow, and a summary of her report appears below. After identification, four samples were submitted to Dr M J Stenhouse, Chemistry Department, University of Glasgow, for radiocarbon dating, and the results are given overleaf.

CHARCOAL IDENTIFICATION

Camilla A Dickson*

- 1 Post-pit 32
Alnus (alder) c 6.2 g
 - 2 Post-pit 35
Alnus (alder) c 13.2 g
 - 3 Post-pit 39
Betula (birch) c 53.8 g
Quercus (oak) c 21.6 g
Unidentified small fragments c 40.3 g
 - 4 Period 2 wall-core
 - (a) *Alnus* (alder) c 15.0 g
Corylus (hazel) c 1.7 g
Unidentified small fragments c 3.1 g
 - (b) *Alnus* (alder) c 25.2 g
Corylus (hazel) c 21.6 g
Salix (willow) c 1.7 g
Unidentified small fragments c 32.9 g
 - 5 Period 3 wall-core SW of entrance
Alnus (alder) c 19.8 g
Betula (birch) c 10.0 g
Corylus (hazel) c 9.7 g
Unidentified small fragments c 23.0 g
 - 6 Period 3 wall-core NE of entrance
Alnus (alder) c 19.8 g
Salix (willow) c 0.8 g
 - 7 External gully NE of entrance
 - (a) *Alnus* (alder) c 85.8 g
Corylus (hazel) c 11.4 g
Salix (willow) c 6.4 g
Unidentified small fragments c 160 g
 - (b) *Alnus* (alder) c 4.2 g
Corylus (hazel) c 31.3 g
Unidentified small fragments c 7.9 g
 - (c) *Alnus* (alder) c 9.7 g
 - 8 External gully SW of entrance
Alnus (alder) c 3.7 g
Corylus (hazel) c 0.3 g
Salix (willow) c 0.07 g
Unidentified small fragments c 4.4 g
 - 9 Internal slot
Alnus (alder) c 12.0 g
Betula (birch) c 5.1 g
Unidentified small fragments c 11.7 g
- Weight is of damp charcoal including soil.

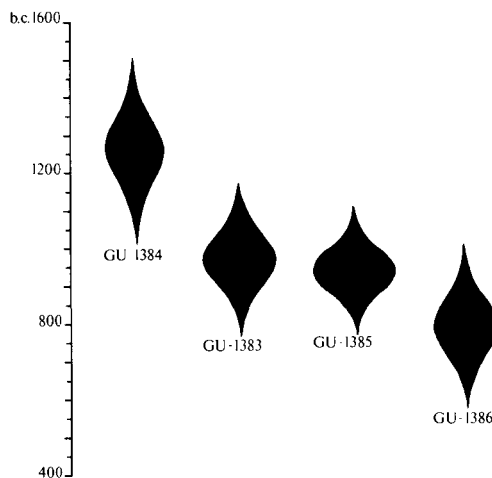
RADIOCARBON SAMPLES

M J Stenhouse†

- GU-1383 *Alnus* charcoal from sample 7a, 2920±65
 $\delta^{13}\text{C}$: -27.0‰
- GU-1384 *Alnus* charcoal from sample 9, 3214±80
 $\delta^{13}\text{C}$: -26.5‰

* Department of Botany, University of Glasgow

† Department of Chemistry, University of Glasgow



ILLUS 13 Cùl a'Bhaile, Jura: radiocarbon diagram

GU-1385 *Alnus* and *Corylus* charcoal from sample 4, 2890 ± 55
 $\delta^{13}\text{C}: -26.8\%$

GU-1386 *Alnus* charcoal from sample 6, 2745 ± 70
 $\delta^{13}\text{C}: -26.7\%$

The above C14 dates are quoted in conventional years bp and are uncalibrated with respect to dendrochronological age. Errors are expressed at the \pm one sigma level of confidence.

REPORT ON THE POLLEN ANALYSES

G Whittington*

During the excavations at Cùl a'Bhaile material was collected from a variety of points within the excavation zones and in the immediate vicinity. The results of the analysis of this material are given in two parts: the first provides an attempt to assess the environmental conditions and the exploration of the environment during the occupation of the site; the second deals with those samples taken from within the house or from parts of its structure.

ENVIRONMENTAL CONDITIONS AND LAND-USE

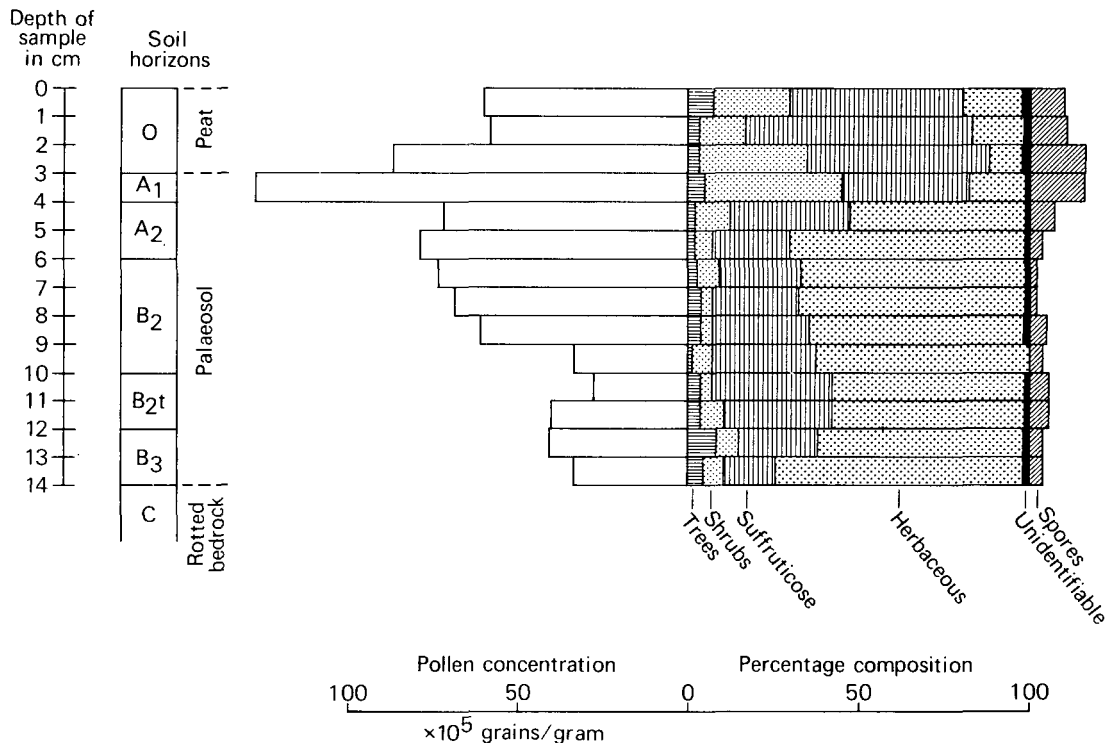
The site occupied by the house and its enclosure is at present covered with a blanket peat of differing depths due both to cutting and to varying ground configuration. In general, the ground slopes south-eastwards away from the house, so peat depth and wetness increase in that direction as well. Underlying the blanket peat there is a palaeosol which seemed to provide the best chance of establishing environmental conditions, not only during the period of existence of the house but probably both before and after. The suggestion that prehistoric exploitation of land could cause degradation of soils (Dimbleby 1962) further encouraged the idea that the demise of the house and the peat growth might not be unconnected.

The palaeosol was sampled by means of monoliths taken at many points over the site both inside and outside the enclosure, and evidence from three of these will be presented here. Each monolith was sampled at either one or one-half centimetre intervals and each sample was subjected to both physical and pollen analysis. The physical nature of the soil was examined by first burning off the organic material so as to evaluate organic content, and the remaining material was then examined to establish its constituent particle size by means of a Coulter Counter. A gramme of material was prepared for

* Department of Geography, University of St Andrews

pollen analysis and from the ensuing preparation pollen grains were counted until a total of 100 introduced *Lycopodium* spores had been achieved for every level.

One monolith taken from a point a short distance SE of the enclosure wall, and below one of the wetter parts of the area, can be used to show what has been revealed as the typical soil structure and pollen spectrum of the palaeosol over a wide zone at Cùl a'Bhaile. Beneath the lowest three centimetres of peat (its pollen content being dominated by *Calluna* (ling), *Potentilla* (probably common tormentil), *Alnus* (alder), *Betula* (birch) and *Sphagnum*) lies a podsol with well-developed A₁, A₂, B₂, B_{2t} and B₃ horizons above a zone of rotted bedrock; its total depth is 11 cm down to the C horizon (illus 14). Also shown in illus 14 is the composite pollen spectrum for each one centimetre slice of the palaeosol, in both relative and concentration terms. In general, pollen concentrations fall from top to bottom of the soil but three concentration peaks of varying strengths can be distinguished. By far the highest concentration is in the A₁ horizon (illus 15) where increasingly wet conditions are marked, even before the true peat has formed, by striking increases in *Alnus*, *Betula*, *Corylus* (hazel), *Sphagnum*, *Calluna*, *Potentilla* and *Pteridium aquilinum* (bracken). The rise in *Corylus* and *Betula* would seem to signify the absence of man in the area for such species are unlikely to colonize successfully where humans and grazing animals are present. A second pollen concentration peak occurs between 5 cm and 6 cm, and this marks a flora dominated by Gramineae (grass) but in which *Alnus*, *Plantago* (plantains), Cruciferae and *Succisa pratensis* (devil's bit scabious) are well represented. This occurs immediately above a peak in the concentration of clay in the soil which probably prevented any further downward movement of pollen; indeed pollen concentration below this is at its lowest in the whole profile (9–11 cm). A third pollen concentration peak (11–13 cm) occurs in and below the lower part of a further clay concentration peak and the dominant species of the previous peak are repeated. Throughout the profile Gramineae is dominant. Other notable features are the strong presence of *Polypodium* (polypody fern) spores throughout the profile and the sudden rise of *Quercus* (oak) pollen in the A₁ horizon. A major aspect revealed by the pollen spectrum of this palaeosol is the fact that



ILLUS 14 Cùl a'Bhaile, Jura: soil profile from monolith taken from outside the enclosure

Jura, locally without any doubt but probably on a wider scale, was virtually treeless during the entire period represented by the palaeosol. Only *Alnus* is continuously and well represented. This species is still present today, occurring along with *Salix* (willow), *Corylus* and *Sorbus aucuparia* (rowan) on the degraded cliff lines of the lower eastern raised beaches.

Of great interest to the early agricultural history of the area is the strong representation of cereals at the base of the palaeosols (illus 15). Thus the development of arable agriculture in this area is of considerable antiquity for the movement of cereal pollen down through the palaeosol profile must obviously pre-date the development of the B_{2t} horizon with its concentration of downward translocated clay. After that period a grassland seems to have been dominant, for not only does cereal pollen not recur above 8 cm, but *Artemisia vulgaris* (mugwort) pollen also disappears at that level.

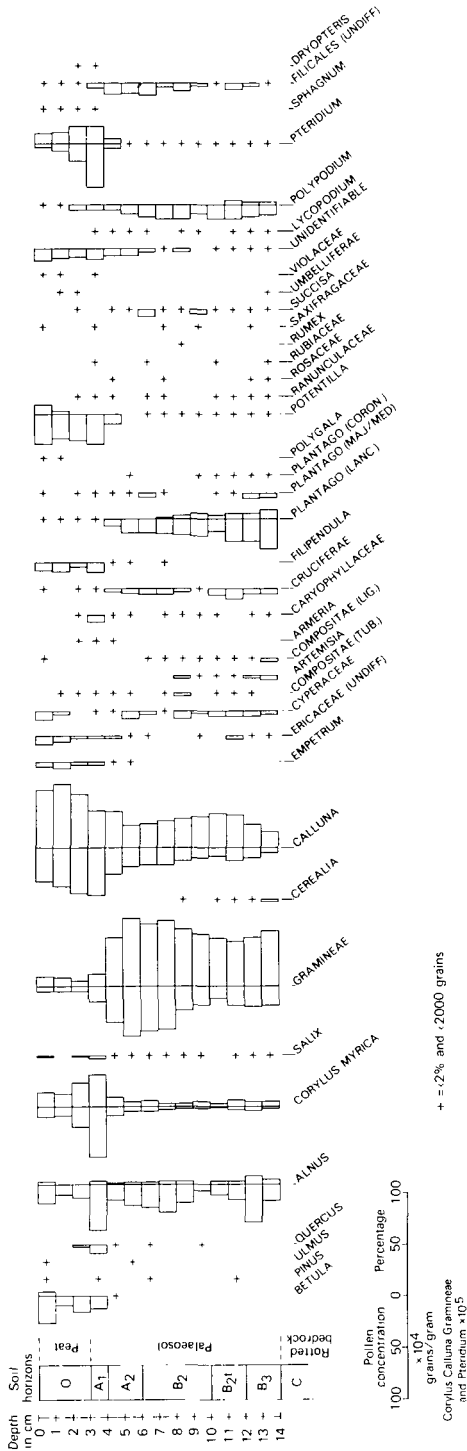
It is conceivable therefore that the area outside the enclosure witnessed an early development and sustained arable agriculture. This was succeeded by pastoral phases which may have been of varying intensities and durations. These in turn came to a halt with the onset of wetter conditions which led to the recolonization of trees and shrubs, the development of a wet *Calluna* moorland, and the eventual growth of blanket peat – a development which continues to the present day.

Within the enclosure the palaeosols are of differing depths due to variable thicknesses of glacial till; localized changes in the bedrock; and location with regard to the variable angle of slope within the enclosure. All, however, share one feature in common – their profiles show little or nothing of pedogenetic processes, being dominated by the effects of hillwash of an extreme nature. One such profile reveals in its 19 cm extent evidence of three distinct and deep hillwashes which must have been the result of severe sheet erosion. The significance of this will be examined later but it is now necessary to turn to a different area of true palaeosol survival.

Excavation undertaken to examine the nature of the enclosure wall at Cutting B (illus 2 B) revealed that it stood on an old land surface above which there was a considerable accumulation of material, having the appearance of another palaeosol (illus 3). It in turn was capped by the growth of regional blanket peat. Monoliths were therefore taken of the whole series of materials. Up to the base of the peat were 16 cm of mineral material and these were sampled at half centimetre intervals and subjected to physical and pollen analyses. The basal 9.5 cm resolved themselves into a podsol with clearly defined A₀, A₁, A₂, B_{2h}, B₂, B_{2t}, B₃ and C horizons. Above the A₀ horizon of this podsol were a further 6.5 cm of mineral-containing material. The origin of this lies in the erosion of the soils in the enclosure to which reference has already been made. The lowest centimetre of this material reveals clearly its origin as having been the result of a massive and probably single hillwash. Between 5.5 cm and 6.5 cm all sizes of mineral particles, from silt right through to gravel, show a rise which is a feature inconsistent with podsol pedogenesis. Above 5.5 cm such processes have clearly occurred, leaving defined A₀, A₁, A₂, B₂ and transitional B₃ horizons (illus 16). Thus the mineral material near the enclosure wall is invaluable as a source for revealing the environmental and land-use events that occurred within the enclosure. The lowest section (6.5 cm downwards) is a podsolized palaeosol which is the enclosure counterpart of the one already described for the extra-enclosure area. Unlike the palaeosol which was buried under blanket peat, the one in the enclosure was overlaid by a massive hillwash before it too, along with the enclosure wall, was overwhelmed by that growth.

Having established something of the nature of the soils in the enclosure it now remains to examine them for evidence of use by the people who once occupied this site. It is here that the benefits of pollen analysis at close intervals in palaeosols become evident. To maintain chronological development, however, an examination will first be made of the basal palaeosol. Generally speaking the pollen concentrations drop from the top of the profile to the base (illus 16). The pollen spectrum is, like the one established for the extramural palaeosol, dominated at all levels by Gramineae. There are, however, many individual features in the pollen spectrum (illus 17) which are of considerable importance as they are clear indicators of human activity.

Attention might be given first to the peak pollen concentrations which occur. The lowest is found at a depth of 14 cm just above the B_{2t} soil horizon. The main characteristic of such a soil horizon is the concentration there of downwashed clay particles which form a compact and relatively impermeable layer. Accompanying the movement of the clays would have been pollen grains and spores but their movement would have been at differing rates depending upon their size; if they were large then they would have moved slowly and by the time they reached the B_{2t} horizon they would have found it impossible to penetrate. It is interesting to note, therefore, that the lowest 'pollen' concentration peak not only occurs above the B_{2t} horizon but consists very largely of the spores of *Lycopodium clavatum*



ILLUS 15 Cùl a'Bhaile, Jura: pollen diagram from monolith taken from outside the enclosure

(common club moss) and *Pteridium aquilinum*. Both of these spores are large and, unlike those of *Polypodium* which are also large, they are confined in their major concentrations to the zone above the B_{2t} horizon. Here also the value of having the pollen analysis of the palaeosols outside the enclosure (illus 15) is evident. It is quite usual to find a concentration of spores, especially of *Polypodium*, at the base of palaeosols; they are among the most resistant of all spores and pollens to bacterial and mechanical damage and thus survive very well. An examination of the pollen found at depth over the whole site reveals large concentrations of *Polypodium* spores. Nowhere outside the enclosure, however, are such concentrations or even occurrences of *Lycopodium* and *Pteridium* to be found. In the case of the former plant it is not surprising because it is an upland inhabitant, probably being found at this period on the Paps of Jura. The existence of these spores in the enclosure cannot be explained by their characteristic longevity in soils or as a result of the usual basal concentration of spores. *Pteridium* has caused similar problems on other sites (eg Dimpleby & Evans 1974). Both *Pteridium* and *Lycopodium* would make ideal bedding for animals; the probability that it was also used by humans here has to be discounted as no evidence of its employment in the house was found. After use, the resultant litter appears to have been spread over the site, being used as a manure. It is a practice, however, which seems to have been abandoned at an early stage, either due to changes in animal husbandry or to a shift in land management.

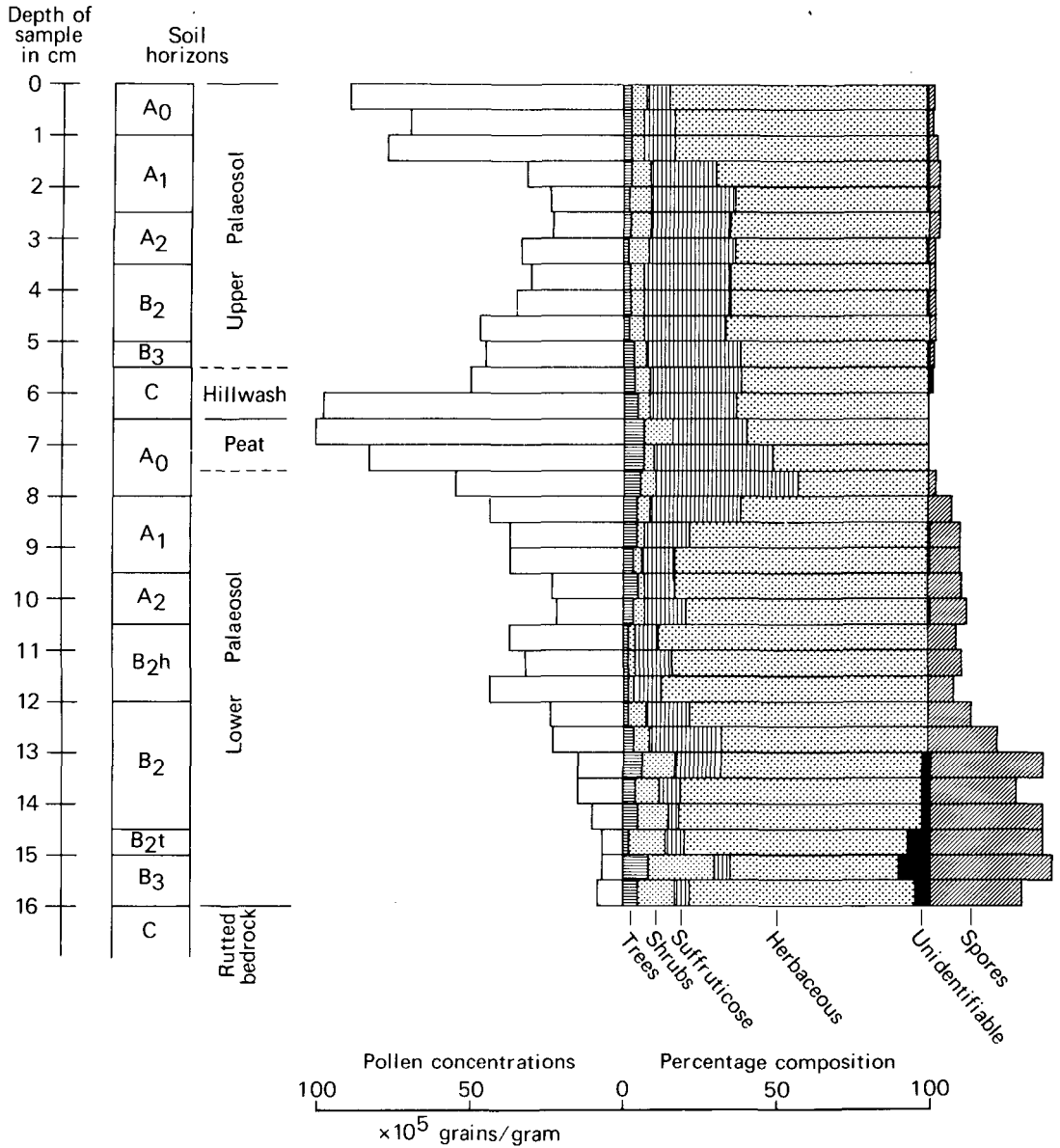
A second pollen concentration peak occurs between 10.5 cm and 12 cm where there is a strong presence of pollen grains from Gramineae, *Plantago lanceolata* (ribwort plantain), *Succisa pratensis* and *Ranunculus acris* (buttercup). Such a concentration peak suggests a long period during which the enclosure supported a meadowland flora. The same kind of flora, although with a lower concentration of pollen, also occurs between 8.5 cm and 9 cm.

The strongest pollen concentration is found from the top of the A₀ horizon into the upper part of the A₁ horizon. This is coincident with a massive rise in the organic content of the soil; it reaches 65%. Here there is a pollen assemblage which has not been met before in this palaeosol. There are strong rises in the concentrations of the pollen of trees, *Betula* and *Alnus*, of the shrub *Corylus*, of *Calluna* and *Potentilla*, of Gramineae, Cyperaceae (sedges), *Succisa pratensis* and Sphagnum. The very high organic content and the flora indicate that soil processes had now progressed to the stage of peat formation. Such conditions, probably associated with climatic deterioration, suggest that man would find the site now untenable for anything more than extensive pastoralism and even that seems unlikely to have taken place, otherwise recolonization of the area by trees and shrubs would have occurred and been maintained.

A further important feature revealed by the pollen spectrum of the lower palaeosol is the existence of an unbroken occurrence of cereal pollen from its base to the top of the A₁ horizon. For such pollen to have permeated the whole of the palaeosol must mean a long and probably also a continuous practice of arable farming. It was noted earlier that the B_{2t} horizon had inhibited the downward movement of the large spores of *Lycopodium* and *Pteridium*. Cereal pollen grains are also large and yet they are to be found right down to the base of the palaeosol. There is clear evidence for the use of an ard on the site and its stirring of the soil may well have induced deep penetration of the cereal pollen, but the clear banding of the soil pedogenetic horizons and the concomitant pollen concentrations indicate that soil-forming factors have overridden cultivation disturbance. For a podsol to have reached the stage shown by the lower palaeosol would probably demand at least 100 years of development and thus a period of arable cultivation of at least that duration must have occurred. The proximity of cereal pollen to the soil surface also suggests that arable farming must have taken place right up to the time at which the area became too wet for it to continue.

The upper, partially developed palaeosol near the enclosure wall also contains evidence of the use of the site subsequent to the cessation of cereal growing. First of all it is necessary to draw attention to the different nature of the peat zone that underlies this soil and the peat that caps the palaeosol outside the enclosure. The former is dominated by pollen of plants from a wet grassland in which shrubs and trees occurred. The latter is dominated by pollen from suffruticose plants, especially *Calluna*, while Gramineae pollen only occurs at comparatively low levels. There are two possible explanations for this difference: either that the low-lying, more level nature of the area outside the enclosure encouraged the growth of heather moorland rather than a wet grassland or, and perhaps more likely, that the occupants of the house indulged in peat cutting in the extra-enclosure area so that there is a hiatus in the peat profile with the lowest levels missing.

As has been stated earlier, the material comprising the upper podsol in the enclosure is derived



ILLUS 16 Cùl a' Bhaile, Jura: soil profile from section through enclosure wall

from a massive hillwash. How did this come about? The evidence seems to suggest that the house was built during the reoccupation of the site after a first growth of peat. As part of this new settlement the enclosure wall was built. The new occupants were arable farmers growing both wheat and barley, and ploughing in the interior of the enclosure in preparation for these crops led to severe erosion. It is interesting to note that the material at the base of the upper podsol contains over 10% of organic material which is surprisingly high for a level which has not undergone pedogenesis; furthermore it contains pollen of species which are represented in the A₀ horizon of the lower podsol. This suggests that the thin peat layer over the lower podsol was broken up and incorporated into the mineral zone by

ploughing and that subsequently much of it was removed downslope under the influence of heavy rainfall.

The origin of the upper podsol as hillwash makes the interpretation of its pollen spectrum more difficult as that material must contain pollen from two quite different episodes of the site's occupation. However, the fact that pedogenesis has affected the hillwash material down to a depth of 5.5 cm shows that a period of up to 60 or 70 years must have elapsed before the regrowth of peat ended such activity. During that time plant growth in the area would have produced pollen and this would have become incorporated into the soil by the pedogenetic processes. Thus pollen derived from the earlier period would have been swamped by more pollen acquired after the hillwash had ceased.

The upper podsol is dominated by Gramineae and again cereal pollen is present throughout the profile, making a strong appearance in the A₁, A₂, and B₂ horizons along with such cultivation ruderals as *Artemisia*, *Centaurea cyanus* (cornflower), Caryophyllaceae, Compositae and Chenopodiaceae. The presence of these pollen types and the evidence for several episodes of severe hillwash in the soils of the enclosure indicate that the dwellers in the house were involved in arable agriculture but under more difficult conditions than those their predecessors had known. If the ard was still being used, and there is no direct evidence for that, its head at least must have needed frequent replacement for the soils of the enclosure are exceedingly stony and contain throughout their depth pieces freed from the rotting bedrock. The recurrence of arable agriculture on the site must indicate a period of more clement weather, perhaps of more sunshine, than had occurred during the growth of the first peat layer. The cultivators, judging from the state of the enclosure soils, must have been fighting a losing battle with the increased wetness and stormy nature of the rainfall. Their own cultivation activities allied to the deterioration of the climate must have made the growing of crops exceedingly difficult. It is no surprise to find that the A₀ horizon of this upper palaeosol shows a re-establishment of the flora of the lower peat.

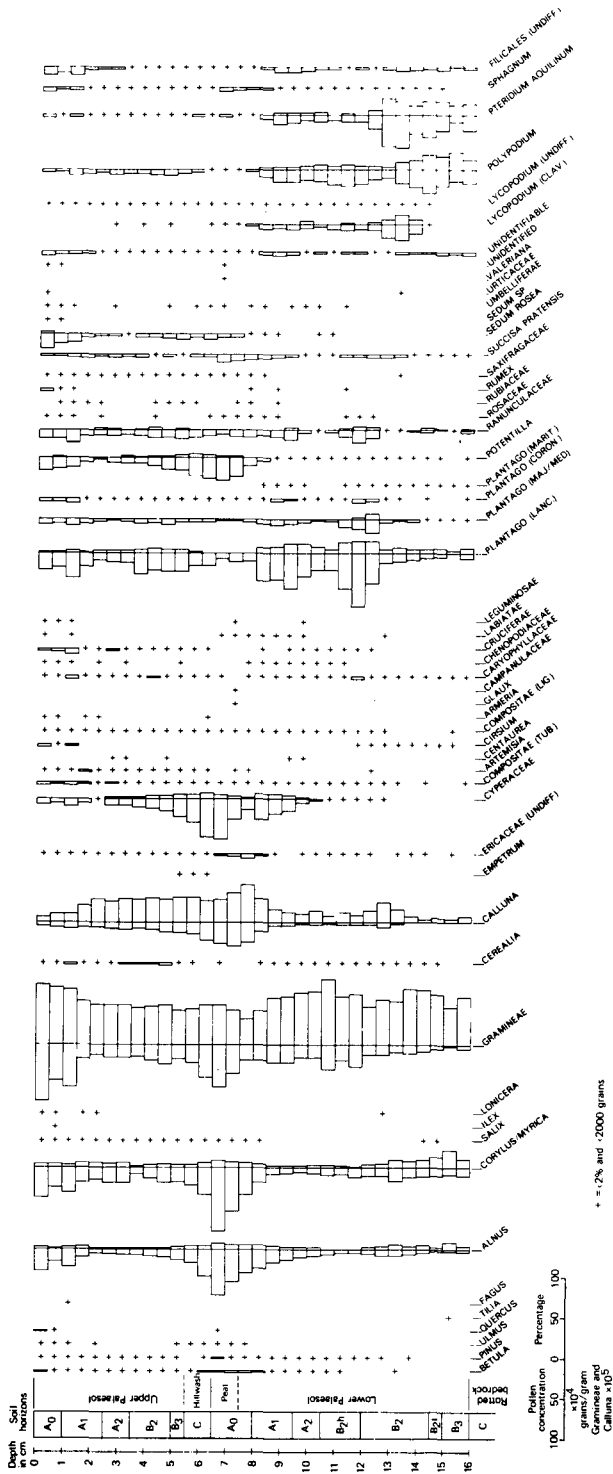
An interesting feature of the pollen spectrum of the upper palaeosol is the inclusion of significant quantities of the pollen of *Sedum rosea* (roseroot). The building of the enclosure wall would have provided a suitable habitat for its expansion until the growth of blanket peat overwhelmed that construction.

The examination of the physical nature and pollen content of the palaeosols, together with the evidence from analyses around the house, make the following sequence of events most likely to have occurred on the site.

- 1 Occupation of a treeless grassland by agriculturalists, creating clearance cairns and using the ard. The people were both pastoralists and cultivators of grain, growing wheat and barley. The area involved in the cultivation appears to have been extensive and the agricultural occupation lasted at the very least throughout the time needed for the development of a full podsol profile. The agriculture on the upper slopes involved the integration, at least in the early stages, of pastoral and arable activities in that manuring with discarded cattle litter was practised. The upper parts of the slopes also seem to have been intensively and perhaps continuously cultivated, whereas the lower slopes were eventually given over to purely pastoral uses.
- 2 As a result of a greater rainfall total the site became untenable and a layer of peat formed accompanied by a recolonization by arboreal and shrub species.
- 3 During an amelioration of the climate the site was cleared of trees and shrubs and reoccupation took place. At this time both the house and the enclosure wall were constructed.
- 4 Cultivation of the area inside the enclosure was resumed but was interfered with by massive hillside erosion accelerated by the agricultural activity. The area outside the enclosure may have been cut over for fuel and perhaps used for extensive pastoralism but arable agriculture did not occur there again.
- 5 Eventually the climate became wetter (stormier?) and perhaps less sunny with the result that blanket peat grew again and the site was abandoned.

ANALYSIS OF MATERIAL FROM THE HOUSE

The section (illus 4) through the wall at the rear of the house was examined for pollen and soil evidence. The samples were taken at levels where the absence of stone made that possible and in order to obtain material from each layer which appeared different in texture and colour. Eleven samples were obtained, the first being 22 cm below the top of the surviving wall and the lowest at 75 cm. The three lowest levels (ie below 55 cm), both in terms of pollen concentration and pollen types are entirely



ILLUS 17 Cùl a Bhaile, Jura: pollen diagram from section through enclosure wall

+ = .2% and .2000 grains

different from those sampled above them. Herbaceous pollen, particularly of *Gramineae* (grass) is dominant accompanied by large numbers of *Polypodium* (polypody fern) spores. The level at 65 cm also contains some pollen from suffruticose species (up to 30%) which was probably derived from the overlying wall material. The lowest part of the house wall thus accords in its pollen types and its low concentrations with those of the lowest levels of the lower palaeosol inside the enclosure.

The pollen in the wall down to 55 cm is entirely different from that to be found in the palaeosols either inside or outside the enclosure wall. It is dominated by that of suffruticose species (from just over 50% to over 87%), mainly *Calluna* (ling), with varying contributions from herbaceous and shrub species. It thus accords with the pollen spectrum found in the peat that lies above the palaeosol outside the enclosure. From the nature of the pollen spectrum in the samples from this part of the wall it would seem probable that the main construction materials, apart from the stones, were turves cut from a *Calluna*-dominated heath, and soil from the immediate vicinity of the house. The building of the house clearly was not the first activity on the site as the pollen in the wall contains such species as are commensurate with the occurrence of arable agriculture; not only are the ruderals well represented but cereal pollen also occurs. There is also a suggestion that the back wall may have been constructed in at least two different phases; its upper areas, from above 45 cm, representing either a rebuilding of the structure on the remains of a pre-existing house or perhaps a remodelling. Not only are pollen concentrations very much higher (reaching over two million grains as against just over one million for the lower layers¹) in the upper section, perhaps indicative of a shorter period available for pollen decay, but the spectrum, although still dominated by the pollen from suffruticose species, is of a much wider range. The indicators of arable agriculture are much more numerous including not only cereal pollen but also that of Cruciferae, Violaceae (violets), Urticaceae (nettles), *Artemisia vulgaris* (mugwort) and at least three species of Plantaginaceae (plantain), ie *lanceolata* (ribwort), *major* or *media* (great or hoary) and *coronopus* (buck's horn). At one level, 27 cm, what might have been repair work to the latest phase of wall construction seems to have occurred. There the pollen spectrum not only has its highest percentage of pollen from suffruticose species (over 87%) but that of *Vaccinium myrtillus* (whortleberry) reaches 45%, a total which is not only unprecedented in any samples taken from anywhere else on the site either inside or outside the enclosure but relating to a species which is virtually never encountered in them. It would seem therefore that a different period of construction or repair work is thus involved here using material from an extra-local and unusual source.

In 1979 three postholes (illus 4) were sampled (54, 38, 48) and one further in 1980 (37); this latter yielded material which was non-polleniferous. Postholes are difficult features to analyse in any meaningful way palynologically because the origin and date of any infilling are always problematic. Posthole 24 provided the best chance of examination as it was possible to take samples at three different levels. The lowest infill was polleniferous and contained a grass-dominated flora in which cereal pollen occurred along with that of *Artemisia vulgaris*. This material was overlain with non-polleniferous material which in turn was succeeded by another grass-dominated layer. The pollen evidence from this posthole must mean that before it was excavated arable agriculture had already taken place on the site. The non-polleniferous material presumably marks the accumulation of infill in the posthole subsequent to its occupation by a post. Its exposure over a long period would have ensured the non-survival of any pollen. The third sample from posthole 54 came from the top filling of the hole once the post had gone and can be compared with the samples from postholes 48 and 38 which came from a similar level. The abandonment of these two latter holes seems to stem from the same period in that the pollen spectrum of each has a markedly similar range of species, is dominated by the same species, Gramineae, and has similar concentrations of pollen (0.16). At this time cereals were also available on the site in that cereal pollen is found in each posthole filling. The top filling of posthole 54, although belonging to a time when arable agriculture was pursued, seems to have come from an earlier period because, like the earliest layers of the wall, the pollen spectrum from the infilling has virtually no suffruticose pollen whereas postholes 48 and 38 have over 25% of their pollen derived from such species. It thus appears that posthole 54 belongs to the earliest phase of house construction whereas postholes 38 and 48 belong to a later phase which most probably occurred after the initial growth of peat on the site because until that time pollen evidence from the palaeosols suggests that suffruticose plant growth in the vicinity was not sufficient to produce that quantity of pollen (illus 14 & 16).

The most outstanding feature of the pollen obtained from the samples at different levels in the stakeholes, discovered in 1980, was the consistently low concentrations that occurred (0.016 was the

greatest), among the very lowest from the whole site. The spectrum was dominated by Gramineae and *Polypodium*, a feature which belongs to the lowest levels of the palaeosols.

In 1980 material was taken from the floor of the house. Its pollen spectrum shows marked similarities to those of the topmost infill of the postholes 48 and 38. It is therefore possible that the infill was derived from wash from the floor once the posts had gone.

Two other features in the house were examined. Material was taken for analysis from around and beneath the hearthstone but all of it was found to be non-polleniferous. Infill material from the external drainage gully was also taken; the sampling was done at six different depths and the spectrum from each one was similar, being dominated by herbaceous pollen, especially that of Gramineae. Concentrations of pollen were around 0.014 so that both in pollen type and concentration the infill of the gully was similar to that occupying the stakeholes.

Two other samples were taken which seem to shed light on the construction method of the house. When the rear wall was dismantled material was taken from immediately under the lowest stone course; it was hoped that the stones would have been placed directly upon an existing topsoil so enabling pollen analysis to establish environmental conditions at the time when the house was first built. Surprisingly, however, the material yielded no pollen and its physical analysis showed it to have only a 3% organic content. Thus it seems that at the back of the house, before it was built, the soil was removed right down to the lowest part of the B₃ horizon. This is an area of naturally low organic content and low pollen concentration, and its exposure for any length of time would have ensured a further reduction in the pollen content.

Interestingly too in this same area the outline of ard marks was preserved. These, however, even in the deepest part of the surviving cross-section, only contained about 20mm of material above the undisturbed soil, thus suggesting that this area too had also been cleared of soil right down to the lower regions of the soil profile. Pollen concentration in the material from the base of the furrow was also low (0.02), but dominated by Gramineae and *Plantago lanceolata*. The stripping of the soil from this area is not surprising for its original sloping nature would have made house construction and occupation very difficult. That soil stripping occurred at the back of the house only is evidenced by pollen analysis of material from beneath the lowest layers of the SW (front) wall. This, unlike the material from a similar position at the back of the house, not only contained pollen, providing a similar spectrum to that in the base of the ard furrow, but also had a pollen concentration (0.16) similar to that found in the lowest layers of the back wall, which may well have been constructed from the soil removed from that part of the site.

Only one other sample of significance was taken from the house site. Revealed over much of the interior of the house at the time of initial excavation, and lying immediately below the blanket peat covering, was a grey material which must have come either from constructional work dating to the very end of the house's existence or belonging to its abandonment phase. The pollen spectrum revealed by analysis of this material was unlike anything else found on the house site. Pollen concentration was high (0.6) and the spectrum was dominated by shrub (43%) and suffruticose (37%) pollen. The only other material in the area which revealed a similar pollen spectrum was that of the A₀ horizon of the upper palaeosol from within the enclosure. This suggests therefore that the house was abandoned at the time of deteriorating climatic conditions while the absence of any other material between the grey layer and the peat makes it most probable that the house was deroofed rather than left to collapse and decay after its final evacuation.

CONCLUSION

The pollen evidence from the house and its site suggests the following sequence of events.

- 1 The site was originally part of an area occupied by meadowland with a flora dominated by Gramineae and in which *Plantago lanceolata*, *Polypodium* and *Succisa pratensis* (devil's bit scabious) were important constituents.
- 2 At some stage this land was ploughed with an ard and used for the cultivation of wheat and barley.
- 3 The whole site was abandoned and then at a later date reoccupied, with the house site being prepared for building by the localized levelling of the slope. A bank was built utilizing the

material from the lowest layers of the soil and upon this was raised the house walls. Turves containing high percentages of pollen from suffruticose species mixed with locally derived soil were the building materials. Such turves were not available locally until a late period in the occupation of the site and so building of the house would therefore have been one of the very latest in a chain of human activities on the site before the general and sustained growth of blanket peat.

- 4 The very different floristic elements contained in some postholes and in parts of the wall suggest remodelling and even rebuilding of the house along with some repair work.
- 5 The final abandonment of the house occurred at a time of increasingly wet conditions, and, as will be demonstrated, of severe soil erosion. The house appears to have been deliberately de-roofed before abandonment.

DISCUSSION

The excavation of the farmstead at Cùl a'Bhaile was begun at a time when no upland settlements of second or first millennium date were known in Argyll. Settlements comprising individual or groups of hut circles had been recorded by the Ordnance Survey on Skye and in mainland Inverness, and to the east upland settlements had been noted in Renfrew (Newall 1962) and on Arran, but a gap remained in Argyll. Since 1975, however, fieldwork and excavation by the Commission, the OS, the Central Excavation Unit (SDD), Edinburgh University and others have revealed a wide cross-section of unenclosed settlements which vary in date from the Neolithic to the mid first millennium AD, although the majority probably belongs to the second and first millennia BC.

Cùl a'Bhaile can be ascribed to the group variously referred to as hut-circle settlements, open settlements, or settlements and field systems, a plethora of names reflecting the complexity of monument types hiding behind these bland classifications. The recent surveys and excavations, combined with radiocarbon dating, have made it possible to study these monuments more closely and to place them in a wider context than before. Loosely-knit groups, or individual houses surrounded by enclosures and fields of the type found at Cùl a'Bhaile are a phenomenon of the second and first millennia BC throughout much of Britain from the south-west of England to Shetland, and individual structural characteristics, like pottery traits of the preceding centuries, can be paralleled over long distances. The overall similarities, however, should not distract attention from regional variations and the likely development of local types, giving rise to a considerable range in local building types through time and space.

The term hut circle is commonly used to describe the majority of Cùl a'Bhaile-type structures in order to differentiate them from all-timber round-houses, but in structural terms the two groups are both variants of the double-ring round-house tradition (Guilbert 1981). In all periods at Cùl a'Bhaile the post-ring supported a ring-beam which took the main thrust of the roof, leaving the earth/stone wall as an outer skin. The positioning of the post-ring close to the outer wall finds parallel in English and Welsh double-ring houses (Guilbert 1981, 312–13); the smaller number of posts in the later phases is not unusual and may simply reflect the reduction in the internal diameter of the house. Structural considerations such as this highlight the difficulties of accepting the putative innermost ring of posts as a post-ring which supported a ring-beam. Why the stone-walled double-ring round-house proved so popular in the uplands over such a long period is not clear but it may be a direct structural response to harsher climatic conditions or it might indicate a shortage of sufficient timber for the outer wall.

Not only does the hut circle as a type have a long chronological span, but individual houses

may also have had a long lifetime; if a continuous occupation is assumed at Cùl a'Bhaile, the house could have remained in use for at least 150 years and possibly longer. Evidence from other hut-circle excavations, Tormore, Arran (Barber 1982) and Kilphedir, Sutherland (Fairhurst & Taylor 1971) indicates that it may have been a common practice to refurbish hut circles, and thus what appears to the field-surveyor as a comparatively simple structure may have a complex constructional history. The presence of a medial wall-face in a hut circle at Kintour, Islay (RCAMS 1984, no 272), similar to that noted at Cùl a'Bhaile, suggests that on occasion it may be possible to identify multi-period construction from fieldwork evidence alone. At Cùl a'Bhaile the refurbishment of the house wall led to the doubling of the wall thickness, and considerable variations have been noted in the wall thicknesses of hut circles on Islay (RCAMS 1984, nos 237–81), Colonsay and Oronsay. In fact, few had walls as thin or as slight as that of Period 1, and it is probable that broad walls indicate a long period of occupation.

Only a handful of hut circles have been excavated in Scotland, but it is interesting to note that one of the houses from Tormore, Arran (Barber 1982, 359) shared many characteristics with Cùl a'Bhaile. Although the wall at Tormore was built in a slightly different technique, the inner face was lined by a wicker screen similar to that found at Cùl a'Bhaile, the only difference was that instead of being woven around a series of stakes, it was made in a series of panels supported on a number of posts. At this period such linings may have been a common feature in houses whether surrounded by a stone or timber outer wall and the examples on Jura and Arran can be compared with that at Holne Moor, Site F, Dartmoor (Fleming 1979). The closest parallel for the Period 2 internal slots also comes from the south-west of England, where they may be compared to similar features in the Period II house at Gwithian, Cornwall, site XV (Megaw 1976, 57, fig 4.4).

It was not possible to carry out excavation in the interior of the enclosure, and of necessity its function must remain largely unknown. Despite extensive probing no trace of a second stone-walled building was found, and it is probable that the hut circle was the only substantial building of the farmstead. Such an arrangement is in keeping with many other hut-circle settlements, but on Islay a small number of isolated houses are accompanied by ancillary huts (RCAMS 1984, nos 276, 277). The only evidence for activity in the interior came from one of the sections (B) across the enclosure wall (illus 2 & 3), where cereal pollen was found in deposits contemporary with the use of the enclosure, and thus suggests that cereals were actually being grown within the enclosure. The enclosure, however, is sufficiently large to have allowed a variety of activities to have taken place within it, and doubtless, it served as farmyard, storage area and garden plot.

It has already been noted that Cùl a'Bhaile probably lay on the fringes of the Bronze Age settlement at Knockrome, but there is no reason to believe that it differed in nature from those on lower ground to the S. The closely-related hut-circle settlements on Islay and Colonsay and Oronsay (RCAMS 1984, Introduction & nos 237–81) frequently appear to be agglomerations of individual units, comprising a house with its attendant enclosures and fields. At An Sithean, Islay (Barber & Brown, this volume) what seems to have been a particularly favourable area attracted a large number of units, while on less suitable ground only one or two households could be supported. With Cùl a'Bhaile lying on the upper edge of settlement, there is little wonder that it did not prosper and in the longer term failed altogether.

The excavation provided evidence to show that the construction of the house and enclosure wall had been preceded by ploughing and cereal production, although there is no proof that it is the same event at both sites. Nevertheless, agricultural activity, including cereal cultivation has been recorded at other Scottish sites from contexts that predate the construction of the visible

remains of the fields. At An Sìthean, Islay and Achnacree Moss, Argyll (Barrett *et al* 1976; Whittington 1983) pedological and palynological evidence showed that there had been major phases of activity prior to the erection of the field-banks, but as at Achnacree it is uncertain what length of time separates the two events. In any case, the intricacy of the agricultural history associated with these apparently simple archaeological monuments gives some idea of the complexity of the prehistoric settlement history in these areas.

NOTE

- 1 All pollen concentration figures are given as millions of grains per gramme of material.

ACKNOWLEDGEMENTS

The excavation was undertaken on behalf of the Royal Commission on the Ancient and Historical Monuments of Scotland, and this account is published by courtesy of the Commissioners. Permission to excavate was granted by Lord Astor, and I am grateful to Mr D Boyd, Tarbert Estate, and to Mr A Buie, Knockrome, for their co-operation during the excavation. I would like to thank all those who took part in the excavation: Mr J C Barrett, Dr M Baxter, Miss J Comrie, Miss H Coul, Miss M Ehrenberg, Mr P Hill, Mr and Mrs N J Kerr, Mr A Leith, Mr I Parker, Dr J N G Ritchie, Mr and Mrs J N Stevenson, and Dr G Whittington. Mr I G Scott, Mr J N Stevenson and Miss M O'Neil prepared the drawings for publication and Mr A MacLaren, Dr J N G Ritchie and Mr P Hill gave me valuable help and advice throughout the preparation of this paper.

Copyright The drawings are Crown Copyright: Royal Commission on Ancient Monuments, Scotland.

REFERENCES

- Barber, J 1982 'Arran', *Curr Archaeol*, 83 (1982), 358–62.
- Barber, J W & Brown, M M 1984 'An Sìthean, Islay', *Proc Soc Antiq Scot*, 114 (1984).
- Barrett, J C, Hill, P H & Stevenson, J B 1976 'Second Millennium BC Banks in the Black Moss of Achnacree; some Problems of Prehistoric Land-use', in Burgess, C & Miket, R (eds), *Settlement and Economy in the Third and Second Millennia BC*, Oxford, 283–8.
- Dimbleby, G W 1962 *The Development of British Heathlands and their Soils*, Oxford. (=Oxford Forestry Memoir, 23.)
- Dimbleby, G W & Evans, J G 1974 'Pollen and land-snail analyses of calcareous soils', *J Archaeol Sci*, 1 (1974), 117–33.
- Fairhurst, H & Taylor, D B 1971 'A Hut-circle Settlement at Kilphedir, Sutherland', *Proc Soc Antiq Scot*, 103 (1970–1), 65–99.
- Fleming, A 1979 'The Dartmoor Reave Project', *Curr Archaeol*, 67 (1979), 234–7.
- Guilbert, G 1981 'Double-ring round houses, probable and possible, in prehistoric Britain', *Proc Prehist Soc*, 47 (1981), 299–317.
- Jobey, G 1981 'Green Knowe unenclosed platform settlement and Harehope cairn, Peebleshire', *Proc Soc Antiq Scot*, 110 (1978–80), 72–113.
- Megaw, J V S 1976 'Gwithian, Cornwall: some notes on the evidence for Neolithic and Bronze Age settlement', in Burgess, C & Miket, R (eds), *Settlement and Economy in the Third and Second Millennia BC*, Oxford, 51–66.
- Newall, F 1962 'Early Open Settlement in Renfrewshire', *Proc Soc Antiq Scot*, 95 (1961–2), 159–70.
- Ritchie, J N G 1981 'Excavations at Machrins, Colonsay', *Proc Soc Antiq Scot*, 111 (1981), 263–81.
- Ritchie, J N G, Stevenson, J B & Welfare, H G 1980 'Recent Excavations in the Southern Inner Hebrides', *Northern Archaeol*, 1, 1 (1980), 25–7.

- Ritchie, J N G & Welfare, H G 1983 'Excavations at Ardnave, Islay', *Proc Soc Antiq Scot*, 113 (1983), 302-67.
- RCAMS 1984 Royal Commission on the Ancient and Historical Monuments of Scotland, *Inventory of Argyll*, vol 5 (*Islay, Jura, Colonsay and Oronsay*). Edinburgh.
- Shepherd, I A G & Tuckwell, A N 1977 'Traces of beaker-period cultivation at Rosinish Benbecula', *Proc Soc Antiq Scot*, 108 (1976-7), 114-23.
- Whittington, G 1983 'A Palynological Investigation of a Second Millennium BC Bank-system in the Black Moss of Achnacree', *J Archaeol Sci*, 10 (1983), 283-91.
- Wickham-Jones, C R & Collins, G 1978 'The Flint and Chert Sources of Northern Britain', *Proc Soc Antiq Scot*, 109 (1977-8), 7-21.
- Woodman, P C 1978 *The Mesolithic in Ireland*. Oxford. (= *Brit Archaeol Rep*, 58.)

This paper is published with the aid of a grant from the Scottish Office.